

## Production, Management and the Environment: Disease, Management and Environment

**481 Milking procedures and prevalence of contagious mastitis pathogens on U. S. dairy operations.** J. E. Lombard<sup>1\*</sup>, C. A. Kopral<sup>1</sup>, T. Van Slyke<sup>2</sup>, F. Welcome<sup>2</sup>, and Y. Schukken<sup>2</sup>, <sup>1</sup>USDA:APHIS:VS:Centers for Epidemiology and Animal Health, Fort Collins, CO, <sup>2</sup>Quality Milk Production Services, Ithaca, NY.

The National Animal Health Monitoring System's Dairy 2007 study collected milking procedures and other management practice data from 582 operations in 17 of the top dairy states. In addition, a single bulk tank milk sample was collected from 534 operations to estimate the prevalence of the contagious mastitis pathogens - *Staphylococcus aureus*, *Streptococcus agalactiae* and *Mycoplasma*. Milk was cultured according to NMC protocols. After adjusting for the study design, an estimated 43.3% of U.S. dairy operations were infected with *S. aureus*, while *S. agalactiae* and *Mycoplasma* prevalences were 2.7 and 3.2%, respectively. Only *Mycoplasma* had herd size differences where prevalence increased as herd size increased ( $P=0.005$ ). The presence of *S. aureus* was positively associated with use of a backflush system, milking mastitis cows in a separate string and culturing milk from fresh cows and high SCC cows ( $p<0.05$ ). Operations infected with *S. agalactiae* were more likely to have purchased cattle in 2006, applied a nonlabeled predip using a cup, or had a BTSCC greater than 400,000 ( $p<0.05$ ). The use of a labeled predip using a sprayer, a postdip or a backflush system were associated with decreased odds of being infected with *S. agalactiae* ( $p<0.05$ ). Operations who had cultured *Mycoplasma* in the 12 months prior to the interview, applied a labeled predip using a sprayer, provided vitamin ADE or selenium supplementation, purchased cattle, had a BTSCC greater than 400,000 or had concurrent infection with *S. aureus* were at increased odds of being infected with *Mycoplasma* ( $P<0.05$ ). Operations that used a water hose with disinfectant, or applied labeled predip using a cup or single use towels were less likely to be infected with *Mycoplasma* ( $P<0.05$ ). Although some of the associations found in this analysis are likely effects of infection, rather than causes, not purchasing cattle and following recommended milking procedures appears to decrease the prevalence of contagious mastitis pathogens and improve milk quality.

**Key Words:** Mastitis, Milk Quality, Pathogens

**482 Reliability of a standardized environmental sampling protocol to quantify *Mycobacterium avium* ssp. *paratuberculosis* in free-stall dairies.** S. S. Aly<sup>1\*</sup>, R. J. Anderson<sup>2</sup>, I. A. Gardner<sup>1</sup>, R. H. Whitlock<sup>3</sup>, T. Fyock<sup>3</sup>, J. M. Adaska<sup>4</sup>, and J. Jiang<sup>1</sup>, <sup>1</sup>University of California, Davis, <sup>2</sup>California Department of Food and Agriculture, Animal Health Branch, Sacramento, CA, <sup>3</sup>University of Pennsylvania, Kennett Square, <sup>4</sup>California Animal Health and Food Safety Laboratory, Tulare Branch, Tulare, CA.

*Mycobacterium avium* ssp. *paratuberculosis* (MAP) is the cause of Johne's disease in dairy cattle and can be detected in fecal slurry in pens housing infected cows. The extent to which environmental samples are comparable across collectors and time affects the reliability of a sampling protocol. High reliability is important if such samples are to be used as part of a diagnostic strategy to detect MAP super-shedder cows and monitor temporal changes in environmental MAP load. The objective of this longitudinal study was to quantify MAP in environmental samples collected using a standardized sampling protocol from free-stall pens

using culture on Herrold's egg yolk medium (HEYM) and quantitative real-time PCR (qrt-PCR), and estimate the variability in results due to dairy, pen, collector and time.

