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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. **For full bio** [CLICK HERE](#).



CONGRATULATIONS TO Anna Martyn who won a \$500 Visa Prezzy Card by taking part in our recent Sheep and Beef Research Review Subscriber Survey. Anna is a Senior Veterinarian from Atkinson & Associates Veterinary Services, Piopio.

Welcome to the seventh issue of Dairy Research Review.

This issue is devoted entirely to the bovines. Topics covered include the effects of pre-weaned calf nutrition on the first-lactation performance of heifers, how colostrum and milk pasteurisation improves health status in neonatal calves, and the effects of ketosis on reproductive performance. Some of the other selections deal with the characteristics of cross suckling calves, bony changes and lameness, and the effects of coagulase-negative staphylococcus (CNS) on milk production.

We hope that there is something practice-changing for you in this issue of Dairy Research Review. As always, we look forward to receiving your feedback and comments.

Kind regards
Hamish Newton
hamishnewton@animalhealthreview.co.nz

Use of early lactation milk recording data to predict the calving to conception interval in dairy herds

Authors: Cook JG & Green JJ

Summary: The objective of this study was to predict the likelihood of conception occurring by days 100 and 150 of lactation (days in milk, DIM) using test day milk recording data and reproductive records gathered retrospectively from 8,750 cows from 33 dairy herds located in the UK. Overall, 65% of cows re-calved with 30, 46, and 65% of cows conceiving by 100 DIM, 150 DIM, and beyond 150 DIM, respectively. The overall conception rate was 27.47%. The probability of conception by both 100 DIM and 150 DIM was positively associated with the average daily milk weight produced during the fourth week of lactation and the protein percentage for test day samples collected between 0–30 and 31–60 DIM. Butterfat percentage at 0–30 DIM was negatively associated with the probability of conception by 100 DIM but not at 150 DIM. Also, a high somatic cell count (SCC) at both 0–30 and 31–60 DIM was negatively associated with the probability of conception by 100 DIM, whereas only a high SCC at 31–60 DIM was associated with a reduced probability of conception by 150 DIM. In terms of parity, the predicted likelihood of a “good” cow conceiving by 100 and 150 DIM was 0.39 and 0.57, respectively, and that for a “poor” cow was 0.28 and 0.42.

Comment: This paper examined the herd test records from 8,750 cows that were from 33 herds with poor reproductive performance. The percentage of cows conceived by 100, 150 and >150 DIM were 30, 46 and 65% respectively. The overall conception rate (total cows pregnant/total inseminations) was 27.47%. Herd test data from either the first 30 DIM (milk weight, protein percentage, fat percentage and LnSCC) or the second month of lactation (31–60 DIM) [did not use fat percentage] were used in the models as well as a calculated value for average daily milk weight in the fourth week of lactation to predict either pregnancy by day 100 or 150 DIM. The week four average daily yield was positively associated with increased odds of being pregnant by 100 and 150 DIM. Increasing protein percentage was also associated with increased odds of being pregnant in both models. Fat percentage was associated with lower odds of pregnancy by 100 DIM. Increased SCC up to day 60 was associated with reduced odds of being pregnant by 100 DIM and increased SCC between day 31 and 60 was associated with lower odds of pregnancy by 150 DIM. Increasing parity was associated with lower odds of pregnancy at both 100 and 150 DIM. In the model examining pregnancy by 100 DIM, which is likely to be of most interest in a seasonally calving herd, the factor associated with the greatest odds ratio was the protein percentage measured between 31 and 60 DIM. This paper highlights the importance of feeding and controlling mastitis.

Reference: *J Dairy Sci.* 2016;99(6):4699–706
[Abstract](#)



Colostrum and milk pasteurization improve health status and decrease mortality in neonatal calves receiving appropriate colostrum ingestion

Authors: Armengol R et al.

Summary: In this study, 587 calves were randomly assigned to receive non-pasteurised or pasteurised colostrum. The non-pasteurised group (n=287) was fed frozen (-20°C) colostrum (6-8L during the first 12 hours of life) that was previously reheated up to 40°C. They were also fed refrigerated (4°C) raw milk from the bulk tank that was also reheated up to 40°C (1.8L every 12 hours). The pasteurised group was also fed colostrum and milk, but both were pasteurised before freezing. On-farm heat treatment for colostrum and milk reduced total plate counts (TPC) and total coliform counts (TCC) between 1 and 2 log10. During the first 21 days of life, pasteurisation of colostrum and milk significantly decreased the morbidity (5.2 vs 15.0%) and mortality (2.8 vs 6.5%) compared with calves receiving non-pasteurised colostrum and milk, respectively.

