IDF Animal Health Newsletter

Issue N° 8 - October 2014

Preface

Dear Reader,

The Standing Committee on Animal Health and Welfare (SCAHW) has successfully completed an eighth edition of the yearly IDF Animal Health Newsletter. The Newsletter is available both electronically and as a paper copy. The Newsletter is produced with the primary aim of providing SCAHW members and others in the IDF community with knowledge of current activities in the field of animal health and welfare. It contains short descriptions of recent research, including summaries of PhD and Master theses, current activities in SCAHW, different projects and campaigns from member countries and more. The contributions are from members of the IDF SCAHW and their collaborators, from all over the world. In this edition we can present authors from Europe, Israel, Japan, North America and Australia. This issue of the Animal Health Newsletter represents the broad nature of SCAHW very well, with contributions ranging from mastitis reduction campaigns and BVDV eradication to animal welfare, dead cows and paratuberculosis. I hope that you will find it both interesting and inspiring.

If you want to contribute to the Newsletter by providing us with the results of research of interest to the dairy community, as well as information on recent or forthcoming meetings, do not hesitate to contact us.

Ylva Persson (Sweden) Editor
E-mail: ylva.persson@sva.se

The International Dairy Federation

70/B, Boulevard Auguste Reyers
1030 Brussels – Belgium
info@fil-idf.org
http://www.fil-idf.org

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From the Chair of the IDF Standing Committee on Animal Health and Welfare (SCAH)

Welcome to all the new members who have joined our committee and thank you for all the support from those who have retired. Cheryl McCrindle, who retired this year, was a very active member and on the organizing committee for the excellent IDF World Dairy Summit in Cape Town in 2012. I would also like to thank all the current committee members for their help and contributions to our various work items and to Ylva and Marylène for this current newsletter.

Our *Guide for Use and Interpretation of Bovine Somatic Cell Counts* published last year has proven to be very popular and an important reference document, especially as many countries are reviewing the treatment and prevention of intramammary infections both during lactation and at the end of lactation. Alongside this work is a continuing project involving a literature review on antimicrobial resistance. The current fact sheet on this topic will be updated next year after a review of the literature from the last ten years.

The committee continues to work with other IDF committees and is currently involved in preparing a joint fact sheet with the Standing Committee on Microbiological Hygiene.

Several members of the committee gave presentations at the Animal Health session at the Yokohama World Dairy Summit in 2013. This session was so popular that it had to be moved to hold the extra people registering.

Committee members have also worked with the World Organisation for Animal Health (OIE) on their "Ad hoc Group on Animal Welfare in Dairy Cattle Production Systems" and with the International Committee for Animal Recording (ICAR) on using existing and new outcome measures that could be important with regards welfare and also for "Recording Organizations" to use with regards genetic evaluation indices.

Dr Elizabeth Berry
Chair of the IDF Standing Committee on Animal Health
E-mail: Elizabeth.Berry@dairyco.ahdb.org.uk

PhD reports

On-farm cow mortality in Swedish dairy herds

A high rate of on-farm cow mortality (i.e. euthanasia and unassisted death) is both a financial concern and an important animal welfare issue. Increasing mortality rates among dairy cows have been reported in Denmark and the USA in the past few decades. This project was initiated to evaluate the development of cow mortality in Swedish dairy herds and to identify characteristics associated with on-farm mortality at cow and herd levels.

The study was divided into four parts. In paper I, two analyses were performed using data from the cattle database with the objective of identifying risk factors at the herd level: one multiple-year study of 6898 herds between 2002 and 2010; and one single-year study of 4252 herds in the year 2010. The studies demonstrated that the cow mortality rate had gradually increased between 2002 and 2010, from 5.1 to 6.6 deaths/100 cow-years. At the herd level, larger herd size, longer calving interval and the Swedish Holstein breed were associated with greater mortality. Lower mortality was observed during autumn–winter, in herds with a higher average milk yield and in organically managed herds.

In paper II, a questionnaire was developed to acquire information on management routines that we hypothesized were related to on-farm cow mortality. This postal questionnaire was sent to farms with herds that had either high or low mortality rates for three consecutive years, 250 and 194 herds, respectively. Of the returned questionnaires, 145 were included in the analysis. Being a high mortality herd was associated with a larger mean annual herd size, having predominantly Holstein cows, having cows on exercise pasture (instead of production pasture) during the summer season, and no answer on the question of bedding improvement frequency.

Risk factors at cow level were evaluated in paper III. All dairy cows with a calving between 1 July 2008 and 30 June 2009, from herds enrolled in the milk recording scheme with a herd size of more than 40 cows, were included. First parity cows (n = 76 720) and second or greater parity cows (n = 130 032) were analysed separately. At the cow level, the highest mortality hazards were found for traumatic events and diseases. The mortality hazard was higher in early lactation and increased with parity.

In paper IV, a field study was performed to assess the relative proportion of unassisted cow deaths in the on-farm cow deaths. The two main destruction plants in Sweden were visited three times each in 2011–2012. All dairy cow cadavers (n = 556) were examined and the type of death was recorded. A hole in the forehead (caused by a bullet or a captive bolt) was used as an indication of euthanasia. Farmers that had sent the cows were contacted by telephone to verify type of death and to give a short case history. The results showed that 30% of the cows died unassisted and that a high herd average stillbirth rate increased the risk of unassisted cow death (as opposed to euthanasia).

In conclusion, these studies have identified that Swedish cow mortality rates are at a relatively high level compared with other countries. The good news, however, is that although the average mortality rate is high, there are large differences between herds and many herds have low mortality rates. Also, the relative proportion of unassisted cow deaths in Swedish herds is lower than that reported from the USA and Denmark. This thesis demonstrates that characteristics related to intensification of the dairy industry are also associated with high on-farm mortality. It is important to remember that on-farm cow mortality is a multifactorial problem that is highly affected by factors such as farmers' attitudes and management practices.

A digital version of the thesis can be found at:
http://pub.epsilon.slu.se/11128/

Karin Alvåsen
Department of Clinical Sciences, Division of Ruminant Medicine and Epidemiology, Swedish University of Agricultural Sciences, Uppsala, Sweden
E-mail: Karin.Alvasen@slu.se

Other research

Trial for an evaluation of dairy cattle welfare in free-stalls at Hokkaido, Japan according to UK Farm Animal Welfare Committee (FAWC) standards

The welfare of dairy cattle in Japan has been taken notice of since late in the previous century. Hokkaido is one of the most prospered areas of dairy production in Japan, and farmers, veterinarians and the staff of research stations here have also paid great attention to this subject.

In this study on the degree of attainment of dairy cattle welfare according to the standards of the United Kingdom Farm Animal Welfare Committee (FAWC), nine dairy farms in Hokkaido were surveyed (Table 1). The number of dairy cattle on the visited farms ranged from 53 to 950 (mean 406), including company farms and family farms (stanchion stall). Production on these farms was 280–6000 tons/year (mean 2300 tons/year) and mean milk yield was 8500–12 000 kg milk/305 days/cow. The mean percentage replacement of dairy cows was 10.5% and accidental death was less than 5%.

For each farm, the number of attainment items for the FAWC standard and the percentage attainment are shown in Table 2. The total mean attained percentage was 76%, which was almost the level required for the FAWC standard. Low attainment items were found in "grazing" and "frequency of checking the milking machine". Usually in Japan, farms applying the free-stall system do not utilize grazing but total mean ration (TMR) feeding. Periodic checking of the milking machinery was done once a year officially. These two items were the cause of the lower attainment score.

The mean percentage of replacement of dairy herd, about 12%, was normal. The percentage of accidental death, less than 5%, was considerably lower than in other developed countries.

In conclusion, the welfare of dairy cattle in Japanese dairy farms applying the free-stall system could achieve qualifying marks for the FAWC standard, although the number of samples was limited. The proportion of accidental deaths is especially excellent compared with North American records of 7–11%.

Seiji Kondo
Graduate School of Agriculture, Hokkaido University, Japan
E-mail: skon@anim.agr.hokudai.ac.jp

Table 1: Outline of farms surveyed

	Farm												
	IW	M	NÇP	N2	N3	M	IN	NK	MW	Mean	SD	Max	Min
Number of cows	53	32	505	323	78	28	120	170	520	203.2	197.5	520	28
Lactating cows	40	28	467	296	73	252	104	150	420	203.3	163.8	467	28
Heifers and calves	37	21	372	283	71	180	105	80	430	175.4	151.3	430	21
TOTAL	90	53	877	606	149	460	225	250	950	406.7	337.0	950	53
Cows in stanchion barn	0	32	0	0	30	46	0	0	0	12.0	18.5	46	0
Cows in free stall barn	62		500	370	80	300	84	160	520	259.5	189.5	520	62
Cows in tie stall				100	8					54.0	65.1	100	8
Shipping amount of milk (t)/year	380	250	5,936	3,500	730	2,900	1,040	1,650	4,030	2,268	1,948	5,936	250
Mean milk yield (kg) /year	8,800	8,500	11,600	11,824	10,000	12,000	10,000	9,800	8,600	10,125	1,389	12,000	8,500
Mean parity of cows	3.2	3.8				2.4	2.7	3.0	2.1	2.9	0.6	3.8	2.1
Max parity in each farm	11	9				8	8	9	8	8.8	1.2	11	8
Replacement cows/year	7	1		55	23	80	25	25	125	42.6	42.0	125	1
Accidental death/year	4	3		35		20	15	2	60	19.9	21.3	60	2
% of replacement cows/year	7.78	1.89		9.08	15.44	17.39	11.11	10.00	13.16	10.48	12.46	17.39	1.89
% of accidental death/year	4.44	5.66		5.78		4.35	6.67	0.80	6.32	4.88	6.32	6.67	0.80

