



Dairy Research Review™

Making Education Easy

Issue 2 – 2015

In this issue:

- *Oestrus synchronisation in dairy heifers*
- *Vitamin B12 supplementation for spring calves*
- *Efficacy of a polyvalent mastitis vaccine*
- *Prevalence of enteropathogens in calves*
- *Does subclinical mastitis affect milk yield?*
- *Effects of copper supplementation on milk yield*
- *Residual feed intake divergence in calves*
- *Predicting survival after LDA corrective surgery in dairy cows*
- *Analgesia during disbudding affects calf productivity*
- *Veterinary drug approvals: quality control issues?*



FOLLOW ANIMAL HEALTH REVIEWS ON TWITTER

@animal_review

Welcome to the second issue of Dairy Research Review. Featuring prominently in this issue is research into the effect of different interventions and factors on milk production, including mastitis vaccination, copper supplementation, feed efficiency, and subclinical mastitis caused by coagulase negative staphylococci. Another theme is growth rates in calves, specifically the effects of vitamin B12 supplementation and use of analgesia during disbudding.

We hope that the selections in this second issue of Dairy Research Review are interesting and thought-provoking and we encourage your feedback and comments.

Kind regards

Hamish Newton

hamishnewton@animalhealthreview.co.nz

Conception rates to fixed-time artificial insemination of two oestrus synchronisation programmes in dairy heifers

Authors: Sahu SK et al.

Summary: The study evaluated the conception rate to fixed-time artificial insemination (FTAI) of two oestrus synchronisation programmes in dairy heifers on eight Palmerston North farms over a period of 2 years. Friesian and Friesian×Jersey heifers (13-15 months of age) were randomly allocated to one of two oestrus synchronisation programmes: (i) gonadotrophin-releasing hormone (GnRH) given by intramuscular injection on day 0, a progesterone (P4)-releasing intravaginal device on days 0-7, prostaglandin F2α (PGF) intramuscular injection on day 7, and a second dose of GnRH at the time of FTAI on day 9 (GPG+P4; n=330); or (ii) P4-releasing intravaginal device from on days 0-7, PGF on day 6, and FTAI on day 9 (P4+PGF; n=343). Rates of overall conception were 52.4% in the GPG+P4 and 54.8% in the P4+PGF group. The odds of conception for the two treatments did not differ (OR: 0.90; 95% CI: 0.67-1.23) and there was no difference between groups in different years (p=0.58). Although the conception rate was affected by the particular farm (p=0.002), there was no interaction with treatment (p=0.92).

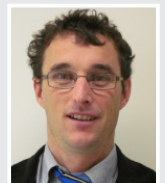
Comment: This study showed that two heifer oestrus synchronisation programmes resulted in conception rates that were not significantly different. What differed was the number of yardings required for treatment with the GPG+P4 programme (3 yardings) compared with the P4+PGF programme (4 yardings). The choice between these programmes will depend on the cost or ease of yarding heifers.

Reference: *N Z Vet J. 2015;63(3):158-61*

[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.



THE SCIENCE OF HEALTHIER ANIMALS

www.msd-animal-health.co.nz

ANIMALS FEED US. THEY WORK FOR US. THEY COMFORT US. WHICH IS WHY OUR SCIENCE IS ALL ABOUT MAKING THEM HEALTHIER.





Vitamin B12 status and the effects of vitamin B12 supplementation during the first year of life of spring calves from pasture-fed dairy herds

Authors: Grace ND et al.