Comment: This Spanish study examined the effect of pasteurising the colostrum and bulk milk that was fed to calves had on the morbidity and mortality of 587 calves born over 18 months on one farm. This study was conducted on a farm that had very strict feeding protocols and all the colostrum fed had to have a specific gravity ≥1.056 and the calves enrolled all had a serum total protein (STP) ≥5.8 at 2 days of age. Calves were clinically examined daily for 21 days (the end of the study period for each calf). Despite all calves receiving good qualities and quantities of colostrum and showing evidence of adequate passive transfer (STP ≥5.8) the calves that received unpasteurised colostrum and milk were 3.8-times more likely to suffer from illness and 2.5-times more likely to die in the first 21 days of life. The TPC and TCC were significantly lower in both the pasteurised colostrum and milk fed. This study did not find a difference in the STP between the two groups (although it is known that high TBC can interfere with passive transfer) yet there were marked differences in both mortality and morbidity.

Reference: *J Dairy Sci.* 2016;99(6):4718–25

[Abstract](#)

Reciprocated cross suckling between dairy calves after weaning off milk does not appear to negatively affect udder health or production

Authors: Vaughan A et al.

Summary: In this study, 56 female Holstein calves were housed in groups of 8 and fed milk, grain, and hay ad libitum and the effects of weaning on cross suckling were observed (5 observation periods of 72 hours each). The overall level of cross suckling after weaning, at 4–5 months of age, was low and a small proportion of individuals accounted for the majority of events. After weaning, the calves that cross suckled did so on certain calves, with the most suckled calf within each group accounting for 74% of all cross-suckling events. Although there was no relationship between cross suckling and being cross suckled in the period before weaning, a positive correlation was found by 4–5 months of age. The majority of calves reduced or ceased cross suckling after weaning. Those still cross suckling by 4–5 months of age had formed pairs with other cross-suckling individuals and cross-suckling events occurred almost exclusively between these pairs. Cows that were cross suckled as heifers were no more likely to develop mastitis or have a higher SCC in their first lactation than those that were not involved in cross suckling.

Comment: This study followed heifers that were housed to 4 or 5 months of age and observed cross suckling events. The heifers were then followed through their first lactation to see if being cross suckled resulted in more mastitis, damaged udders or increased SCC. Although cross suckling is relatively rare, it was found that the majority of suckling (74%) was performed on one calf in a pen. So, although rare, it could well be significant for an individual. By 4 to 5 months of age most suckling events occurred between pairs (calves that did the most cross suckling also tended to be the most suckled also). The authors cite a study that found 72% of cross suckling attempts were rejected by the intended recipient. Calves do not appear to cross suck randomly and cross suckling is targeted at one or two individuals who are tolerant of this behaviour. Heifers that were cross suckled were not found to have suffered from more mastitis or a higher SCC or have reduced production. Although this study found no detrimental effect of cross suckling, I still think fitting a frustrator to a suckler is sensible and perhaps one on the calf observed being suckled might be a good idea as well if they form pairs.

Reference: *J Dairy Sci.* 2016;99(7):5596–603

[Abstract](#)

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Prediction of intramammary infection status across the dry period from lifetime cow records

Authors: Henderson AC et al.

Summary: These UK researchers investigated whether lifetime cow data, available through routine on-farm milk recording, could be used to predict changes in intramammary infection (IMI) status across the dry period for individual cows that were: (i) deemed high somatic cell count (SCC; >199,000 cells/mL); or (ii) low SCC (<200,000 cells/mL) at the last test day before drying off. They found that cows with a smaller proportion of test days with a high SCC in the lactation before drying off, a smaller proportion of test days recording a high SCC in the lactation before the current lactation, of lower parity, producing less milk before drying off, of lower days in milk at drying off, and of lower SCC just before drying off were more likely to cure across the dry period. They also found that cows with a smaller proportion of test days recording a high SCC in the lactation before the current, of lower parity, of lower milk production at drying off, and fewer days in milk at drying off were less likely to develop a new IMI.