Table 2: Attainment number and percentage for FAW standard

		Farm									Mean	
		IW	M	N1	N2	N3	M	IN	NK	MW	Farms	Åì
Feed	Number of items	7	5	6	6	7	6	6	6	5	6	
	Attained %	100	71	86	86	100	86	86	86	71		88
Water	Number of items	4	2	1	4	4	4	4	4	4	3	
	Attained %	100	50	25	100	100	100	100	100	100		82
Building	Number of items	5	7	6	7	6	6	5	9	7	6	
	Attained %	50	70	60	70	60	60	50	90	70		60
Milking Parlar	Number of items	4	4	6	5	5	5	4	3	5	5	
	Attained %	50	50	75	63	63	63	50	38	63		59
Attained Farm %		69	62	66	76	76	72	66	76	72	69	
Total mean												72.25
SD												14.9304
MAX												88
MIN												59

An epidemiologic study of the summer rise in bulk milk somatic cell count in Ontario dairy herds

Regionally aggregated bulk milk somatic cell count (BMSCC) data from around the world show a repeatable, globally pervasive cyclicity, with peak levels experienced during warm, humid seasons. No studies have evaluated this seasonal phenomenon at the herd level. The objectives of this study were: (a) to define summer seasonality in BMSCC on an individual herd basis, and subsequently to describe the characteristics and dynamics of herds with increased BMSCC in the summer; and (b) to investigate farm-level environmental, pathogen and management risk factors associated with elevations in BMSCC during the summer.

To address the first objective, the data used for this analysis were from all dairy farms in Ontario, Canada between January 2000 and December 2011 ($n \approx 4000–6000$ herds/year). Bulk milk data were obtained from the milk marketing board and consisted of bulk milk production, components (fat, protein, lactose and other solids), quality (BMSCC, bacterial count, inhibitor presence, freezing point), farm quota holdings, milk quota and incentive fill percentage. A time-series linear mixed model, with random slopes and intercepts, was constructed using sine and cosine terms as predictors to describe seasonality, with herd as a random effect. For each herd, seasonality was described with reference to one cosine function of variable amplitude and phase shift. The predicted months of maximal and minimal BMSCC were then calculated. Herds were categorized as low, medium or high peak (Figures 1–3) based on percentiles of amplitude for each of the four seasons. Using the above seasonality definitions, two transitional repeated measures logistic regression models were built to assess the characteristics of summer seasonal herds. Control herds were defined as herds experiencing low levels of summer seasonality. Case herds for each model were defined as herds experiencing either a moderate or high level of summer seasonality, respectively.

Based on the analyses performed, a history of summer BMSCC elevations increased the odds of experiencing a subsequent elevation. As herd size decreased, the odds of experiencing moderate to high BMSCC elevations increased. Herds with more variability in daily BMSCC were at higher odds of experiencing moderate and high elevations in BMSCC, as were herds with lower annual mean BMSCC. Finally, there was a negative association between filling herd production targets and experiencing moderate to high elevations in BMSCC. These findings provide farm advisors direction for predicting herds likely to experience elevations in SCC over the summer and may help them to devise intervention strategies that focus on known mastitis risk factors.

To address the second objective, 50 herds were recruited to participate in an intensive study. Each herd was visited three times during the summer months, with two of those visits occurring at milking time. Herds were classified as high summer BMSCC increasing (HSI) and low summer BMSCC increasing (LSI) based on Fourier regression techniques assessing daily or every-other-day pick-up BMSCC levels between January and December 2013. A total of 30 herds were classified as HSI. Multivariable logistic regression models were employed to assess the relationship between environment, pathogen and management variables with the odds of being classified as an HSI herd. After controlling for winter BMSCC, an increase (from the first to the second assessment visit of the summer) in the proportion of cows scored as having dirty and hyperkeratotic teat ends was associated with increased odds of experiencing a summer elevation in BMSCC. In addition, an increased number of cows milked per hour was associated with higher odds of experiencing a summer increase in BMSCC. When evaluating environmental risk factors, herds that experienced high sample prevalence of Gram-positive environmental (GPE) and yeast subclinical infections tended to have higher odds of experiencing summer BMSCC elevations. For instance, herds with a 30% prevalence of GPE pathogens diagnosed from subclinical samples taken from high SCC cows had 20 times the odds of being classified as HSI herds, relative to herds with a 10% prevalence of GPE pathogens. Herds that did not practice regular udder hair removal were at significantly higher odds of experiencing summer BMSCC elevations. Herds that allowed their close-up cows to stay in the pen of intended calving for 10 days had 0.25 times the odds of being classified as an HSI herd relative to herds that allowed their cows access to such pens for less than 1 day. Prevention practices should focus on mitigating risk factors associated with environmental mastitis pathogens.

Figure 1: Low peaking summer herd in 2011. *Solid line* represents model prediction for the herd, and *symbols* represent actual bulk milk somatic cell counts (BMSCC)

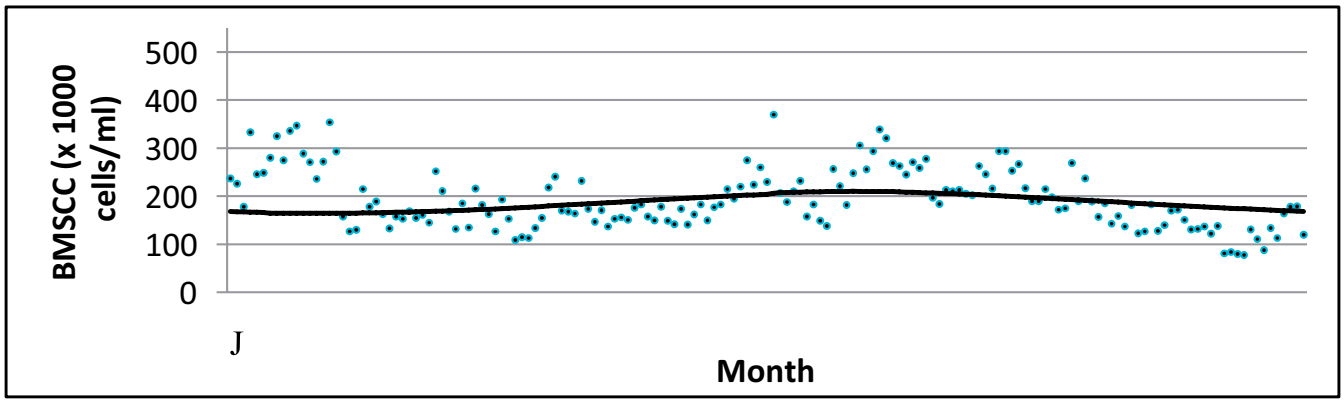


Figure 2: Moderate peaking summer herd in 2011. *Solid line* represents model prediction for the herd, and *symbols* represent actual bulk milk somatic cell counts (BMSCC)

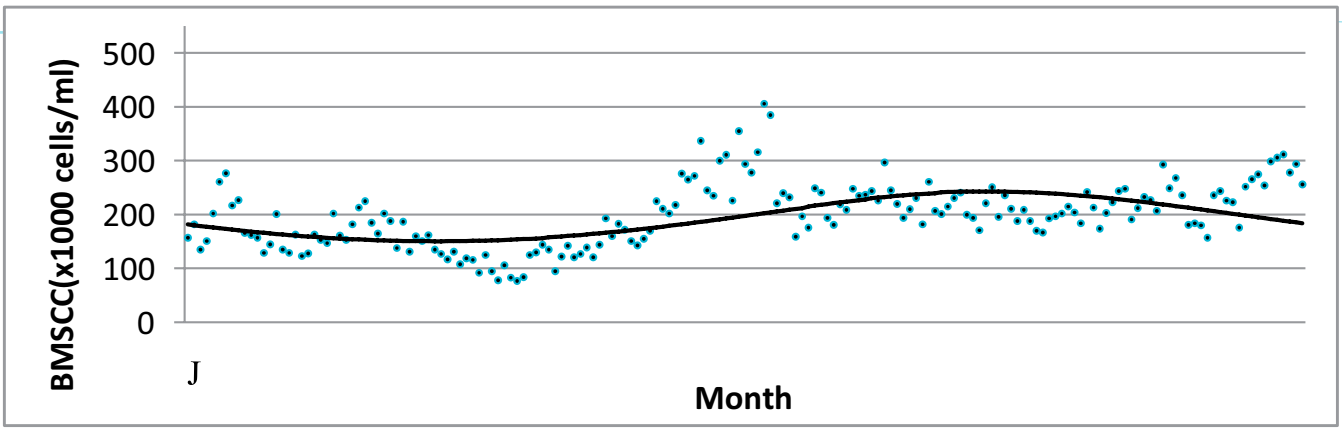
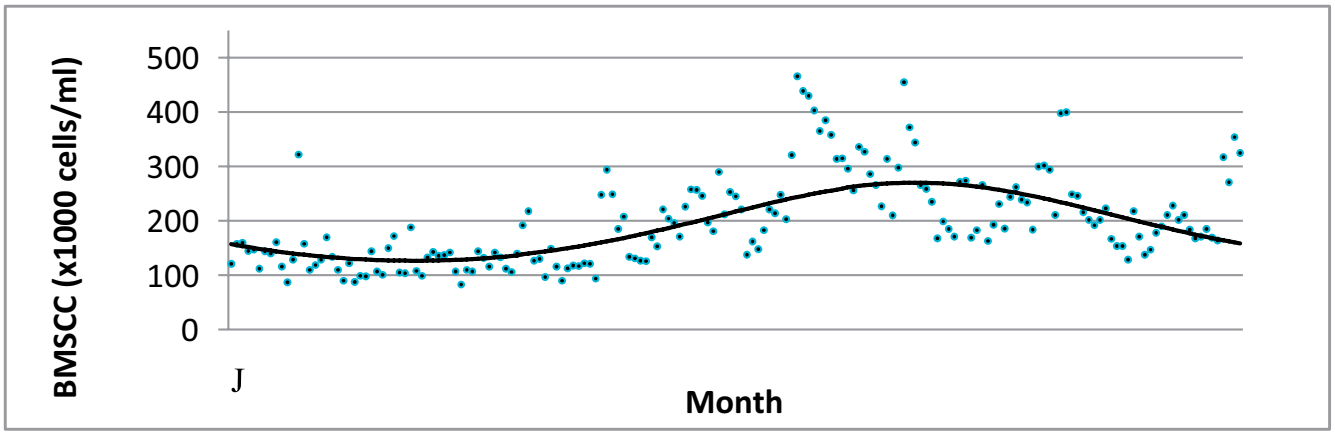