Summary: The objectives of this study were to determine the vitamin B12 status of dairy calves during their first year of life and to evaluate the benefits of vitamin B12 supplementation. In Experiment I, twenty 17-day-old heifer calves from the AgResearch Flock House herd were monitored until 198 days old. On days 0 and 90, half of the animals received an injection of microencapsulated vitamin B12 at 0.12 mg/kg bodyweight. In Experiment II at Flock House and the adjacent Landcorp Tangimoana station, eighty 150-day-old heifer calves were monitored until 342 days old. On days 0 and 97, half of the animals received vitamin B12 as per Experiment I. The mean concentration of vitamin B12 in milk replacer was 63 µg/kg dry matter (DM) and cobalt concentrations in calf meal were 0.45-1.58 and 0.07-0.28 mg/kg DM in pastures. From 17 to 198 days of age (Experiment I), mean serum concentrations of vitamin B12 in the control group decreased from 119 to 57 pmol/L. From 150 to 342 days of age (Experiment II), overall mean serum concentrations of vitamin B12 in the control groups at Flock House and Tangimoana were 90 and 96 pmol/L, respectively. Vitamin B12 injections increased ($p < 0.001$) serum concentrations for ≥ 90 days, with peak concentrations of 323 pmol/L (Experiment I) and 520 pmol/L (Experiment II) being reached 28-35 days after each injection.

Comment: Two age groups of calves were followed. The first group were pre-weaned calves (mean age 17 days at enrolment). Half ($n=10$) were given Smartshot at day 0 and day 90 of the trial, which ran for 181 days. Calves were weighed approximately every 30 days. There was no significant difference in the rate of gain of weight between calves treated with B12 or not over the course of this study. The second part of this study examined calves from weaning to almost a year of age. Half of the calves were treated with Smartshot on days 0 and 97 of the study, which ran for 192 days and the calves were 342-days-old on average at the end of the trial. This second trial was run over two adjacent properties. The calves on one property (Flockhouse) had significantly greater weight gains than the other property (Tangimoana) and the control animals on the Flockhouse farm had higher weight gains than the controls. The lack of a growth rate response in supplemented calves suggests that the B12 levels in these calves were not limiting growth rates and in this case the blood levels were >90 pmol/L.

Reference: *N Z Vet J.* 2014 Sep;62(5):274-8

[Abstract](#)

An investigation of the efficacy of a polyvalent mastitis vaccine using different vaccination regimens under field conditions in the United Kingdom

Authors: Bradley AJ et al.

Summary: This UK study assessed the efficacy of a commercially available vaccine in a total of 3,130 cows recruited from 7 farms that were randomly allocated, within farm, to 1 of 3 groups. The first group received the vaccine following the label regimen, the second group was vaccinated every 90 days following an initial vaccination course, and the third group was left unvaccinated to act as controls. Vaccine efficacy was assessed in the first 120 days of lactation and data were available from 1,696 lactations in 1,549 cows. In total, 779 cases of clinical mastitis occurred in the 3 study groups, with no significant difference in the incidence or prevalence of clinical or subclinical mastitis between any of the 3 groups being detected. Mastitis vaccination following the label regimen was associated with a significant reduction in the severity of clinical cases. Cows in this group were at significantly reduced odds of developing clinical mastitis presenting with more than just milk changes (OR: 0.58; 95% CI: 0.35-0.98). Similarly, each additional vaccination resulted in a cow being at reduced odds of developing clinical mastitis presenting with more than just milk changes (OR: 0.87; 95% CI: 0.77-0.98). Although no cows were culled because of severe mastitis in either of the vaccinated groups, no significant difference in the mastitis-related culling rate between groups was observed. Cows on the label regimen produced a higher volume of milk (231L; 95% CI: 104.1-357.4) and more milk solids (12.36kg; 95% CI: 3.12-21.60) than unvaccinated cows in the first 120 days of lactation. A return on investment of 2.57:1 could be expected under UK conditions based on increased milk yield alone.

Comment: Mastitis vaccines, although not available in New Zealand at present, have been used to reduce the severity of mastitis but have not reduced the number of intramammary infections. This study evaluated an *Escherichia coli* and *Staphylococcus aureus* vaccine, which has been registered in the EU (Startvac), under UK field conditions. Reflecting the different mastitis conditions experienced in the UK compared with New Zealand, the proportion of mastitis cases caused by *E. coli* (20%) was higher than what we find in New Zealand. This study did not show a reduction in the number of cases of mastitis in vaccinated cows but the vaccinated cows that did get mastitis were less likely to have severe mastitis (changes other than changes to the milk). Perhaps the most interesting finding is that the vaccinated groups as a whole had greater milk production than unvaccinated cows. This has not been reported before; previously, any increase in milk yield has only been reported in vaccinated cows that experienced mastitis compared to unvaccinated cows that got mastitis. The effect on yield in this study may be due to reduced negative energy balance as indicated by the milk protein to fat ratio (the milk effect was relatively greater for milk protein than milk fat).