Comment: This study examined the herd test records from 114 herds over 20 years and resulted in just over 46,000 lactations from 24,570 cows. Two models were constructed from this dataset. One examined the cows that were deemed infected at the last herd test (SCC >199,000) and looked at probability of a cure over the dry period. Cows with more herd tests with a SCC >199,000 were less likely to cure and this effect was greater if a cut-off of 399,000 was used. This effect was even present when the lactation prior to the current one was examined using a 199,000 cut-off. A parity 2 cow was twice as likely to cure as a parity 5 cow. A second model was constructed to examine chance of getting a new infection over the dry period using the cows with a last herd test of <200,000. The chance of a cow getting infected over the dry period increased as the proportion of herd tests >199,000 in the lactation before the current one increased. The odds of a new infection were 0.65-times less in a parity 2 cow compared to a fifth or greater parity cow. The odds of a new infection also increased with increasing maximum SCC recorded in the current lactation. I found it surprising that the SCC history of the lactation prior to the current one was a predictor of both cure and new infection in the dry period. Apart from that finding, the rest of the models do not come as surprise and reinforce the use of SCC data as a tool to make decisions about dry cow selection or culling decisions.

Reference: *J Dairy Sci.* 2016;99(7):5586–95

[Abstract](#)

A meta-analysis of the effects of preweaned calf nutrition and growth on first-lactation performance

Authors: Gelsinger SL et al.

Summary: The objective of this meta-analysis was to evaluate the effects of pre-weaning diet and growth rate on first-lactation performance in neonatal calves. Data from 9 studies representing 21 treatment groups were included in the analysis. The effect of study explained 98, 85, and 96% of the variance in 305-day milk, fat, and protein yield in first lactation, respectively. There was, however, a synergistic relationship between pre-weaning liquid and starter dry matter intake for improving milk, fat, and protein production, as well as a positive relationship between first-lactation performance and pre-weaning average daily gain.

Comment: This paper reports on a meta-analysis of 9 papers that examined pre-weaning feeding and its effect of first lactation performance. Models were constructed to look at first-lactation protein yield, fat yield, and 305-day milk yield. In all of the models, >85% of the variation was explained by study and very little explained by the amount of liquid or starter meal consumed. Models were also constructed that looked at the effect of average daily gain (ADG). Again, >85% of the variation was explained by the study. This suggests that farm factors other than different pre-weaning feeding regimens and growth rates have a greater effect on first-lactation performance. The effect of intake of liquid feed, starter meals, and ADG accounted for <3% of the variation in the first lactation performance. The authors conclude that the provision of adequate nutrition and achieving ADG >0.5 kg/day combined with "proper post-weaning management" can enhance first-lactation performance. The take-home message seems to be look after your calves until weaning then continue to look after them.

Reference: *J Dairy Sci.* 2016;99(8):6206–14

[Abstract](#)

The effect of subclinical ketosis on activity at oestrus and reproductive performance in dairy cattle

Authors: Rutherford AJ et al.

Summary: In this UK study, the influence of subclinical ketosis (SCK) on physical activity at oestrus and on future reproductive performance was evaluated in 203 Holstein-Friesian cows on three dairy farms. Thirty-five (17%) of the enrolled cows were affected with SCK between 7 and 21 days in milk, defined as a blood β -hydroxybutyrate concentration (BHB) of 1.2–2.9 mmol/L. Compared with non-SCK cows, SCK cows showed a lower peak activity and shorter duration in activity clusters associated with first oestrus and first insemination postpartum. In SCK cows, calving to first oestrus, calving to first insemination, and calving to pregnancy intervals were prolonged. First insemination was 4.3-times less likely to be successful in SCK cows versus non-SCK cows. The mean number of inseminations per pregnancy was 2.8 for SCK cows and 2.0 for non-SCK cows.

Comment: It has been suggested that negative energy balance may result in reduced oestrus expression in the same way that high SCC, lameness, and low BCS do by reducing the amount of GnRH, which results in reduced LH pulsatility, and so less oestradiol pre-ovulation ultimately leading to reduced expression of heat. This study compared the data from neck accelerometers on cows with and without SCK. Cows were blood tested for BHB between 7 and 21 days in milk. A cow was classified as having SCK if her BHB level was between 1.2 and 2.9 mmol/L. If cow had a BHB >2.9 she was considered to have clinical ketosis and was not enrolled. It was found that cows that were diagnosed with SCK show oestrus with less intensity and for a shorter duration at both the first observed oestrus and the first oestrus that lead to an insemination. The length and intensity of the oestrus that resulted in a pregnancy were comparable between cows that were classified as SCK or not SCK. The authors also followed cows through and recorded their reproductive performance. Cows with SCK also took longer to show a first oestrus, and took longer to get pregnant, which is what plenty of other work has shown. What this paper highlighted to me was that "poor heat detection" may in some herds be due to the transition feeding and the cows are in fact showing quiet heats. Something else to consider when reviewing or planning the mating period.