Figure 3: High peaking summer herd in 2011. *Solid line* represents model prediction for the herd, and *symbols* represent actual bulk milk somatic cell counts (BMSCC)



Daniel A. Shock[1], Stephen J. LeBlanc[1], Ken E. Leslie[1], Karen Hand[2], Ann Godkin[3], Jason B. Coe[1] and David F. Kelton[1]
[1]Department of Population Medicine, University of Guelph, Guelph, Ontario, Canada, N1G 2W1
[2]Strategic Solutions Group, Guelph, Ontario, Canada, N0B2J0
[3]Veterinary Science and Policy Group, Ontario Ministry of Agriculture and Food, Guelph, Ontario, Canada, N1G 4Y2
E-mail: shockd@uoguelph.ca

Mastitis microbes in Norwegian AMS herds

Norway has at present approximately 9000 milk producers. The herd size is increasing and there is an ongoing structural change. At present, the mean herd size is 25 cows, but the number of herds with 50–100 cows is steadily increasing. The number of herds with less than 20 cows is decreasing. There is also a regulation demanding that barns be free stalls after 2024. This, together with the high building and labour costs in Norway, is probably a driving force for this change. At present 25% of all farms have an automatic milking system (AMS). Because the herd size is larger in AMS herds and the milk yield is higher, approximately one third of all milk was obtained using an AMS in 2014.

The AMS system seems to function well. The herds have the same bulk milk somatic cell count (BMSCC) as other herds with the same structure and the rate of treatment for clinical mastitis cases has decreased from 16.9 to 13.8 cases per 100 cow-years. Data available from subclinical cases illustrate that the mastitis microbes are different in AMS herds compared with other herds of the same structural size (Table 1). In this material, there are 598 control herds without AMS and 765 herds with AMS. Of those herds using AMS, 467 had DeLaval VMS machinery, 258 Lely and 26 SAC; other brands were used by less than 10 herds each. The herd size in the control group was 39.3 cows compared with 51.0 cows in the AMS group. The BMSCC was 144 000 versus 149 000; the number of clinical cases was 18.3 versus 13.5 per 100 cow-years; and milk yield was 7165 versus 7667 kg per cow-years, respectively, for controls and AMS herds.

Table 1: The odds ratio for identifying a certain mastitis microbe from subclinical cases in AMS herds compared with other herds

Mastitis microbe	Odds ratio	Confidence interval (95%)
Streptococcus agalactiae	3.9	2.9–5.2
Streptococcus dysgalactiae	1.2	1.1–1.3
Corynebacterium bovis	0.95	0.83–1.09
Coagulase-negative staphylococcae (CNS)	0.93	0.87–0.99
Corynebacterium spp.	0.78	0.68–0.88
Staphylococcus aureus	0.66	0.61–0.71
Streptococcus uberis	0.47	0.41–0.54

Corresponding figures for bacteria cultured from clinical cases were not different, except for *Staphylococcus aureus* and *Escherichia coli* where the odds ratio (OR) was found to be 0.48 (0.34–0.69) and 2.2 (1.5–3.1), respectively.

The most prevalent mastitis pathogens isolated from individual cows in Norway have so far been CNS (40.5%), *S. aureus* (23.7%), *S. dysgalactiae* (12.0%) and *S. uberis* (9.6%). *S. agalctiae* (0.42%) was a very seldom seen pathogen from the late 1980s until 2005. Then, it started to increase, probably as a result of introduction of the AMS system. At present, bulk milk screening has identified 100 herds (0.9%) with *S. agalactiae*. These are typically large AMS herds. These farms are now given advice on how to eliminate this pathogen. For clinical cases, the proportion of inflamed teats are *S. aureus* (27.4%), coliform bacteria (15.4%), *S. dysgalactiae* (10.5%), CNS (8.6%), *S. uberis* (5.8%) and *S. agalactiae* (0.18%).

In conclusion, a change to the free-stall system with an AMS seems to have a large impact on the proportion of different mastitis pathogens detected, both in subclinical and clinical cases. It seems that the proportions of *S. agalactiae* and *S. dysgalactiae* are increasing, whereas those of *S. aureus* and *S. uberis* are decreasing. For clinical cases, *S. aureus* is also decreasing, whereas *E. coli* is increasing. The implication is that the present mastitis control programme also needs to adapt to these changes in the mastitis pathogens.

Olav Østerås
TINE Advisory Service, Section Animal Health and Welfare, PO Box 58, 1431 Ås, Norway
E-mail: olav.osteras@tine.no

Bovine neutrophil responses to dietary copper and zinc supplementation

Bovine neutrophils are crucial components of the mammary host defence against intramammary infections and mastitis. Neutrophils originate in the bloodstream and migrate to the site of infection by extravasion and chemotaxis. Once neutrophils arrive at the site of infection, they destroy bacteria by phagocytosis and intracellular killing [1]. The efficacy of neutrophils is influenced heavily by nutrition, particularly vitamins and minerals. Copper and zinc are both components of the superoxide dismutase enzymes, which are responsible for converting superoxide radicals to hydrogen peroxide. These enzymes protect cells, including neutrophils, from oxidative stress [2] and thus influence the ability of neutrophils to migrate and their phagocytic capabilities. The purpose of the current experiment was to evaluate the effects of supplementing the diet of cows with organic copper and zinc on (1) the in vitro phagocytosis and intracellular kill of *Escherichia coli* and (2) the in vivo clinical response to intramammary infusion of lipopolysaccharide (LPS).

Twelve lactating Holstein cows were paired by parity and days in milk. One cow in each pair was fed a diet supplemented with 8 ppm copper and 25 ppm zinc. The remaining cow in each pair was fed a diet void of supplementary copper or zinc. Cows were fed the experimental diets for 30 days prior to testing. Intracellular kill and phagocytosis assays were as described by Hogan et al., using *Escherichia coli* 487 as the test bacteria [3]. Subsequent to neutrophil testing, each cow was infused in the right front mammary gland with 10 µg of LPS diluted in 10 ml of sterile saline. Rectal temperature, clinical score and milk somatic cell count (SCC) of challenged mammary glands were recorded for each cow over the 48 hours after intramammary infusion.

Intracellular kill of bacteria by neutrophils was not affected by diet. The mean percentage intracellular kill of bacteria did not differ between supplemented and control cows (Figure 1). Diets with mineral supplementation did result in a significant difference between treatment groups in the number of bacteria phagocytized per neutrophil. Neutrophils from cows fed the control diet had an increased mean phagocytic index compared with those from supplemented cows (Figure 2). Following intramammary LPS challenge, milk SCC (Figure 3) and clinical score (not shown) did not differ between cows fed supplemented and control diets. However, rectal temperatures (Figure 4) of cows fed control diets were higher than those of cows fed supplemented diets from 2–24 hours post-infusion.

Supplementation of the diets of lactating cows with organic copper and zinc had minimal positive effects on in vitro neutrophil function or on the in vivo intramammary response of SCC and clinical score to LPS challenge. Surprisingly, the rectal temperatures of supplemented cows were reduced compared with those of cows fed control diets following LPS intramammary infusion.

