



Dairy Research Review™

Making Education Easy

Issue 4 – 2015

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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.

Welcome to the fourth issue of Dairy Research Review.

Selections in this issue include social variables in managing mastitis, factors affecting production in dairy cows, identifying dairy farms in the Netherlands with a high incidence of clinical mastitis, synchronized ovulation in dairy heifers, cephalixin for purulent vaginal discharge, dairy farmer compliance with animal welfare legislation, and evidence that UK dairy cows are at risk of chronic copper toxicity.

We hope that you find the selections in this issue of Dairy Research Review thought-provoking and helpful in your practice, and we look forward to receiving your feedback and comments.

Kind regards

Hamish Newton

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Herd management and social variables associated with bulk tank somatic cell count in dairy herds in the eastern United States

Authors: Schewe RL et al.

Summary: This investigation involved sending a survey to 1700 dairy farms in Michigan, Pennsylvania, and Florida to assess the adoption rate of mastitis control practices in US dairy herds, as well as assess social variables. The overall survey response rate was 41%. Herd size ranged from nine to 5800 cows. Self-reported 3-month geometric mean bulk milk somatic count (BMSCC) for all states was 194,000 cells/mL. According to multivariate analysis, proven mastitis control practices such as the use of internal teat sealants and blanket dry cow therapy (DCT), and not using water during udder preparation before milking, were associated with lower BMSCC. In addition, farmer and manager beliefs and attitudes, including the perception of mastitis problems and the threshold of concern if BMSCC is >300,000 cells/mL, were associated with BMSCC. Ensuring strict compliance with milking protocols, giving employees a financial or other penalty if BMSCC increased, and a perceived importance of reducing labour costs were negatively associated with BMSCC in farms that used non-family employees.

Comment: This survey looked at many factors that might have been associated with the BMSCC. Some findings were not at all surprising (use of blanket DCT and use of internal teat sealants) and some of the factors that might have been expected to be associated with BMSCC were not often due to interactions with other factors (e.g. sand bedding and what State the farm was from). What is interesting from a practitioner's point of view are some of the social factors associated with BMSCC. In this study, respondents who reported difficulty in following protocols had higher BMSCC. Similarly the "threshold for concern" when the BMSCC exceeds a value was higher for herds with a high BMSCC. This backed up earlier cited research that showed the sense that the farmer could control mastitis was associated with the BMSCC. These findings highlight the need to engage with a farmer and his/her staff and get everyone on board and understanding why mastitis and BMSCC is a problem.

Reference: *J Dairy Sci.* 2015;98(11):7650–5

[Abstract](#)

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Effects of precalving body condition score and prepartum feeding level on production, reproduction, and health parameters in pasture-based transition dairy cows

Authors: Roche JR et al.

Summary: In this study, 161 days before calving, 150 cows were randomised (2x3) to one of six treatment groups (n=25): two pre calving body condition score (BCS) categories (4.0 and 5.0; based on a 10-point scale: BCS4 and BCS5, respectively) and three levels of energy intake during the three weeks preceding calving (75, 100, and 125% of estimated requirements). Cows in the BCS4 and BCS5 groups were managed through late lactation to ensure that target calving BCS was achieved at dry off. Cows were then fed to maintain this BCS target until three weeks before the expected calving date, at which point they were managed within their allotted pre calving energy intake treatments. The results included pre calving BCS and pre calving feeding level having both independent and interdependent effects on production and health of transition dairy cows. Irrespective of pre calving BCS, a controlled restriction pre calving reduced the net release of non-esterified fatty acids (NEFA) from adipose tissue postpartum and increased plasma calcium concentrations. Fatter cows produced more milk but lost more BCS post calving and had higher blood β -hydroxybutyrate concentrations and greater hepatic lipidosis. After calving, indicators of reduced immune competence were heightened in BCS4 cows whose feed was restricted before calving.