Reference: *J Dairy Sci.* 2015;98(3):1706-20

[Abstract](#)



Are you prepared to take a hit?

One shot could save a hiding

Scours can knock you sideways – hurting your calves, your family and your income. And it can strike on any farm. With Rotavec® Corona, a single shot before calving helps protect your calves against three of the most common causes of infectious scours – rotavirus, coronavirus and *E. coli*.

AVAILABLE ONLY UNDER VETERINARY AUTHORISATION. ACVM No: A8132. ®Registered trademark.
Schering-Plough Animal Health Ltd. Phone: 0800 800 543. www.msd-animal-health.co.nz NZ/ROT/0315/002





Prevalence of endemic enteropathogens of calves in New Zealand dairy farms

Authors: Al Mawly J et al.

Summary: In this country-wide prevalence study, faecal samples (n=1,283) were collected during calving season from calves aged 1-5 and 9-21 days on 97 dairy farms and analysed for the presence of bovine group A rotavirus, coronavirus, *Cryptosporidium parvum*, *Salmonella* spp. and enterotoxigenic K99(+) *Escherichia coli* (K99). Of the 97 farms, 93 (96%) had ≥1 sample infected with enteropathogens. The standardised farm prevalence rates of bovine group A rotavirus, bovine coronavirus, and *C. parvum* were 46, 14, and 18%, respectively, in calves that were 1-5 days of age. Corresponding prevalence rates were 57, 31, and 52%, respectively, in calves that were 9-21 days of age. The farm-level prevalence of K99 was 11% in calves that were 1-5 days of age. *Salmonella* spp. were found in 3 and 4 samples, respectively, from calves that were 1-5 and 9-21 days of age. The odds of *C. parvum* shedding and of co-infection with any combination of pathogens were higher in calves aged 9-21 days than those aged 1-5 days.

Comment: In our practice, and I suspect most if not all practices in New Zealand, neonatal diarrhoea is the most common reason we get called to calf rearing facilities. This paper reports on a nationwide survey of the prevalence of calf pathogens at both farm and calf level at 1 to 5 days of age and 9 to 21 days of age. Overall, 96% of farms had samples infected with an enteropathogen, with rotavirus on 70% of farms. In calves aged 1-5 days, 31% of samples were positive for a pathogen, with rotavirus being the most common pathogen. In the older calves, the most common pathogen at farm and calf level was rotavirus with an increasing proportion of coronavirus. *E. coli* was present in calves aged 1 to 5 days on approximately 10% of farms. These results provide evidence about which pathogens we are targeting with preventative measures to control neonatal diarrhoea.

Reference: *N Z Vet J.* 2015;63(3):147-52

[Abstract](#)

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.

Bovine subclinical intramammary infection caused by coagulase-negative staphylococci increases somatic cell count but has no effect on milk yield or composition

Authors: Tomazi T et al.

Summary: These researchers evaluated the effect of subclinical intramammary infection (IMI) caused by coagulase-negative staphylococci (CNS) as a group, and by specific CNS species, on the milk yield and composition and somatic cell count (SCC) of dairy cows. Cows with IMI caused by CNS were identified in 1,242 dairy cows distributed in 21 dairy herds. After selection of cows, milk yield was measured and milk samples were collected at the mammary quarter level (i.e., 1,140 mammary samples collected from 285 cows) for analysis. In total, 108 isolates of CNS were identified at the species level. Forty-one pairs of contralateral mammary quarters, with and without IMI, were used to evaluate the effect of CNS on milk yield and composition. Mammary quarters infected with CNS had higher mean SCC (306,106 cells/mL) than non-infected contralateral mammary quarters (62,807 cells/mL). IMI caused by CNS had no effect on milk yield or on contents of fat, crude protein, casein, lactose, total solids, and solids-not-fat. The IMI caused by *S. chromogenes* increased SCC but had no effect on milk yield and composition at the quarter level.