Figure 1

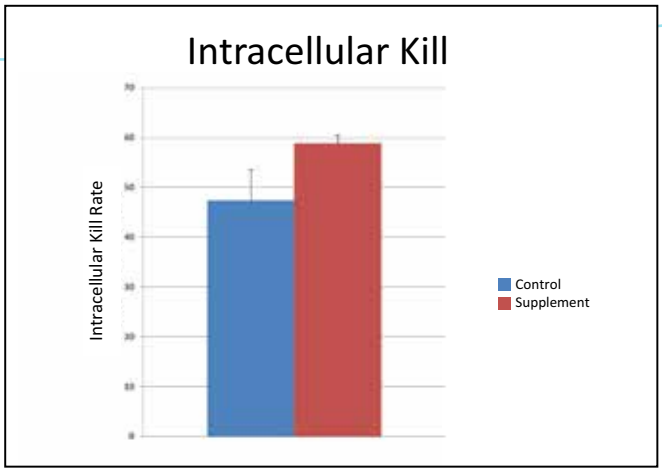


Figure 2

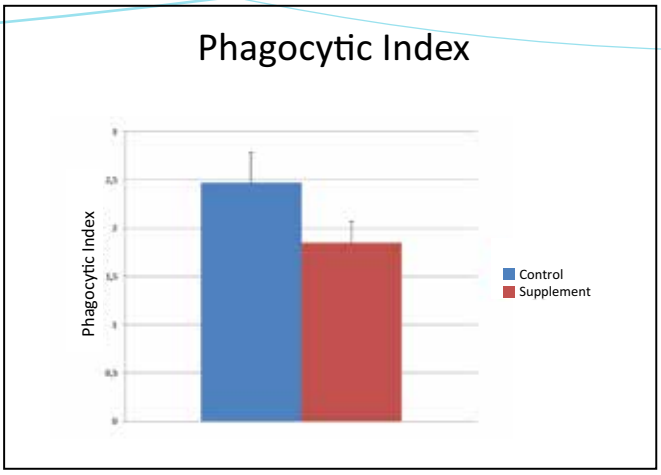


Figure 3

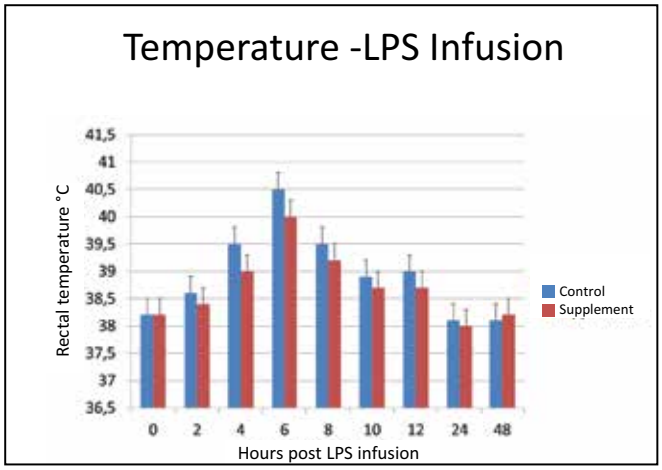
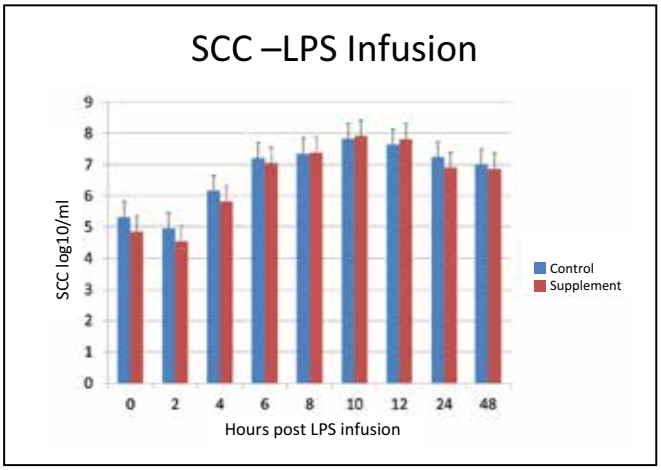


Figure 4



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Kim Tran, Carter Wallinger and Joe Hogan
Department of Animal Sciences, The Ohio State University Wooster, Ohio, USA
E-mails: kimtran2011@gmail.com; wallinger.2@buckeyemail.osu.edu; hogan.4@osu.edu

Effects of freezing bedding samples on bacterial counts

Troubleshooting the sources of bacteria causing mastitis outbreaks in a herd often involves sampling and identifying the primary sources of the etiological agents in the cows' environment. For cows in confinement housing, bedding is often the primary source of environmental mastitis pathogens. For logistical reasons, bedding samples are often frozen during transport and prior to bacteriological examination. However, little data is available on the validity of freezing bedding samples relative to the effects on bacteriological counts of common mastitis pathogen groups. The purpose of the current trial was to compare bacteriological counts in common bedding materials analyzed either fresh or after being frozen for up to 21 days.

Bedding samples were collected from two commercial dairies in Ohio during October 2013, November 2013, May 2014 and June 2014. Bedding types sampled were recycled manure solids, sand and sawdust. Bedding samples were collected prior to use as bedding and from stalls after use. Each sample was thoroughly mixed and divided into four sub-samples for analysis as fresh or after freezing at –20°C for either 7, 14 or 21 days (n = 192). All bedding samples were analyzed and the results reported as described by Sorter et al. [1]. Bacterial counts were analyzed by bedding type, days frozen and bedding type × days frozen using ANOVA [2].

Freezing of samples had different effects on bacterial counts according to bedding type and pathogen group. Total Gram-negative bacterial counts in recycled manure (Figure 1) and sand (Figure 2) samples were reduced in frozen samples compared with fresh bedding. However, Gram-negative bacterial counts did not differ within recycled manure and sand bedding samples frozen for 7, 14 and 21 days. Similarly, coliform counts in recycled manure and sand bedding were reduced by freezing, but were similar among samples frozen for 7, 14 and 21 days. Gram-negative bacterial and coliform counts in sawdust were not affected by freezing (Figure 3). *Klebsiella* and streptococcal counts were similar in fresh and frozen samples for all three bedding types.

Documentation of procedures and consistency of methods for storing bedding samples appears to be necessary when comparing bacteriological results. Freezing decreased the Gram-negative and coliform counts in recycled manure and sand bedding. However, bacterial counts did not change over 21 days once these two bedding types were frozen. Surprisingly, bacteriological counts in sawdust samples did not follow a similar trend and were unaffected by storage conditions. Standard operating procedures for storage of bedding samples should be practiced and documented in reports by both clinicians and researchers evaluating bedding as a potential source of environmental mastitis pathogens.

Figure 1

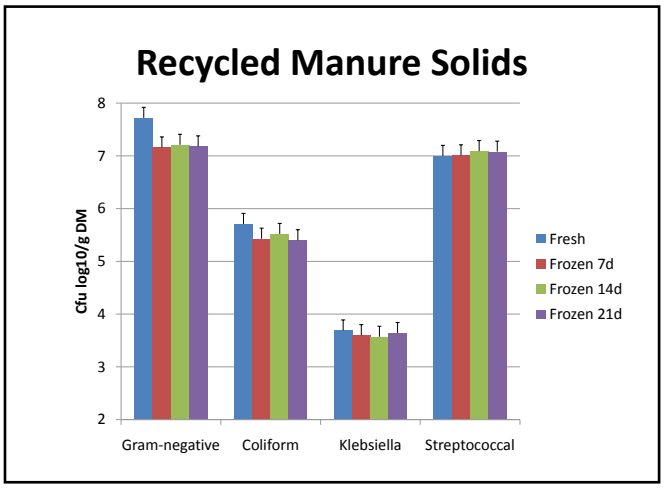
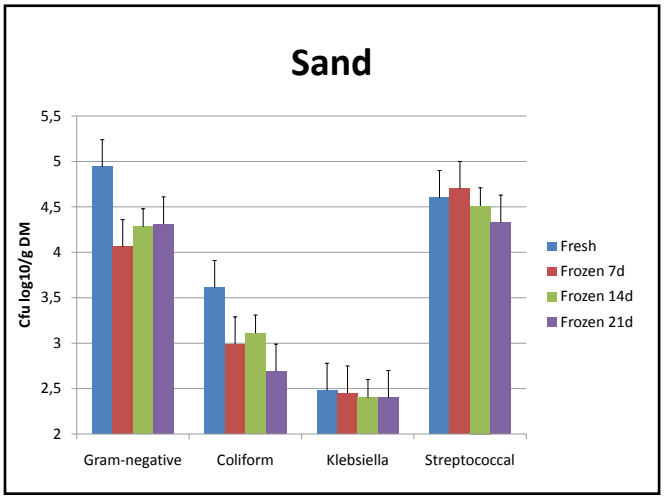


Figure 2



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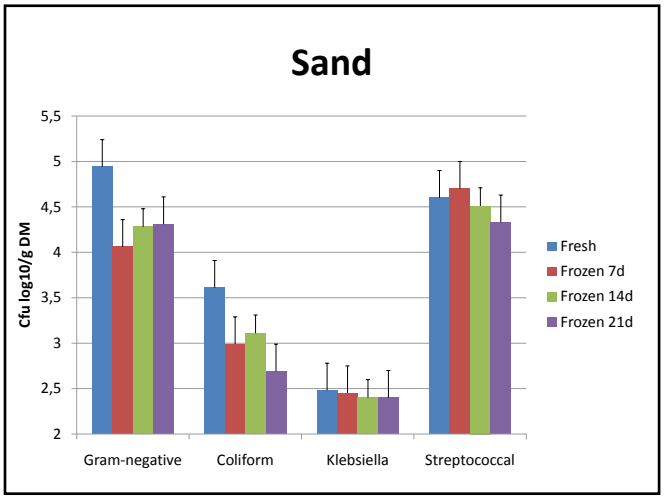

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Erin Homerosky, Stephanie Reed and Joe Hogan
Department of Animal Sciences, The Ohio State University, Wooster, Ohio, USA
E-mails: homerosky.3@buckeyemail.osu.edu; smreed@cinci.rr.com; hogan.4@osu.edu

Investigating social networks to improve the productivity and health of dairy cows

A wealth of studies investigating social behaviour has revealed that social relationships between animals have a great impact on fitness in many species. Individuals may benefit from advantages gained by associating with familiar conspecifics, such as improved predator defence or foraging efficiency. Furthermore, social bonds maintained between individuals in animal groups can act as a buffer against stress, a phenomenon referred to as "social support". This can improve reproductive success, cardiovascular health, learning, immune function and recovery from stressful experiences.