Comment: This study examined the effect of restricted feed intake pre calving on cows of different BCS. Cows that were either BCS4 or BCS5 were fed at 75%, 100% or 125% of their estimated feed requirements for three weeks pre calving. Regardless of the BCS group, restriction of feed pre calve resulted in lower NEFA levels and higher calcium levels post calving. The BCS4 cows on a restricted diet pre calve had indicators of reduced immune competence. BCS4 cows on average had a post-partum anoestrus of 45 days compared with 35 days for BCS5 cows. The level of feeding pre calve did not affect milk production but BCS5 cows produced more milk than BCS4 cows. These results support the recommendation that cows should calve at BCS 5. If a cow is going to calve at BCS 5 restricted feeding pre-calving is likely to be beneficial. A cow that is going to calve at BCS 4 should probably be fed to her requirements in the 3 weeks pre-calving.

Reference: *J Dairy Sci.* 2015;98(10):7164–82

[Abstract](#)



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An estimation of the clinical mastitis incidence per 100 cows per year based on routinely collected herd data

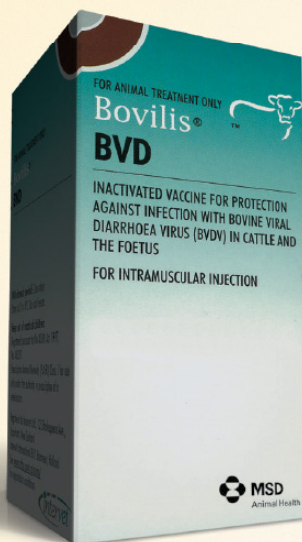
Authors: Santman-Berends IMGA et al.

Summary: To estimate the clinical mastitis incidence rate (CMI) for all dairy herds in the Netherlands and to detect farms with a high CMI based on routinely collected herd data, this study randomly recruited 240 dairy farms with a conventional milking system that participated in the milk recording programme every 4–6 weeks. Out of the initial 240 herds, clinical mastitis (CM) registration data and routinely collected herd data from 227 herds were complete and could be used for analysis. Two models were developed to predict the CMI for all dairy herds and to detect individual herds that belonged to the 25% of herds with the highest CMI. Records of 156 (67%) herds were used for development of the models and the remaining 71 (33%) were used for validation. The model that estimated the CMI in all herds consisted of 11 explanatory variables. The observed and predicted averages of the validation herds did not differ significantly. The model estimated a CMI per 100 cows per year of 32.5 cases (95% CI: 30.2–34.8), whereas the farmers registered 33.4 cases (95% CI: 29.5–37.4). The model that detected individual herds with a high CMI contained six explanatory variables and could correctly classify 77% of all validation herds at the quarter-year level. The most important variables in the model were antibiotic usage for treating CM and BMSCC.

Comment: This Dutch study used “automatically” collected data to see if it would be possible to identify farms with a high incidence of clinical mastitis in the absence of farmer recorded mastitis events. The models included data such as herd test data and BMSCC data, herd size, etc. It also included data on animal daily dose (ADD) of antibiotic supplied to the farm, which is centrally recorded in Holland. While we are not required to centrally record ADD supplied to our clients it is interesting to see a potential use for the data if it ever does become mandatory here.

Reference: *J Dairy Sci.* 2015;98(10):6965–77

[Abstract](#)



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Synchronized ovulation for first insemination improves reproductive performance and reduces cost per pregnancy in dairy heifers

Authors: Silva TV et al.