A standardized sampling protocol was used to collect environmental samples from unflushed cross-over alleys in 31 cow pens in 4 California free-stall dairies (803, 1024, 1300 and 3577 cows). Samples were collected simultaneously by two veterinarians on each of days 1, 3 and 5 after scraping alley surfaces while keeping pen populations stable. Results were analyzed using variance components models and variability due to dairy, pen, collector and time were estimated and used to compute intraclass correlation coefficients (ICC). Among-pen variation was the largest source of sample variation. The ICC for similarity in samples collected by different collectors from the same location on the same day was 80% for qrt-PCR and 82% for HEYM. The ICC for samples collected by the same collector from the same location on different days was 82% for qrt-PCR and 65% for HEYM.

Environmental sampling of free-stall pens using a standardized sampling protocol can be reliable and yield comparable results with minimal variation due to collector or time. As part of a diagnostic plan, environmental samples can be used to identify pen populations with high MAP loads that are likely to include super-shedders thus reduce testing costs compared to whole herd tests and encourage more owners to enroll in Johne's disease control programs.

**Key Words:** Johne's, Environmental Sampling Reliability

**483 Prevalence of bovine viral diarrhoea virus in bulk tank milk and associations with herd characteristics on U.S. dairy operations.** J. E. Lombard<sup>1\*</sup>, E. J. Dubovi<sup>2</sup>, and C. A. Kopral<sup>1</sup>, <sup>1</sup>USDA:APHIS:VS:Centers for Epidemiology and Animal Health, Fort Collins, CO, <sup>2</sup>Cornell University, Ithaca, NY.

Bulk tank milk was collected and tested for BVD antigen during the National Animal Health Monitoring System's Dairy 2007 study. Information regarding BVD-related management practices and dairy cow health and productivity was also collected. One objective of the study was to estimate the prevalence of persistent infection with BVD and associated herd level factors. Samples were collected from 527 operations during the months of March through August 2007. After adjusting for study design and incorporating weighting procedures, 1.7% of dairy operations had PCR evidence of BVD infection. BVD virus was detected in bulk tank milk on 1.0% of operations with less than 500 cows and 12.9% of operations with 500 or more cows. A larger percentage of operations in the West (7.8%) were BVD-infected compared to the East (1.1%). The mean number of cows represented in the bulk tank samples were 125 for noninfected and 677 for infected operations. Vaccination for both heifers and cows was more commonly performed on infected compared to noninfected operations. Operations that brought in new additions during 2006 were more likely to have BVD virus in their bulk tank than operations that did not purchase cattle. Infertility problems, defined as percent of cows >150 days open, were higher for infected operations compared to noninfected (18.2% of cows versus 14.3%). Although there were no differences in the percentage of removals, noninfected operations sold a higher percentage of removal as dairy replacements compared to infected operations (6.2% and 1.9%, respectively). Rolling herd average milk production was higher for infected operations (10,201 kg) compared to noninfected operations (9,254

kg). Results suggest that large operations and those that purchase new additions are more likely to have animals with persistent BVD infection compared to small closed herds.

**Key Words:** BVD, Bulk Milk, Prevalence

**484 Prevalence of *Mycobacterium avium* subspecies *paratuberculosis* and associations with herd characteristics on U.S. dairy operations.** J. E. Lombard\*<sup>1</sup>, R. T. Capel<sup>2</sup>, B. A. Wagner<sup>1</sup>, J. B. Payeur<sup>2</sup>, and C. P. Fossler<sup>1</sup>, <sup>1</sup>USDA:APHIS:VS:Centers for Epidemiology and Animal Health, Fort Collins, CO, <sup>2</sup>USDA:APHIS:VS:National Veterinary Services Laboratories, Ames, IA.