There is currently a substantial gap in our understanding of how the social environment affects farm animals. However, research into social instability in the farm environment, such as during regrouping, shows that there are numerous detrimental effects on health, welfare and production. Regrouping cattle has been linked to increased frequency of agonistic encounters, reduced time feeding and milk decline. Furthermore, one study has demonstrated a negative correlation between the number of times a cow is regrouped and her productive lifetime.

A project investigating the social dynamics of dairy cattle and the influence these have on the health and productivity of individuals is currently underway at the University of Exeter. Behavioural data used to construct social networks (a measure of the social relationships between individuals in a group) is being collected using spatial proximity loggers (Sirtrack Ltd.) on commercial dairy farms in the southwest of the UK. These automated radio-signal devices measuring inter-individual proximity are becoming an increasingly popular tool for recording patterns of social interactions in animal groups. They have also been applied in studies of contact between species, notably dairy cows and badgers in the context of disease transmission. As part of the study at Exeter University, the reliability of this technology was investigated by analysing data collected by loggers deployed on cows and assessing the performance of these devices under standardised conditions (Figure 1). As proximity loggers function by simultaneously sending and receiving radio signals when in close-distance range, data on loggers should be reciprocal, i.e. if logger A records a 3-minute contact with logger B, logger B should also record a contact with A starting at the same time and for the same duration. Yet, testing revealed that contacts between loggers were often unreciprocated, a finding that has been noted in previous studies without due acknowledgement of the potential consequences for the interpretation of social data. In this study, proximity logger performance was demonstrated to vary between each logger, yet was consistent within a given logger.

The implication of this discovery is that when loggers are deployed on animals, significant sampling biases can occur and, if left uncorrected, logger inconsistency can be misinterpreted as individual differences in social behaviour. However, research at Exeter University has resulted in multiple approaches that can be taken to correct for such biases in association data, a crucial step for any studies using these devices, which are being rapidly embraced by animal behaviourists.

Spatial proximity data can now be used to accurately measure the relationships between cows and provide us with a better understanding of the social network structure in groups of dairy cattle. This provides a foundation from which to investigate the health and production implications of regrouping, and the effect of stocking density on the patterning of social associations. Results from this research will be incorporated into practical advice for farmers on how cow–cow relationships can be managed in order to improve the health and productivity of their herds.

Figure 1: Cows inspect a spatial proximity logger – a device used to collect data on social relationships

Natasha Boyland
Exeter University, Exeter, UK
Contributor: Elizabeth Berry, DairyCo, Agriculture & Horticulture Development Board, Stoneleigh Park, UK
E-mails: nkb204@exeter.ac.uk; elizabeth.berry@dairyco.ahdb. org.uk

The effect of social contact on weaning distress in dairy calves

In the UK, dairy calves are separated from their dam within hours of birth; however, subsequent rearing practices vary. Around 60% of calves are individually reared, whereas others are housed in pairs or small groups. The use of individual pens is largely driven by attempts to reduce the risk of disease transmission. However, maternal and social isolation from conspecifics during early life has been shown to have detrimental effects on behaviour that can persist into adulthood in a diverse range of species.

Calves work harder to gain access to full social contact over partial contact with conspecifics, indicating that social contact is important to the calf. The importance of social contact is also acknowledged by UK regulations, which state that calves over the age of 8 weeks must be group housed. For younger calves, the regulations only state a requirement for visual and tactile contact with animals of similar age (The Welfare of Farmed Animals (England) Regulations 2007). Whether this is sufficient social contact is not yet proven.

Weaning often involves a change of environment, as individually housed calves are grouped and those reared in group-housing are re-grouped. This change of environment and social group coincides with a change of diet; all contributing to a stressful period. Disruption in growth is often experienced, providing a significant challenge to the industry.

One of the potential benefits of social contact is that it can increase social support, thus promoting wellbeing. For example, previous work has shown that calves exhibit reduced distress when separated with a familiar calf and that social support can buffer the stress of weaning. We currently know little about the importance of the strength of the social bond for social buffering.

This study compared the effects of rearing calves individually or in pairs with different contact durations on stress, health, production and behaviour at weaning. Forty female Holstein-Friesian were allocated to one of three treatments: individual housing (IH; Figure 1) (n = 8), calves pair-housed (Figure 2) from day 5 (P5) (n = 8 pairs), and calves pair-housed from day 28 (P28) (n = 8 pairs). From day 48, these bucket-fed calves were weaned by gradual reduction of milk over 3 days. Vocalisations were recorded as a behavioural response to stress during the 3 days pre-weaning, during weaning and during the first 3 days post-weaning. Cattle vocalisations can be a good indicator of both biological and emotional state. Additional data were collected on health, feed intake and body weight.

There was a significant effect of treatment on vocalisations during weaning (p = 0.008) and post weaning (p <0.001) (Figure 3). Individually reared calves vocalised four times more than P5 calves during the post-weaning period and over twice as much as P28 calves. Moreover, during this post-weaning period the P28 calves vocalised more than P5 calves. However, treatment did not have a significant effect on health (faecal score and respiratory score) or production as measured by feed intake (Figure 4) and growth rate (Figure 5).

These results suggest that the duration of time calves have to socialise is important for determining the degree of social buffering to stressors (weaning in this case). Inhibiting full social contact may leave calves less able to cope with stressful situations (such as weaning or re-grouping). Additionally, this study showed that, contrary to popular belief within the industry, calves can be pair-reared without detriment to health or production. However, the mode of feeding needs to be considered to reduce cross-sucking. Teat feeders, especially with low flow rates, are likely to result in less cross-sucking than bucket feeding. Further work will be required to establish whether long-term benefits to welfare and production can be achieved through providing full social contact during the early weeks of rearing.

Figure 1: Individually reared calf (2.59 m^2 pen)

Figure 2: Pair-reared calves (2.59 m^2 per calf)