Reference: *J Dairy Sci.* 2016;99(6):4808–15

[Abstract](#)

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Vulvovaginal laceration as a risk factor for uterine disease in postpartum dairy cows

Authors: Vieira-Neto A et al.

Summary: This US study evaluated the association between vulvovaginal laceration and uterine diseases, cyclicity, and reproductive performance in 660 lactating Holstein cows. They were inspected at 4 days in milk (DIM) and assigned a vulvovaginal laceration score (VLS) as follows: 0 = no laceration; 1 = laceration <2cm; 2 = laceration ≥2cm. Cows with VLS = 2 demonstrated a higher incidence of metritis than cows with VLS = 0 (69.1 vs 42.4%) and cows with VLS = 1 tended to have a higher incidence of metritis than cows with VLS score of 0 (52.0 vs 42.4%). Cows with VLS = 2 demonstrated a higher incidence of purulent vaginal discharge (PVD) than cows with VLS = 0 (56.5 vs 43.1%). A lower proportion of cows with VLS = 2 than a VLS = 0 were cyclic by 64 DIM (70.0 vs 86.8%) and were pregnant at 60 days after first artificial insemination (AI; 28.7 vs 33.6%). The proportion of pregnant cows at 60 days after AI tended to be lower for VLS = 1 than for VLS = 0 (28.4 vs 33.6%). The hazard of pregnancy was decreased for cows with metritis, PVD, and anovular cows.

Comment: At 4 days in milk, 660 cows had the vulvovaginal area examined and classified as no lacerations, laceration <2cm, or a laceration >2cm. Cows were not eligible for enrolment if they had a caesarean or a fetotomy. Parity (heifers at greater risk OR 7.6) and dystocia (OR 1.6) were the significant risk factors for vulval lacerations. Vulvovaginal laceration was a risk factor for developing metritis but by far the biggest risk factor was retained placenta. Similarly, it was also a risk factor for PVD but not as big a risk factor as retained placenta. Cows with a 2cm laceration had reduced odds of cycling by 64 days in milk compared with cows with no laceration. Cows with a 2cm laceration also had reduced odds of being pregnant by 60 days after first AI compared with cows with no laceration. Lacerations to the vulva are associated with poorer uterine health and reproductive outcomes. Lacerations to the vulva may be a sign of uterine trauma or it may be a risk all by itself. Either way, if calving a cow, it seems that a "bit of tear" could be a problem.

Reference: *J Dairy Sci.* 2016;99(6):4629–37

[Abstract](#)

Linking bone development on the caudal aspect of the distal phalanx with lameness during life

Authors: Newsome R et al.

Summary: This retrospective cohort study was performed to assess whether bone development was associated with poor locomotion and occurrence of Claw Horn Disruption Lesions (CHDL) during a cow's life. A total of 142 hind claws from 72 Holstein-Friesian dairy cows culled from a research herd were imaged using computed tomography (CT), with four measures of bone development taken from the caudal aspect of each distal phalanx. Cow-level variables were constructed to quantify the average bone development on all hind feet (BD-Ave) and bone development on the most severely affected claw (BD-Max). Weekly locomotion scores (1–5 scale) were available from first calving. Both BD-Ave and BD-Max increased with age, CHDL occurrence, and an increasing proportion of locomotion scores at which a cow was lame (score of 4 or 5). Linear regression modelling estimated that BD-Max would be 9.8mm greater in cows that had been lame at >50% of scores within the 12 months prior to slaughter (versus cows that had been assigned no lame scores during the same period) or 7.0mm greater if the cow had been treated for a CHDL during life (versus cows that had not).

Comment: This retrospective study looked at the bone changes that occurred in cows' feet and any relationship with a history of CHDL – sole ulcers, White line disease, and sole haemorrhage. A total of 142 hind feet from 72 cows were collected (two cows had a foot go missing at the abattoir) and the distal phalanx was examined using CT. Locomotion scoring results and history of being treated for CHDL were recorded. This study found that bony developments on the distal pharynx were associated with the cow's lameness history. The life-time occurrence of CHDL was associated with bony changes whereas infectious causes of lameness were not. The authors proposed a mechanism for the changes seen as follows: inflammation due to active CHDL → utilisation of fat locally → digital cushion reduced or scarred → periosteum stimulated to produce new bone → greater point source force on the germinal epithelium of the foot leading to a new source of inflammation and the cow always at risk of lameness. If this proposed mechanism is correct then anti-inflammatory drugs with a shoe or block should be a standard treatment.