Summary: In this US study, the effects of synchronizing oestrus and ovulation to implement a timed artificial insemination (AI) at first insemination on reproductive performance and cost per pregnancy in dairy heifers were evaluated. Holstein heifers (n=611) at approximately 400 days of age from three farms were enrolled in the study. Six days before moving to the breeding pens, the heifers were randomised to AI after detected oestrus from study day 0–84 (CON, n=306), or to timed AI for first AI followed by detected oestrus for the remainder of the 84 day study (TAI, n=305). Heifers receiving TAI were enrolled in the 5-day timed AI protocol on study day -6 (day -6, GnRH and a progesterone insert; day -1, PGF2 α and insert removal; day 0, PGF2 α ; day 2, GnRH + AI), and they were allowed to be bred the day before scheduled timed AI if detected in oestrus. Starting on study day 0, oestrus was detected daily. Heifers in oestrus were inseminated on the same morning as detected oestrus. Control heifers not inseminated by study day 7 received PGF2 α and this treatment was repeated every 2 weeks until AI. The study duration was 84 days to allow a period of breeding equivalent to four 21-day oestrous cycles. The interval to first AI was 8 days shorter for TAI than for CON. Pregnancy at first AI was not different between treatments (58.3% in CON vs 62.8% in TAI). TAI increased pregnancy per AI (P/AI) versus CON in heifers inseminated with sex-sorted semen (31.6 % for CON vs 54.8% for TAI). The 21-day cycle insemination rate was greater for TAI (91.4%) than for CON (82.4%), even when evaluated after the first 21 days in the study (68.2% for CON vs 77.1% for TAI). The higher insemination rate increased the 21-day cycle pregnancy rate from 47.9% in CON to 57.2% in TAI heifers. Indeed, the hazard of pregnancy was 60% greater for TAI than CON. The higher pregnancy rate in TAI reduced the median days to pregnancy by 12 days (2.0 for CON vs 14.0 for TAI) and increased the proportion of pregnant heifers (85.2% for CON vs 91.5% for TAI by study day 84). Sensitivity analysis suggested that it was economically more advantageous to use TAI to produce a pregnancy than using CON.

Comment: This study evaluated a heifer synchrony programme and fixed time AI against conventional heat detection. The programme used GnRH and a progesterone insert at day -6, progesterone device out and PGF2 α on day -1, PGF2 α on day 0, and on day 2 GnRH and fixed time AI for heifers that were not detected on heat on day 0 or 1, detection of heats then continued out to day 84. The control group had natural heats detected from day 0–84 and any heifer not put up to AI by day 7 received PGF2 α , which was repeated every 14 days until the first detected oestrus. The treated heifers had a median time to first service of two days after start of AI compared with 10 days for the control heifers. The conception rate did not vary between groups but the 21-day pregnancy rate was higher in the treatment heifers and remained numerically higher throughout the trial due to a reduced mean time to second service in the treatment group of 10 days (26 days vs 36 days from start of AI).

Reference: *J Dairy Sci.* 2015;98(11):7810–22

[Abstract](#)

Randomized clinical trial of intrauterine cephalosporin infusion in dairy cows for the treatment of purulent vaginal discharge and cytological endometritis

Authors: Denis-Robichaud J & Dubuc J

Summary: This randomised clinical study had two objectives: i) to quantify the effect of an intrauterine infusion of cephalosporin on reproductive performance at first service of post-partum dairy cows affected by purulent vaginal discharge (PVD) and cytological endometritis (ENDO) using different diagnostic strategies; and ii) to determine if the presence of prolonged anovulation would influence the magnitude of treatment benefit. A total of 2259 Holstein cows in 28 herds were enrolled. At 35 (\pm 7) days in milk (DIM), cows were diagnosed with PVD using the Metricheck device (Simcro, Hamilton, New Zealand) and with cytological endometritis using endometrial cytology (ENDO-CYTO) and leukocyte esterase (ENDO-LE). Regardless of reproductive tract disease status, the cows were randomly assigned to intrauterine cephalosporin infusion or no treatment. Intrauterine cephalosporin was associated with an increased first-service pregnancy risk in cows diagnosed with PVD (no treatment: 15.4%; treatment: 31.4%), ENDO-CYTO (no treatment: 16.2%, treatment: 24.4%), and ENDO-LE (no treatment: 15.8%; treatment: 25.1%), but not in cows without any form of reproductive tract disease (no treatment: 34.8%; treatment: 32.6%). Cephalosporin treatment was also associated with higher first-service reproductive performance in cows affected simultaneously by both PVD and ENDO-CYTO (no treatment: 8.7%; treatment: 23.4%). The effect of cephalosporin treatment in anovular cows (no treatment: 21.0%; treatment: 26.4%) was lower than in cyclic cows (no treatment: 22.7%; treatment: 34.1%).