Figure 3: Number of vocalisations

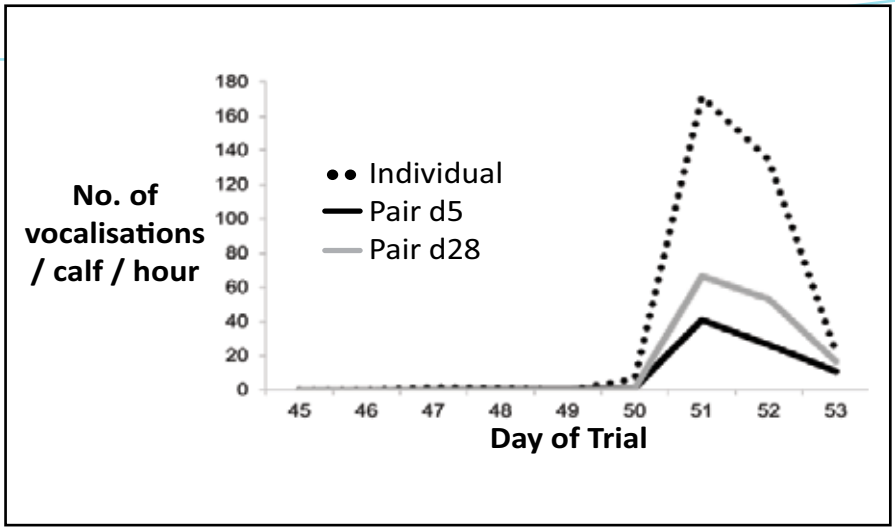


Figure 4: Daily concentrate intake

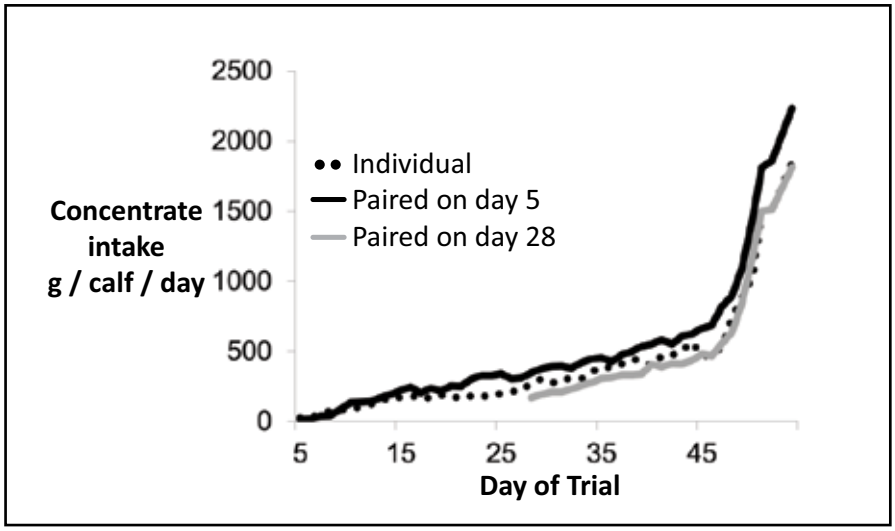
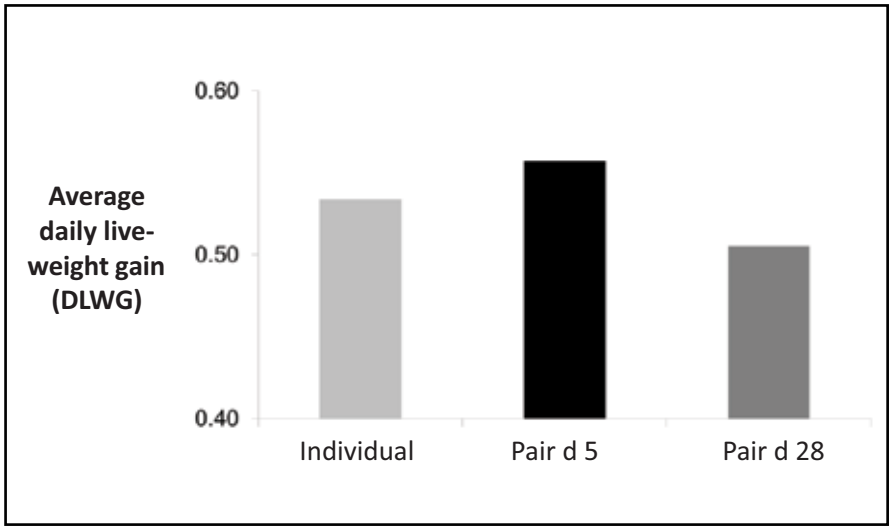


Figure 5: Average daily live-weight gain from birth to day 55



Sarah L. Bolt[1] and Darren P. Croft[2]
[1]AHDB, DairyCo Division, Stoneleigh Park, Kenilworth, Warwickshire, CV8 2TL, UK
[2]Centre for Research in Animal Behaviour, College of Life and Environmental Sciences, University of Exeter, Perry Road, Exeter, Devon, EX4 4QG, UK
Contributor: Elizabeth Berry, DairyCo, Agriculture & Horticulture Development Board, Stoneleigh Park, Kenilworth, Warwickshire, CV8 2TL, UK
E-mails: sarah.bolt@dairyco.ahdb.org.uk; elizabeth.berry@dairyco.ahdb. org.uk

News from member countries

Implementing our Code of Practice: The Canadian dairy animal care assessment programme

In Canada, Codes of Practice are nationally developed guidelines for the care and handling of the different species of farm animals. They are intended to promote sound management and welfare practices through recommendations and requirements for housing, management, transportation and other animal husbandry practices. The Codes serve multiple purposes, including providing information and education, serving as the foundation for animal care assessment programmes and providing reference materials for regulations. The National Farm Animal Care Council (NFACC) regroups various interested stakeholders to build consensus on the care of farm animals [1]. The *Code of Practice for the Care and Handling of Dairy Cattle* [2] is specific to dairy farms.

Developing Codes is the first step in providing customers with assurance about animal care on farms. NFACC has also developed the Animal Care Assessment Framework, which the dairy sector also piloted, being the first to develop an assessment programme under the guidelines developed for the Framework. Here again, the parties were national producer associations, auditors, animal welfare advocates, researchers and representatives from the retail and processor sectors. Two stakeholder workshops were part of the Framework development, and a test pilot on 35 dairy farms was conducted to seek practical comments from farmers and would-be auditors of the dairy programme.

The Animal Care Assessment Framework had the broad objective of facilitating the implementation of Codes of Practice by providing an informed framework and useful resources to groups developing an animal care assessment programme. The intent was also to enhance the transparency, legitimacy and credibility of assessment programmes developed according to a well-defined framework [1], which ensures consistency of communications along the value chain. At the end, it promotes Canada's cooperative approach to farm animal care, an approach that can be communicated nationally and internationally, and that builds upon existing initiatives.

High level principles guide the Framework, and it remains the sector's responsibility to initiate the development of an assessment programme. Animal care assessment programmes should bring benefits to stakeholders, including facilitating and accelerating technology transfer, providing assurances to buyers and consumers that animal care standards are being met, recognizing the achievements of programme participants and assisting them in meeting their management goals for the welfare of the animals in their care and, finally, providing a mechanism for continuous improvements in animal care and welfare.

Stakeholders share an interest in seeing the Codes of Practice implemented, not only because the Codes were developed for a purpose, but because failure to implement them undermines their role and value in society and makes the agriculture and agri-food sector more vulnerable to criticism.

Because it is important to Canadian dairy farmers that they continue to lead and drive change and innovation at home, the Dairy Farmers of Canada (DFC) has now taken the lead in refining the programme and developing training material, to be ready to conduct a second pilot project on farms in the autumn of 2014, with the aim of bringing it to all farms starting in 2015.

The DFC approach is to integrate this programme along with other existing and future programmes that aim to reassure the public that dairy farmers are responsible and sustainable food producers.

Combined , the various modules of the *proAction Initiative* [3] will provide measurable proof of the ongoing improvement on Canadian dairy farms for on-farm food safety, quality, animal health and care, traceability and environmental stewardship.

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Rejean Bouchard[1] and Therese Beaulieu[2]
[1]Assistant director, Dairy Farmers of Canada, Ottawa, CA
[2]Assistant director, Strategic Communications, Dairy Farmers of Canada, Ottawa, CA
E-mails: Rejean.bouchard@dfc-plc.ca; Therese.beaulieu@dfc-plc.ca

An action plan to prevent and reduce mastitis in France

Why a national plan on mastitis?

France is the second European country for cow milk production. In 2012, there were about 69 800 dairy farms and the average production per farm was 345 000 l (from: *L'Economie Laitière en Chiffres*, CNIEL, 2014).

With European milk quotas coming to an end in 2015, restructuring trends have been observed in French dairy farms, notably with herd size evolution. This comes with new challenges for dairy farmers, and collective actions are being organized to better anticipate potential issues and mutualize data and knowledge.

French programme: "Les mammites, j'anticipe"

The French action plan "Mastitis: I do anticipate" to prevent and reduce mastitis is a 5-year plan. It was launched in 2014 as an answer to the increase in cell counts observed in all French regions. It also contributes to the more general "Ecoantibio2017" French plan, which aims to reduce the use of antimicrobials at the farm level: less mastitis cases will require less antimicrobial treatments.

Mastitis leads to:

- An important economic loss for farmers (reduced milk production, decreased milk price, increased veterinary costs, etc.)
- An increase in the herd replacement rate and associated costs
- An increase in the workload (management of treatments and milk from infected animals) and stress for farmers

So, for dairy farmers, it is important to control mastitis. Remaining competitive and ensuring milk quality are challenges for them.

What is mastitis?

Mastitis is an inflammation of mammary tissues due to the penetration of bacteria in the udder. Bacterial growth induces an inflammatory reaction of variable importance. Two types of mastitis can be observed:

- Subclinical mastitis: Inflation is moderate, without visible signs, and an increase in somatic cell count can be observed (notably, white blood cells).
- Clinical mastitis: This type of mastitis is associated with visible symptoms, such as udder inflammation (hot, painful), or observable changes in milk appearance. It can cause an important decrease in the cow's milk production.

Mastitis is a multifactorial disease, which makes its control quite complex.

Objectives of the action plan

The programme is addressed directly at dairy farmers and at the professionals that give advice to farmers regarding milk quality management (i.e. veterinarians and consultants; the term "adviser" will be used in the remainder of the text). The general objective of this action plan is to help advisers in their approach to farmers.

To achieve this objective, three fields of action have been defined:

1. Assist and support advisers by:
   - Training: A specific training of 6 days has been developed and should be attended by hundreds of advisers specialized in mastitis. This training aims at giving advisers the latest findings on mastitis, preventative measures and ways of reducing infection (milking, housing, feed, etc.), but also to give a common approach for on-farm intervention and for building a mastitis management plan with the dairy farmer. This is a key field of action for the programme's success, so that all advisers disseminate the same messages.
   - Developing practical, simplified and easy-to-use tools; for example, a mastitis cost-assessment tool or a simplified tool for use as a basis for discussion with dairy farmers during the observation phase, the interview and subsequent advice.
2. Mobilize and inform dairy farmers through:
   - Articles published in the agricultural press, which is the main source of information for French dairy farmers, on several key messages such as "what is mastitis?", " 10 good practices for avoiding mastitis", "mastitis treatments", etc.
   - Promotional material (e.g. Post-it notes) bearing the programme logo and slogan "les mammites, j'anticipe", as a reminder that mastitis can be prevented.
3. Research and development:
   - Since 2013, the INRA (French National Institute for Agricultural Research), has been carrying out a 3-year research programme on immunity to mastitis. One of the main objectives is to analyse how to improve an animals' immune response when confronted with bacterial infection.

Who is involved?

This action plan has been initiated by the dairy sector and its technical partners, and its success depends on the involvement of all stakeholders.

Organizations involved include the French Dairy Inter-branch Association (CNIEL), the French milk recording umbrella organization (FCEL), the French Livestock Institute (IDELE), the National Federation of Animal Health Services (GDS), the National Agency of Veterinary Technical Service Providers (SNGTV) and the French Association for Veterinary Medicine (SIMV).