Comment: This study examined the effect of infection with CNS on SCC and milk yield and composition. The significance of infection with CNS is unclear, with some studies showing reduced milk yields and other studies showing no effect on milk yield or quality. This study is unique in that it compared a mammary quarter infected with CNS with a non-infected contralateral quarter. The authors reported no reduction in yield or milk composition but the quarter SCC was increased. This result is similar to that found by Pearson et al. (2013) in their New Zealand study that examined monozygotic twin heifers that had calving infections. In that study, heifers with a *Streptococcus uberis* infection had reduced yields but this was not the case for heifers with CNS infection. The authors discuss that some CNS have similar ability to adhere to but less ability to invade mammary cells than *S. aureus*. This might explain why there is an apparent immune response (i.e. increased SCC) but no change in milk yield.

Reference: *J Dairy Sci.* 2015;98(5):3071-8

[Abstract](#)

Effects of subcutaneously injected Ca Cu EDTA on concentrations of Cu in liver, milk production and reproductive performance in New Zealand dairy cows

Authors: Hawkins D

Summary: This study determined the effect of dose and frequency of copper (Cu) as Ca Cu EDTA administered subcutaneously on concentrations of Cu in liver, and the effect of a single Cu 200mg treatment on milk production and reproductive performance in dairy cows. Four groups of dairy cows (n=18 per group) on 3 farms were injected with Cu 100 or 200mg once, or 3 times at 6-weekly intervals, commencing 6-8 weeks into lactation. Cows at peak lactation on one farm were treated with Cu 200mg, or received no treatment (n=92 per group). In 7 dairy herds from throughout New Zealand, cows were injected Cu 200mg 10 days prior to mating start date (MSD) or received no treatment. Injecting with Cu 200mg once or 6-weekly increased concentrations of Cu in liver compared with 100mg (p<0.05). Injection of Cu 200mg decreased total milk yield (p=0.006) and protein production (p<0.001) in the 24-36 hours after treatment. Compared with control cows, Cu 200mg 10 days before MSD reduced 21-day submission (78 vs 75%; p=0.04) and 21-day pregnancy rates (47 vs 43%; p=0.03). For 28-day pregnancy rates there was a farm by treatment interaction (p=0.02), with a negative effect observed on some, but not other, farms.

Comment: This paper reports on a series of studies that examined the dose and frequency of dosing of a copper injection (Cue). These studies demonstrated that 200mg of copper administered as a subcutaneous injection was effective in raising the liver copper concentrations for at least 42 days as repeated injections at 42-day intervals continued to raise the liver copper levels. The injections had a temporary negative effect on milk production. Injection of this copper preparation 10 days prior to the planned start of mating did result in a reduced 3-week submission rate and, on some farms, a reduced 3-week pregnancy rate that was not explained by the reduced submission rate. This suggests that there is some mechanism that may act on embryonic survival as well as the expression of oestrus.

Reference: *N Z Vet J.* 201;62(5):244-9

[Abstract](#)



FIRST CHOICE ANTIBIOTICS YOU CAN STAND BY

www.msd-animal-health.co.nz



AVAILABLE ONLY UNDER VETERINARY AUTHORISATION. ACVM No's: A3308, A4256. ®Registered trademark. Schering-Plough Animal Health Ltd. Phone: 0800 800 543. www.msd-animal-health.co.nz NZ/ENM/0714/0001a





Holstein-Friesian calves selected for divergence in residual feed intake during growth exhibited significant but reduced residual feed intake divergence in their first lactation

Authors: Macdonald KA et al.