During the National Animal Health Monitoring System's Dairy 2007 study, in addition to information collected on management practices and health, 6 environmental samples were collected from 524 operations for culture of *Mycobacterium avium* subspecies *paratuberculosis*, the causative agent of Johne's disease. One objective of the study was to estimate the prevalence of *M. paratuberculosis* and associated herd level factors. Samples were collected during the months of March through August 2007. Samples were cultured on Herrolds egg yolk in both tubes and flasks and confirmed as positive with PCR. After adjusting for study design and incorporating weighting procedures, 45.8% of samples were positive and 68.1% of operations had at least one sample that was culture positive for *M. paratuberculosis*. The largest percentage of samples that tested positive were from flush water (64.6%) and lagoons (61.2%) while the lowest percent positive were from gutter cleaners (32.1%). The herd-level prevalence of *M. paratuberculosis* increased as herd size increased with 95.0% of large operations (500 or more cows) being infected. No regional or month of collection differences were observed at the operation level. Operations that brought in herd additions during 2006 were at increased risk of being infected. The overall percentages of removals or deaths were not different between infected and noninfected operations. However, differences were observed in the percentage of cows removed for poor production (8.8% for noninfected operations compared with 14.8% for infected operations). In addition, noninfected operations had a higher percentage of removals sold as replacements (12.5%) compared with infected operations (4.5%). There were no significant differences in RHA milk production. The prevalence of *M. paratuberculosis*-infected dairy operations in the U.S is higher than previously reported.

**Key Words:** Paratuberculosis, Prevalence, Johne's Disease

**485 Puncture force resistance of hoof horn from New Zealand (NZ) Friesian and Jersey cross NZ Friesian dairy.** L. A. Lethbridge, J. K. Margerison\*, G. W. Reynolds, R. Laven, and C. S. Brennan, Massey University.

The aim was to assess the resistance to puncture of the hoof horn from differing claws and regions of claws in prepartum New Zealand (NZ) Friesian and Jersey cross NZ Friesian dairy breeds. At 14 weeks of age all four hooves from 9 (5 Jersey × NZ Friesian (JXNZF); 4 NZ Friesian (NZF)) male dairy cattle had their hooves held and the distal Imm surface of the sole horn removed. All 8 claws were scored for the

presence of lesions and hoof samples were collected from the weight bearing regions 1 to 5 (according to the International foot map (IFM) and tested for puncture force (PF) using a texture analyser. PF of regions 1 and 2, corresponding to the white line, was consistently significantly lower compared with regions 4 and 5, which correspond with the sole, for both NZF and JXNZF (NZF: 1; 0.62<sup>c</sup>, 2; 0.57<sup>c</sup>, 3; 0.74<sup>b</sup>, 4; 0.80<sup>ab</sup>, 5; 0.86<sup>a</sup> (SEM 0.013) P<0.001; JXNZF: 1; 0.76<sup>b</sup>, 2; 0.64<sup>c</sup>, 3; 0.86<sup>ab</sup>, 4; 0.94<sup>a</sup>, 5; 0.93<sup>a</sup> (SEM: 0.019) P<0.001). Horn PF of JXNZF was consistently higher for both sole and white line regions compared with Friesian (IFM 1: NZFR; 0.67<sup>b</sup>, JXNZF; 0.85<sup>a</sup> (SEM 0.021) P< 0.001; IFM 2: NZFR; 0.60<sup>b</sup>, JXNZF; 0.70<sup>a</sup> (SEM 0.022) P< 0.001; IFM 3: NZF; 0.73<sup>b</sup>, JXNZF 0.85<sup>a</sup> (SEM 0.023) P< 0.001; IFM 4: NZF 0.78<sup>b</sup>, JXNZF 0.91<sup>a</sup> (SEM 0.020) P<0.001; IFM 5: NZF; 0.84<sup>b</sup>, JXNZF; 0.90<sup>a</sup> (SEM 0.021) P< 0.001). In conclusion hoof taken from Jersey cross Friesian cattle required a significantly higher maximum force to puncture than that from Friesian cattle, making claws less susceptible to puncture and wear. PF for white line tissue (1 and 2) was significantly lower than that from the sole (4 and 5) in both breed types.

**Key Words:** Dairy Breed, Hoof Horn Strength, Lameness

**486 Incidence of peripartum health related problems in Argentine dairy herds.** C. Corbellini<sup>1</sup>, F. Busso<sup>1</sup>, F. Bargo<sup>2</sup>, B. Suarez<sup>2</sup>, J. Grigera\*<sup>2</sup>, M. Podetti<sup>2</sup>, and G. Tuñon<sup>3</sup>, <sup>1</sup>INTA, Argentina, <sup>2</sup>ELANCO, Argentina, <sup>3</sup>AACREA, Argentina.