Nadine Ballot[1] and Jennifer Huet[2]
[1]Breeding Sciences and Technics department, Centre National Interprofessionnel de l'Economie Laitière (CNIEL), Paris, France
[2]Fédération Internationale du Lait (FIL) France, Paris, France
E-mails: nballot@cniel.com; jhuet@cniel.com

Bovine tuberculosis in Chile: latest developments

Tuberculosis (TB) is considered one of the most devastating human infectious disease. In 2012, the World Health Organization reported 8.6 million new cases of TB worldwide and 1.3 million deaths on account of TB. Over 95% of the deaths occurred in low- and middle-income countries. Before regular milk pasteurization, a significant proportion of human tuberculosis cases were due to infection by *Mycobacterium bovis*, the causative agent of animal tuberculosis. Currently, in industrialized countries, the disease has been almost eradicated due to preventive and/or control measures such as testing, culling and pasteurization of milk. However, animal tuberculosis is still widely distributed in developing countries and considered a neglected zoonosis. In spite of the robust control measures in developed countries, research is on-going to find strategies to control this serious animal health problem and source of high economic losses in affected countries.

In the Americas, a recent systematic review of the scientific literature reports a median of 0.3% (range 0–33.9%) of *M. bovis* infections in humans [1]. *M. bovis* along with *Mycobacterium caprae* are the principal pathogens of bovine tuberculosis and both are members of the *M. tuberculosis* complex. Other members of this complex are *M. tuberculosis*, *Mycobacterium africanum* and *Mycobacterium Canetti*, which infect predominantly humans; *Mycobacterium microti*, which infects rodents; and *Mycobacterium pinnipedii* isolated form sea lions. Genome comparison results describe this complex as a series of host-adapted ecotypes, each with a different host preference representing different niches [2].

In Chile, bovine tuberculosis (BTB) is endemic with an area of high prevalence in the centre of the country and an area of low prevalence located in the south of the country (Araucanía, Los Ríos and Los Lagos region); the latter concentrates the largest bovine population (74.6%). A new government programme for the control of BTB was implemented in 2011 by the national agriculture authority (SAG). The plan included a control strategy in the high prevalence area and eradication through compartment strategy in the low prevalence area.

To support the official BTB programme, we have designed a highly sensitive TaqMan-based real-time PCR kit named BoviMan®, This test is fast and specific for the detection of *M. bovis* DNA and suitable for use on different PCR platforms (ABI, Roche LC480). The kit includes an instruction manual for fast and simplified DNA sample preparation and testing. BoviMan® was validated in 300 fresh nodules, culture-positive to BTB, and 900 culture-negative nodules from herds negative to the PPD test for at least 3 years. The sensitivity and specificity values registered were 95 and 97%, respectively. BoviMan® was certified by the health authority and incorporated as a tool to speed up the confirmation of BTB suspicious lesions.

Figure 1 shows a typical titration curve using different amounts of *M. bovis* genome copies. The results show a limit sensitivity of one genome copy, with an efficiency of 100%. The addition of *Bos taurus* DNA to mimic the pathogen DNA detection in tissue did not affect the sensitivity nor the efficiency.

M. bovis genotypes vary depending on the geographic region of origin and may influence the transmission of the disease. We have studied the polymorphism of *M. bovis* Chilean isolates using the DR locus (by spoligotyping) as genetic marker and the variation of loci with tandem repeats (VNTR) [3]. A total of 1406 isolates from 639 herds from different regions of the country were obtained from the National Livestock and Agriculture Laboratories and genotyped. The main spoligotype found was SB0140, representing 74% of the total. This genotype is also highly represented in Ireland, England and Argentina and shares the chromosomal deletion RDEu1 (Eu1) [4]. This suggests that the route of entry of *M. bovis* to Chile was commercial trade, because an agreement to import cattle from Argentina was under negotiation during the period 1905 to 1910. The remaining 26% of the isolates showed high variability of spoligotypes, which might be correlated to the differences in prevalence and the unrestricted movement of cattle within the country before the official BTB programme started in 2012. The Chilean *M. bovis* isolates are also widely spread in Ireland and the UK and in former trading partners of the UK (USA, South Africa, New Zealand, Australia and Canada) [3].

Further research is needed to increase the discriminating power of the test to distinguish between prevalent genotypes, as a precise distribution map of *M. bovis* is key to controlling outbreaks, determining disease propagation and distribution and correlating the genetic and environmental risk factors.

Acknowledgements

The authors gratefully acknowledge financial support from the Chilean Economic Development Agency, CORFO 12IDL2-12974, SAG, Dairy Consortium and the farmers who sponsored and participated in this work.

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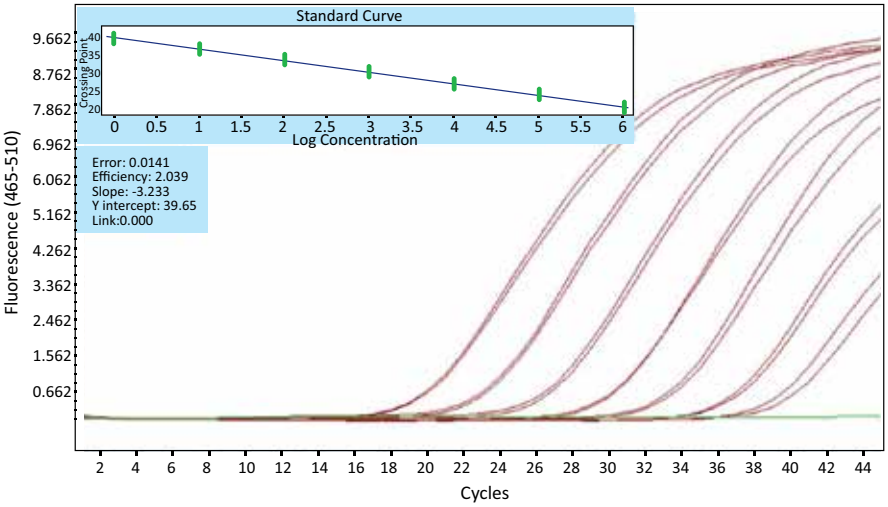
Figure 1: Detection of *M. bovis* DNA by real-time PCR using the kit BoviMan®. The figure shows the titration curve using only *M. bovis* DNA as target or *M. bovis* DNA mixed with *Bos taurus* DNA to mimic infected tissue samples. Efficiency was 100% and limit of detection was one genome copy. Time of assay was 2 hours



Ana María Zarraga[1], Luis Paredes[2] and Octavio Oltra[3]
[1]Institute of Biochemistry and Microbiology, University Austral of Chile, Valdivia, Chile
[2]L. Servicio Agrícola y Ganadero de Chile, Osorno, Chile
[3]Head of Research and Development Department, Dairy Consortium, Osorno, Chile
E-mails: anamariazarraga@uach.cl; luis.paredes@sag.gob.cl; o.oltra@consorciolechero.cl

Sweden has eradicated bovine viral diarrhoea

Background

A voluntary surveillance and control programme with the objective of eradicating bovine viral diarrhoea (BVD) without vaccination was launched by the Swedish Dairy Association in 1993. The government and the farmers share the costs for sampling and testing. Since June 2001, there is also a compulsory control programme requiring all cattle herds to be tested for the BVD virus (BVDV) on a regular basis.

Surveillance

A risk-based surveillance scheme was introduced in January 2010 when the country was divided into regions depending on their BVD status. In regions free from BVD, sampling is mainly directed towards herds buying or selling live animals. Herds are individually risk-categorized based on the number of herds they have purchased from and sold to during the preceding 12-month period. From May 2014 all regions are being regarded as free from BVDV.

Surveillance of dairy herds is performed by sampling bulk milk in conjunction with milk quality testing. Surveillance of beef herds is performed by blood sampling at slaughter. Field testing can also be carried out as a back-up component if case herds cannot be accessed through the slaughterhouse or through sampling of bulk milk. The scheme is designed to detect the presence of infection at a herd design prevalence of 0.02%, with 99% confidence. The within-herd design prevalence is set to 30%. Herds that are infected are screened, and persistently infected virus carriers are identified and removed. Other important parts of the programme are creating a positive attitude to biosecurity in the farming community and protecting the free herds from acquiring BVDV. Diagnostic testing is performed at the National Veterinary Institute, Uppsala, Sweden. For screening, an indirect enzyme-linked immunosorbent assay (Svanovir® BVDV-Ab ELISA) on serum, milk and bulk milk samples is used. The presence of virus is analysed by in-house immunoperoxidase (IPX) or PCR tests.

Conclusion

All herds in Sweden were affiliated to the voluntary or compulsory programmes during 2013. At the end of the year, no herd was diagnosed as having an on-going BVD-infection. A newly infected herd has not been detected since 2011, and the last virus-positive animal was born in an infected dairy herd in 2012. That herd was later declared free from the disease. Thus, the programme objective of eradicating BVD has now been achieved.

FACT BOX

Bovine viral diarrhoea (BVD)

Bovine viral diarrhoea virus (BVDV) is classified in the genus Pestivirus in the family *Flaviviridae*. Cattle are the primary host of BVDV, but most even-toed ungulates are probably susceptible to the disease. Cattle that are persistently infected serve as a natural reservoir for the virus. The virus may be spread between animals via direct or indirect routes.