Summary: These researchers tested the hypothesis that lactating primiparous cows, previously identified as being divergent in residual feed intake (RFI) as growing calves, would still differ in RFI during lactation. RFI, as a measure of feed conversion during growth, was estimated for approximately 2,000 Holstein-Friesian heifer calves aged 6-9 months in New Zealand and Australia, and individuals from the most and least efficient deciles were retained. These animals (78 New Zealand cows, 105 Australian cows) were re-evaluated during their first lactation to determine if divergence for RFI observed during growth was maintained during lactation. Mean daily body weight (BW) gain during assessment as calves had been 0.86 and 1.15kg for the respective countries, and the divergence in RFI between most and least efficient deciles for growth was 21% (1.39 and 1.42kg of dry matter, for New Zealand and Australia, respectively). At the start of evaluation during lactation, the cows were aged 26-29 months. All were fed alfalfa and grass cubes in New Zealand, whereas 6kg of crushed wheat/day was also fed in Australia. Measurements of RFI during lactation occurred for 34-37 days. Other measurements included milk production (daily), milk composition (2-3 times per week), BW and BW change (1-3 times per week), as well as body condition score (BCS). Daily milk production averaged 13.8 kg for New Zealand cows and 20.0kg in Australia. No statistically significant differences were observed between calf RFI decile groups for dry matter intake, milk production, BW change, or BCS; however, a significant difference was noted between groups for lactating RFI. Residual feed intake was about 3% lower for lactating cows identified as most efficient as growing calves, and no negative effects on production were observed.

Comment: RFI (i.e. the difference between actual and predicted intakes), which is a measure of feed efficiency, was used to evaluate whether efficient calves during their rearing were also efficient cows at making milk. The study showed that calves that were more efficient as calves tended to be more efficient as milkers. Not all of the difference in efficiency was carried through. This research might have implications for genetic selection, but at a farm level the calves that grow best in a mob are possibly more likely to be efficient as milkers.

Reference: *J Dairy Sci.* 2014;97(3):1427-35

[Abstract](#)

Factors associated with survival in the herd for dairy cows following surgery to correct left displaced abomasum

Authors: Reynen JL et al.

Summary: This aim of this Canadian study was to determine if survival to 60 days or 1 year after surgery to correct left displaced abomasum (LDA) in dairy cows could be predicted from the physical examination findings, periparturient disease status, and a biochemical profile at the time of LDA diagnosis. Data were obtained from 179 cases, by 24 veterinarians from 4 clinics, including cull date, cull reason, and test-day milk production. Cows that had dystocia (OR: 13; 95% CI: 7-26) or were not ketotic (β -hydroxybutyrate [BHBA] level <1.2mmol/L; OR: 3; 95% CI: 1.03-9) at the time of corrective surgery were more likely to be culled within 60 days. Higher serum levels of BHBA (OR: 0.95; 95% CI: 0.92-0.98), non-esterified fatty acids [NEFA] (OR: 0.81; 95% CI: 0.75-0.88), and Mg (OR: 0.49; 95% CI: 0.35-0.68) all had a protective effect against culling within 1 year of LDA surgery. Longevity in the herd for 365 days following corrective surgery was associated with higher BHBA and Mg levels at the time of LDA diagnosis before surgery, as well as milk production following surgery.

Comment: Although LDAs are not as common in New Zealand as in North America, where 3-7% of calvings result in an LDA, there is a perception in New Zealand that we are seeing more LDAs, or at least diagnosing more. There are known risk factors for acquiring a LDA, but less is known about the predictors for a successful outcome post-LDA surgery. Cows that were culled within 60 days of surgery were more likely to have had a dystocia (13 times) or have been non-ketotic. Similarly, cows culled within one year after surgery were more likely to have lower BHBA and NEFA levels than those that survived for greater than a year. This seems counter intuitive as ketosis is a risk factor for developing LDA. The authors suggest that in cows that undergo surgery for LDA and are not ketotic the cause of the LDA is not associated with negative energy balance but some other causal factor that was not alleviated by the correction of the LDA. Cow-side tests for ketosis are readily available in New Zealand and could be used to aid decision making about what to do with cows with LDA. It is possible that ketotic cows at the time of LDA correction are higher producing and less likely to be culled.

Reference: *J Dairy Sci.* 2015;98(6):3806-13

[Abstract](#)

Effect of analgesia and anti-inflammatory treatment on weight gain and milk intake of dairy calves after disbudding

Authors: Bates AJ et al.