Claves is a program conducted by INTA, AACREA and ELANCO to monitor the incidence of peripartum health problems. A data set of 15165 multiparous and 7607 primiparous dairy cows was used to determine body condition score (BCS=1 to 5 scale) and to calculate the incidence of health problems in the first 90 DIM. BCS was measured at dry off, prepartum, calving and postpartum (46 DIM). Case definition incidences (cases/100 animals) of assisted parturition (API), retained placenta (RPI), clinical hypocalcaemia (HCI), metritis (MI), clinical mastitis (CMI), lameness (LI), sub-clinical ketosis (SCKI= milk BHBA concentration ≥ than 2 mg/100 ml, Ketotest®) and death rates (DR) were standardized and calculated. Incidences were compared between primiparous and multiparous cows using Chi-square test (PROC FREQ of SAS) and t Student test was used for BCS (PROC TTEST). Multiparous cows were dried off with BCS=3.2. At prepartum, BCS was similar for multiparous (3.3) and primiparous cows (3.3), but at calving and postpartum it was lower (P<0.01) for multiparous cows (3.2 and 2.8) than for primiparous cows (3.4 and 2.9), respectively. At 55 DIM, multiparous and primiparous cows reached milk production peak (27.6 and 24.2 kg/d), with a BCS decrease of 0.4 and 0.5 points, respectively. RPI, HCI, CMI and DR were greater (P<0.01) in multiparous (8.1, 5.9, 25.6, 5.6) than in primiparous cows (4.3, 0.8, 13.7, 3.0), while API and LI were greater (P<0.01) in primiparous (28.2, 13.9) than in multiparous cows (13.1, 11.1). There were no differences between MI and SCKI for multiparous (4.3, 4.5) and primiparous cows (2.5, 2.4), respectively. SCKI ranged from 2 to 24 %, with a higher incidence in multiparous cows (BCS ≥ 3.8) or when BCS reduction at 46 DIM was ≥ 1. The mayor causes of death were traumatic calving, hypocalcaemia, endotoxic and mastitis and mostly occurred in the first week of lactation (44 and 34.1% for multiparous and primiparous cows, respectively).

**Key Words:** Peripartum, Health Problems, Incidence

**487 Relationships between production measurements and sow longevity in a university research herd.** M. S. Hicks\* and W. F. Owsley, *Auburn University, Auburn, AL.*

Sow production data were collected by the Auburn University Swine Nutrition Unit from 1996-2003 to determine the relationship of performance measurements (weaning, breeding and farrowing dates, lactation feed intake, number born alive (NBA), number weaned, litter birth weight, litter weaning weight), indicators of sow longevity (sow weight pre-farrowing, sow backfat pre-farrowing, sow weight at weaning, sow backfat at weaning, lactation weight change and backfat change ) and longevity (parity). The data were analyzed using the GLM procedure of SAS. Maximum  $R^2$  for sow weight loss and backfat loss was calculated using the STEPWISE procedure, MAXR option, of SAS. Parity had an effect on both number born alive and number weaned ( $P < .05$ ) but not litter weaning weight. As parity increased, number born and weaned also increased. Parity also affected lactation weight change ( $P < .05$ ), measured as kg per parity or percent weight change. Weight change decreased with increased parity, as total kg and percentage of pre-farrowing weight.

The same was found for changes in backfat measured in mm change ( $P < .05$ ), but not when measured as a percentage of pre-farrowing backfat. Sow weight loss and backfat loss decreased as feed intake increased ( $P < .05$ ). Weight loss increased as the number of pigs weaned per litter increased ( $P < .05$ ). Lactational fat loss increased as the litter weaning weight increased ( $P < .05$ ). For lactation weight loss, a maximum  $R^2$  was reached with a 6 variable model including pre-farrowing weight and fat, parity, intake, weaning weight and number weaned ( $R^2 = .3308$ ,  $P < .05$ ). For lactation fat loss, a maximum  $R^2$  was reached with a 7 variable model including pre-farrowing weight and fat, parity, intake, number born alive, weaning weight and number weaned ( $R^2 = .3245$ ,  $P < .05$ ). Using this study and the available literature, the variables of lactation feed intake, number born alive, number weaned, litter weaning weight, sow weight pre-farrowing, sow backfat pre-farrowing and parity should account for approximately 30 percent of the variation in longevity, and should in part help understand what is required to keep a female productive longer.

**Key Words:** Sow Productivity, Performance, Longevity