BVDV can induce disease of varying severity, duration and symptoms after an incubation period of 6–12 days. Fever, depression, respiratory distress and diarrhoea are typical signs of acute BVD. In pregnant cattle, infection can result in reproductive failure such as abortion, stillbirth or the birth of calves that are persistently infected with the virus. A more uncommon form of BVD is mucosal disease that can occur in acute or chronic form in persistently infected animals.

Sofie Andersson
Växa Sverige (Development and Services for Farmers), Sweden
E-mail: sofie.andersson@vxa.s

Future meetings and reports of past meetings

Animal Health and Welfare welcoming message

On behalf of the Israeli National Committee I would like to express our deep disappointment regarding the cancelation of the IDF Summit in Tel aviv, October 2014. Of course, the security of all participants is of upmost importance.

Israel's geographic location is a bridge tying Africa, Asia and Europe together. Since diseases do not recognize boarders (transmitted through movements of people, animals and insects or airborne), we have one of the largest national programs for vaccination against different kinds of diseases (FMD, BVD, BTV, EHOV, BEF and others).

The Israeli Veterinary Services are responsible for the prevention and controlling of those diseases. We, as a country, register and consistently evaluate the health of dairy cows, both individually and as a herd (on a national level). **The Israel Herd Book** is a computerized national database that traces the genealogy, milk yield and quality for each cow, its production history, fertility, state of health and any other useful data for maintaining and developing the standards of the dairy industry. Any change in milk quality is then immediately brought to attention and treated quickly and efficiently by the farmer as well as the veterinarians. This information is also used by milking management advisers, as a part of the Israel Dairy Board, who help in the assessment of parlour performance on individual farms, give advice on possible shortcomings and monitor these recommendations and improvements to the milking routine.

Besides the Israeli Veterinary Service, other unique organizations are engaged in animal health and welfare:
Hachaklit is a company owned and operated by Israeli farmers whose goal is to provide veterinary services for farm animals country-wide. Hachaklit deals with individual sick animals, general herd health, prevention and control of infectious and reproductive diseases, food safety and overall animal welfare. Hachaklait has been implementing an intensive Herd Health and Reproduction Management program for more than two decades. The program combines comprehensive clinical work on the individual cow in the farm with gathering, recording, monitoring and analyzing the herd data. Interactions between veterinary medicine, nutrition, management and economics are important facets of our approach and practice.

The National Service for Udder Health and Milk Quality (a part of the Israel Dairy Board) was originally founded to eradicate *Streptococcus agalactiae* and subsequently saw immense success. The National Service also provides laboratory diagnosis and services, milking parlor and milking equipment analysis, planning and implementing udder health and education.

Israel has innovative and creative experiences to offer, in the dairy chain and beyond. I would like to thank very much our colleagues abroad and in Israel for working very hard together in preparing the IDF summit in Tel aviv. I am sure that in the future we will find a way to meet all of you in Israel.

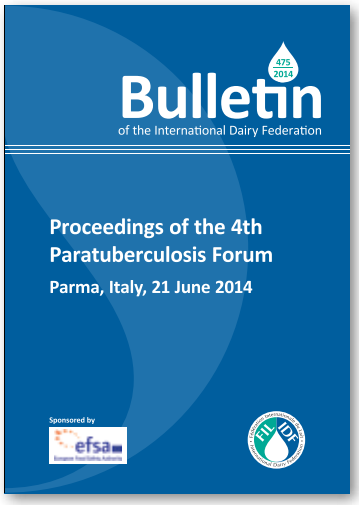
Shmuel Friedman
Veterinary Manager & Milk Quality, Israel Dairy Board, Israel
E-mail: shmulik@milk.org.il

Fourth Paratuberculosis Forum

The fourth Paratuberclosis Forum (ParaTB Forum) was held in Parma, Italy in June 2014 at the European Food Safety Authority. The ParaTB Forum was initiated by the International Dairy Federation and the first event in Shanghai in 2006 was held in conjunction with the World Dairy Summit. Subsequent meetings have been held at the time of the International Colloquium on Paratuberculosis.

The ParaTB Forum, with participants involved in the coordination and management of national and regional Johne's disease programmes, provides an opportunity to discuss and report on the strategies and progress. The meeting in Parma was attended by 35 representatives from 16 countries. Presentations covered a variety of national approaches for the management of Johne's disease, from compulsory measures targeting clinical disease to voluntary industry programmes aimed at reducing the economic impact and supporting the production of high-quality milk. There were also differences in emphasis, with some strategies focused on test and culling and others on risk-based measures to minimize transmission of infection to susceptible animals and avoiding spread between farms.

Participants were able to discuss features of their programmes and share their experiences, successes, challenges and lessons learnt. Understanding the opportunities and limitations of available testing technology allows different approaches to be adopted for surveillance, risk assurance or for culling decisions. Farmer education and engagement in managing the risks of Johne's disease were emphasized in some national programmes. The proceedings of the 4th ParaTB Forum have just been published in the Bulletin of the IDF N° 475/2014.



The IDF gratefully acknowledges the excellent organization of the Forum by Norma Arrigoni and Nicola Pozzato from the Instituto Zooprofilattico Lombadia Emilia Romagna and the Instituto Zooprofilattico Sperimentale delle Venezie, the hosting by the European Food Safety Authority and the assistance from Kelly Wall of Animal Health Australia in compiling the proceedings.

Proceedings of earlier ParaTB Forums are available in the following IDF Bulletins:

- 410:2007 Proceedings of the 1st ParaTB Forum
- 441:2009 Monitoring success of paratuberculosis programs. Proceedings of the 2nd ParaTB Forum
- 460:2012 Proceedings of the 3rd ParaTB Forum

For more information on the IDF publications visit www.fil-idf.org

Robin Condron
Manager Animal Health and Welfare, Dairy Australia, Australia
E-mail: RCondron@dairyaustralia.com.au

World Dairy Summit 2015, Vilnius, Lithuania

In September 2015, the International Dairy Federation's (IDF) annual World Dairy Summit (WDS) will take place in Vilnius, Lithuania. Participants from all over the world, especially from Eastern Europe, are expected to attend the WDS in this small country of unexplored opportunities. That is why information during the event will be available in both the English and Russian languages.

The agreed theme of the IDF WDS 2015 is "**Closing the nutritional gap with sustainable dairy".** The organizing committee has developed the topics of conferences, which are:

1. Dairy Policies and Economics
2. Dairy Science and Technology
3. Nutrition and Health
4. Animal Health and Welfare
5. Dairy Farming
6. Marketing
7. Food Safety
8. Analytical Tools

Dairy is one of the most important sectors of agriculture in Lithuania. Five dominating milk-processing companies in Lithuania produce 93% of the milk purchased in Lithuania. The sector serves not only local needs but is also oriented to export. Lithuania exports dairy products to 65 countries around the world. Most products are exported to the European Union counties (55%) and Russia (35%), but some are also exported to Asia, the Near East, USA and Canada.

Many participants, speakers and stakeholders of IDF WDS 2015 will be visiting Lithuania for the first time. Organizers of the event will provide splendid impressions of the country, starting with the first step off the plane. The goal is to organize not only an informative, fluent and comfortable event, but also to reveal Lithuania's uniqueness: the beauty of the landscape and values of the Lithuanian people, formed by rich history and world-wide experience.

Lithuania's history dates back more than a 1000 years. After reaching a peak, with territory stretching from the Baltic Sea to the Black Sea, and periods of downfall, Lithuania's territory is now 65 300 km². Most inhabitants are Lithuanians who speak the oldest living Indo-European language. It is used by just 4 million people across the world, but helps to maintain strong interrelations between globally minded Lithuanians.

Vilnius – the city of the WDS 2015 – is famous for being in the list of UNESCO World Heritage Sites. It is also the largest city in the country. The historical centre of Vilnius (the old town) covers almost 360 ha and is one of the largest old towns in Eastern Europe. It is situated in a picturesque valley of two rivers, the Vilnelė and the Neris.

It is also highly recommended to take few days off after the WDS to explore the coast of Lithuania, especially the Curonian Spit, a 98-km stretch of land where breeze and sand create a specific relaxing atmosphere interrupted only by sea waves.

Looking forward to meet you in Vilnius – the city of International Dairy Federation's World Dairy Summit 2015.

For more information please contact the Conference Secretariat:
e-mail: info@idfwds2015.com

Antanas Sederevičius
Lithuanian University of Health Sciences, Kaunas, Lithuania
E-mail: antanas@lva.lt

The outline of the conference on Sustaining Animal Health and Animal Welfare in Milk Production is now available

The conference will present current and future challenges to increasing milk production at global and regional level with regard to animal health and welfare. Related management strategies and action plans will be debated.

Session 1: "Responsible and Prudent Use of Antimicrobials in the Dairy Sector"
The session will provide an overview of what is happening at the global level and reflect situations and experiences of different regions of the world. The use of antibiotics and alternative therapy will be discussed.

Session 2: "Epidemiology of infectious Diseases of Importance for Dairy Production"
The session will present the occurrence and consequence of different infectious diseases of milking animals in different parts of the world with particular emphasis on Eastern Europe. Prevention and management strategies and action plans will be analyzed.

Session 3: "Animal Welfare: Problems and Solutions"
The session will provide a broad discussion on animal welfare in the dairy sector combined with specific problems and solutions in different milk production systems. A particular emphasis will be placed on recording animal welfare in an objective way.

Let us know if you want to contribute to the next issue of this Newsletter by contacting us at ylva.persson@sva.se or mtucci@fil-idf.org