Reference: *J Dairy Sci.* 2016;99(6):4512–25

[Abstract](#)

Parturition in dairy cows temporarily alters the expression of genes in circulating neutrophils

Authors: Crookenden MA et al.

Summary: These NZ researchers investigated changes in the expression of genes involved in neutrophil function at five time points over the transition period: pre-calving (-1 week; n=46), day of calving (day 0; n=46), and post-calving at week 1 (n=46), week 2 (n=45), and week 4 (n=43). Genes that were differentially expressed included those involved in neutrophil adhesion (SELL, ITGB2, and ITGBX), mediation of the immune response (TLR4, HLA-DRA, and CXCR2), maturation, cell cycle progression, apoptosis (MCL1, BCL2, FASLG, and RIPK1), and control of gene expression (PPARG, PPARD, and STAT3). Reduced gene expression of pro-inflammatory cytokines (IFNG, TNF, IL12, and CCL2) was noted on the day of calving, whereas anti-inflammatory cytokine gene expression (IL10) was upregulated. Increased gene expression of antimicrobial peptides (BNBD4, DEFB10, and DEFB1) was noted on the day of calving.

Comment: This study looked at the gene expression of neutrophils in peri-parturient cows at Scott Farm, Ruakura. This sort of work has been done before but using housed cows fed TMR type rations so the responses seen in a "typical" NZ cow's neutrophils under our management systems may be different. The results reported here showed that there was altered gene expression in the neutrophils around the time of calving as in previous studies suggesting that these alterations are due to parturition. The changes found would seem to at least partially explain the increase in infectious disease seen around calving. Although we at this point cannot alter the gene expression we now know it does happen in NZ as well and should continue to "load the dice in our favour" with the best possible management of the transition cow that we know about.

Reference: *J Dairy Sci.* 2016;99(8):6470–83

[Abstract](#)

Intramammary infection with coagulase-negative staphylococci at parturition: Species-specific prevalence, risk factors, and effect on udder health

Authors: De Visscher A et al.

Summary: This observational study determined the prevalence and distribution of different coagulase-negative staphylococci (CNS) species causing intramammary infections (IMI) in fresh heifers and dairy cows in Flemish dairy herds and investigated risk factors and effects on udder health. The most frequently isolated species were *Staphylococcus chromogenes*, *S. sciuri*, and *S. cohnii*. *S. chromogenes* was the only CNS species causing IMI in fresh heifers and dairy cows in all herds. Large between-herd differences in distribution were observed for the other species. Quarters from heifers and quarters with an inverted teat end had higher odds of being infected with *S. chromogenes*, *S. simulans*, or *S. xylosum* as well as with *S. chromogenes* alone. Pre-partum teat apex colonisation with *S. chromogenes* increased the likelihood of *S. chromogenes* IMI in the corresponding quarters at parturition. Quarters with dirty teat apices before calving were more likely to be infected with *S. cohnii*, *S. equorum*, *S. saprophyticus*, or *S. sciuri*.

Comment: This study looked at the effect of the CNS at the start of lactation on quarter milk somatic cell count (QSCC) and the risk factors for having a CNS infection. In this study, the CNS were grouped into: 1) the "more relevant" species (*S. chromogenes*, *S. simulans*, or *S. xylosum*); 2) the host adapted species (*S. chromogenes*); or 3) the environmental species (*S. cohnii*, *S. equorum*, *S. saprophyticus*, or *S. sciuri*). Quarters from heifers compared with older cows were more likely to be infected with the "more relevant" species or with *S. chromogenes* (host adapted) as were quarters with an inverted teat end. Quarters that were dirty, not surprisingly, were more likely to be infected with the environmental species. Quarters infected with the "more relevant" species had significantly higher QSCC compared to uninfected quarters. Quarters not infected with "more relevant" species had a QSCC not significantly different from uninfected quarters. This study sheds some light on how we should interpret the diagnosis of CNS. They still remain a bit of mystery at least partially due to number of them and them behaving differently. This paper provides a way of categorising the different species and provides some clues as to where some of the different species come from and how they behave.

Reference: *J Dairy Sci.* 2016;99(8):6457–69

[Abstract](#)