Comment: This Canadian study enrolled cows at approximately 35 days in milk and cows received either a metricure or no treatment. Cows at enrolment had blood progesterone measured to assess whether anoestrus and were metricheck scored and had ENDO scores assigned. At day 49, blood progesterone was measured again. A cow was defined as anovulatory if both blood samples had low progesterone levels. Eighteen percent of cows had a diagnosis of PVD made with the metricheck device. The two cytological methods of diagnosing ENDO had prevalences of 35% and 49%. In cows with PVD (metricheck), the risk getting pregnant to the first service was higher in treated cows (30.0 vs 14.5%). There was also an increased risk of pregnancy to first service for treated cows that were positive to either of the cytological methods but the magnitude of the increase was not as great. In cows with uterine disease and diagnosed with prolonged anoestrus, the effect of treatment with a metricure was reduced. Potential reasons for this are discussed but it is important that we as vets make this understood to our farmers and continue to address the other causes of anoestrus to maximise the benefits from metrichecking and metricuring.

Reference: *J Dairy Sci.* 2015;98(10):6856–64

[Abstract](#)

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Invited review: Mastitis in dairy heifers: nature of the disease, potential impact, prevention, and control

Authors: De Vliegher S et al.

Summary: The aim of this comprehensive review was to summarise the literature on heifer mastitis, focusing on the nature of the problem, causative pathogens, potential effects on future productive performance, risk factors, and non-antibiotic strategies to prevent and control the disease. The review concluded that heifer mastitis can affect the profitability of dairy farming because of a potential long-term negative effect on udder health and milk production and an associated culling risk, specifically when major pathogens are involved. Prevention and control is not easy but is possible via changes in young stock and heifer management. The pathogenesis and epidemiology of the disease remain unknown, however, and identification of more pathogen-specific risk factors is needed to optimise current prevention programmes.

Comment: This is a massive review article and although it does cover systems that are not common in New Zealand there seems to be an over representation of New Zealand data thanks to Scott McDougal, Chris Compton, and Katrina Parker so there is not much of the article that is not of relevance to us. The article covers the bugs, clinical and subclinical infections and their outcomes, prevention strategies ranging from teat sealants to nutrition and trace elements, breeding for mastitis resistance, and management of the environment. If you talk to your clients about heifer mastitis this article will have all you need to know.

Reference: *J Dairy Sci.* 2012;95(3):1025–40

[Abstract](#)

A snapshot of New Zealand farmers' awareness of, and self-reported compliance with, animal welfare requirements

Authors: Williams VM et al.

Summary: The aims of this telephone survey of 1565 farmers from across pastoral, pig, and poultry livestock sectors were to: i) benchmark farmer awareness of and self-reported compliance with the Animal Welfare Act 1999 and codes of welfare; and ii) explore the factors that drive or hinder that compliance. Eighty-two percent of respondents assessed their knowledge of statutory animal welfare requirements as above average or excellent. However, of the five physical, health and behavioural needs of animals on which the legislation is based, only proper and sufficient food and water and adequate shelter were identified by >50% of respondents (77% and 54%, respectively). Once informed of the needs, 63% of the farmers considered that it was not difficult to provide for all five required needs. Compliance levels of >85% were reported by the majority of respondents and they knew of relevant examples of minimum standards from a code of welfare. The main barriers to providing for the needs of animals were: seasonal weather conditions (pastoral enterprises) and lack of money or resources (within the pork and poultry sectors).

Comment: This telephone survey was designed to assess "farmer awareness of, and self-reported compliance with the Act and relevant codes of welfare". The survey included dairy, sheep, beef, pig, and poultry farmers. Out of all the respondents, the factor reported as the biggest challenge in complying with statutory animal welfare requirements was seasonal weather conditions (23% or all respondents and 29% for dairy farmers). Eighty-four percent of dairy farmers regarded compliance with the statutory animal-welfare requirements as extremely important. Fifty-eight percent of dairy farmer respondents reported the five welfare needs easy to achieve. Of the 42% remaining, the most common need reported as difficult to achieve was provision of adequate shelter followed by protection from injury and disease. Most respondents could not recall the five needs but the authors concluded that while farmers may not be familiar with the letter of the law they are aware of the animal husbandry concepts that underpin the legislation.