Summary: These researchers investigated the effect of analgesia at disbudding on weight gain and milk intake of 3- to 6-week-old Friesian-Jersey dairy calves. Farm staff disbudded 101 calves without sedation or local analgesia, of which 51 received subcutaneous meloxicam 20mg. Veterinary staff disbudded 101 calves with sedation and local analgesia, of which 51 also received meloxicam 20mg. From disbudding, i.e. day 0 to day 15, farmer-disbudded calves receiving meloxicam grew faster (0.65 kg/day) than calves without meloxicam (0.55 kg/day; $p=0.011$), but an interaction between operator and meloxicam treatment ($p=0.056$) meant that meloxicam treatment did not increase growth rates in veterinarian-disbudded calves (0.63 vs 0.64 kg/day; $p=0.872$). From days 16-30 there was no significant effect of meloxicam on growth rate, but veterinarian-disbudded calves grew faster (0.76 kg/day) than farmer-disbudded calves (0.66 kg/day; $p=0.034$). For the first 30 days after disbudding, if meloxicam was not used, veterinarian-disbudded calves grew faster than farmer-disbudded calves ($p=0.002$). However, if meloxicam was used at disbudding there was no difference in growth rate between veterinarian- and farmer-disbudded calves. Mean cumulative milk consumption for the 11 days after disbudding was greater for calves disbudded by veterinary staff than by farm staff ($p<0.001$).

Comment: Animal welfare is important regardless of whether there is a production response to enhanced animal welfare. This paper gives us evidence that providing analgesia via meloxicam when calves are disbudded without sedation or local anaesthetic will result in greater growth rates. This hopefully will result in increased use of meloxicam by farmers when calves are disbudded without sedation and local anaesthetic. There was no evidence that using meloxicam in addition to local anaesthetic and sedation increased growth rates but this should not preclude its use as growth rates may not be a sensitive measure of animal welfare and the public's perception of animal welfare could be more important than what actually happens.

Reference: *N Z Vet J.* 2015;63(3):153-7

[Abstract](#)

Pharmacokinetic evaluation of different generic triclobandazole formulations in heifers

Authors: Ortiz P et al.

Summary: This study compared systemic exposure of a reference and four test formulations of triclobandazole (TCBZ) in heifers. Thirty Holstein heifers were randomly distributed into five groups ($n=6$ per group): the reference group (RF) received the reference formulation (Fasinex) and those in the other groups received different commercially available TCBZ formulations (Test I, Test II, Test III and Test IV). All treatments were orally administered at 12 mg/kg bodyweight. Triclobandazole sulphoxide (TCBZ.SO) and TCBZ-sulphone (TCBZ.SO₂) were the only analytes recovered in plasma. Only the Test I formulation did not differ from the RF for all pharmacokinetic parameters measured for either metabolite ($p>0.8$). The TCBZ.SO area under the concentration versus time curve for Test II formulation (268.9 $\mu\text{g}\cdot\text{h}/\text{mL}$) was lower, and for Test III (619.9 $\mu\text{g}\cdot\text{h}/\text{mL}$) and Test IV (683.4 $\mu\text{g}\cdot\text{h}/\text{mL}$) was higher, than the RF (418.1 $\mu\text{g}\cdot\text{h}/\text{mL}$) ($p<0.005$).

Comment: This study compared 4 generic formulations of triclobandazole with a reference formulation (Fasinex) using pharmacokinetic measures. Only one of the generic formulations was deemed to not differ from the reference formulation for all of the pharmacokinetic parameters measured. The other formulations differed. This could potentially lead to reduced efficacy or the potential for toxicity. Generic products may not be equivalent to a reference product for the following reasons:

- Quality of active ingredient.
- Particle size and distribution of particle size.
- Surface crystal structure of active ingredient.
- Type and quality of excipients.

Reference: *N Z Vet J.* 2014;62(5):279-85

[Abstract](#)

[CLICK HERE](#)

to read previous issues of Dairy Research Review