Reference: *Proceedings of the New Zealand Society of Animal Production, Volume 75, 200-204, 2015*

[Abstract](#)

The lying behaviour of non-lactating, pregnant dairy cows wintered in a loose-housed barn on woodchip bedding material

Authors: Dawson LJ et al.

Summary: The objectives of this study were to monitor the lying behaviour of cows wintered in a loose-housed barn with woodchip bedding during three separate 7-day periods to determine: i) if recommended lying times were being met; and ii) if bedding moisture content could be used as a predictor of lying time. From a housed herd of 90 mixed-age cows, 21 non-lactating dairy cows were selected based on age, BCS, and stage of pregnancy. Monitoring in Period 1 was started four days after the cows entered the barn for wintering in early June; Period 2 occurred in early July, just prior to the removal and replacement of bedding material; and Period 3 occurred in mid-July when cows again had fresh bedding material. Average daily lying times were two hours longer during Periods 1 and 3, when barn material was fresh (10.7 vs 10.5 hours/day), than when soiled during Period 2 (8.4 hours/day). The difference in lying behaviour was due to a difference in the number of lying bouts: cows had fewer lying bouts during Period 2 (6.1 per day) than Periods 1 and 3 (7.4 and 7.9 per day, respectively). The average moisture content of the bedding was 60.7, 68.4, and 64.3% for Periods 1, 2, and 3, respectively. Bedding moisture content alone did not appear to be a good predictor of lying time.

Comment: The ability to lie down and rest is a requirement under the dairy code of welfare and 8 hours/day is considered the minimum requirement for good animal welfare. The study reported here measured cow lying times over three one-week periods in a loose barn bedded with wood chips. Cows had more and longer lying episodes at night. The average lying time was adequate in all three measuring time periods but was not deemed to be a good indicator of welfare as the proportion of cows meeting the requirements for eight hours lying was not met by 42% of the cows in one of the measuring time periods. Reasons for the different proportion of cows meeting the 8-hour lying guideline in the different measuring period were proposed. Longer lying times coincided with changing the bedding; however, moisture content of the bedding was not a factor (in contrast to other studies) as the wood chips were stored outside. It seems likely that the temperature of the bedding, bedding cleanliness, and stage of pregnancy were factors affecting lying times.

Reference: *Proceedings of the New Zealand Society of Animal Production, Volume 75, 24-28, 2015*

[Abstract](#)

Liver copper concentrations in cull cattle in the UK: are cattle being copper loaded?

Authors: Kendall NR et al.

Summary: In this UK study, liver samples were recovered from 510 cull cattle at a single abattoir across a period of three days. The samples were wet-ashed and liver copper concentrations determined by inductively coupled plasma mass spectrometry analysis. Dairy breeds had higher liver copper concentrations than beef breeds. Holstein-Friesian and 'other' dairy breeds had 38.3% and 40% of cattle above the Animal Health and Veterinary Laboratories Agency (AHVLA) reference range (8000 µmol/kg dry matter [DM]), respectively. In contrast, only 16.9% of animals in the combined beef breeds exceeded this value. It was found that underlying topsoil copper concentration was not related to liver copper content. The age of the animal also had minimal effect on liver concentration. More than 50% of the liver samples tested showed greater-than-normal concentrations of copper, with almost 40% of the female dairy cattle having liver copper concentrations above the AHVLA reference range.

Comment: This abattoir survey conducted over three days looked at liver copper levels in 510 cows. It was found that over half of the samples were above what was categorised as "normal" (>5618 µmol/kg DM). This value was based on categories used by the University of Nottingham's laboratory values, which in turn were based on values from the University of Wisconsin's laboratory. These numbers are much higher than what we are used to dealing with but we tend to deal with wet weights rather than dry weight — if we assume a DM% of liver of 28% then the value referred to in the test is 1573 µmol/kg, which is number most of us will be more comfortable with. Many of the presumably healthy cattle in this survey had liver copper levels well above liver copper levels recorded from cows that have succumbed to copper toxicity and higher than what we tend to see (at least in our practice). This study suggests that high liver copper levels are a risk factor for copper toxicity but some precipitating factor might also be required.

Reference: *Vet Rec.* 2015;177(19):493

[Abstract](#)