

1493 Sole lesions in dairy cattle. E. Bell and D. Weary*,
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One of the principal causes of lameness in cattle is sole lesions on the hoof. Our aim was to describe the prevalence of sole lesions in dairy cattle from the Fraser Valley of British Columbia, and determine farm management and environmental factors that are most associated with sole lesions in this area. We recorded the number, severity and location of lesions in the claws of 624 Holstein cows from 20 herds during hoof trimming. Lesions were found in cows from all herds. The mean (SD) herd prevalence of cows with at least one lesion was 85.7 (13.8)%. The mean (SD) herd prevalence of cows with at least one severe lesion (severe haemorrhage or ulcer) was 34.9 (15.1)%. Within the cow, we found differences in the number of lesions observed on different claws, with the hind lateral claws containing the most lesions ($P < 0.0001$). Overall, the hind lateral claws contained 54.9% of the lesions followed by the front medial (17.7%), the hind medial (16.4%) and the front lateral (10.9%). We found a very similar pattern when considering only the most severe lesions. Focusing on the distribution of lesions within the claws, zones differed in the total number of lesions. Of the 2116 lesions observed, 47.1% were located in Zone 4, 26.8% in Zone 3, 14.2% in Zone 5, 7.9% in Zone 2, and 4.0% in Zone 1. Once again, we found a very similar pattern of results for the most severe lesions. Primiparous cows were at greater risk for sole lesions at the beginning of their lactation ($P < 0.001$) while multiparous cows were more likely to have visible lesions in mid- to late-lactation ($P < 0.01$). Overall, cows with higher body condition scores were less likely to have sole lesions than those with lower scores ($P < 0.001$). Cows were more likely to have lesions on farms with high steps ($P < 0.01$), computer grain feeders ($P < 0.01$), automatic alley scrapers ($P < 0.01$), and flooring imperfections ($P < 0.05$). In conclusion, sole lesions affect the majority of dairy cows in the Fraser Valley. The risk of lesions is related to stage of lactation, individual cow factors, and farm characteristics.

Key Words: Dairy cattle, Lesion, Lameness

1494 Preferences of pigs for floor types according to ambient temperature. E. Ducreux¹, V. Courboulay², and M.C. Meunier-Salaun*¹, ¹I.N.R.A. Joint Research Unit for Calf and Pig production Saint-Gilles/ France, ²I.T.P. Pig Technical Institute, Le Rheu /France.

The environmental enrichment of housing through flooring is a way to improve the well-being of pigs. The objective of the study was to determine the preference of groups of six growing pigs (70 kg) for three types of floor (Deep-Litter: L, concrete: C and slatted: S) offered as free choice within the same pen. In each flooring type the space allowance was similar (0.78 m²/pig) and a feeder was supplied. Sixteen groups were penned in two experimental rooms where the ambient temperature was at a low level (18°C, n = 8 groups) or at a high level (27°C; n = 8 groups). Each group was videotaped during a 24-h period and the behavioral activities were recorded by 10-min scan sampling. The data analysis was focused on the nature, the localisation and the context of the behavioural activities. Major activities within a 24-h period were resting (70% of total time, $P < 0.05$) and investigation (20%, $P < 0.05$) whatever the ambient temperature. The pigs preferred the litter flooring during time spent investigating ($P < 0.05$) at both temperature levels (62% of total time of investigation). Pigs exposed at 18°C spent more time lying on litter (71% of resting time vs 12% at 27°C, $P < 0.05$) whereas they lied down on concrete or slatted floor when exposed at 27°C (44% vs 15% at 18°C, $P < 0.05$). Pigs adopted, more frequently, a ventral posture and contact with congeners at low temperature level compared to pigs lying down on their sides without physical contact when exposed to warm conditions (66% of resting time vs 34% in "recumbent", $P < 0.05$; 55% vs 44% in "ventral", $P < 0.05$). Pigs used separate areas for resting and dunging activities ($P < 0.05$). These results illustrate that temperature may influence the floor preference of pigs. They point out various preference degrees related to the behavioral activity such as strong use of litter for investigation. Recommendations for housing conditions should therefore consider behavioural needs and thermal context related to season and geographic location.

Key Words: Pig, Floor type, Temperature

Animal Health Mastitis

1495 The effects of pre-milking procedures on hygienic quality of milk. R. Skrzypek* and J. Wojtowski, *Agricultural University, Poznan, Poland.*

The study was carried out over 1999-2000 in 120 dairy herds. The average number of cows in the herd was 47, and ranged from 4 to 244. In the period of observations, the following pre-milking procedures were recorded: fore-stripping (Yes, with tester vs. Yes, without tester), practicing fore-stripping as the first routine before milking (Yes vs. No), and method of udder and teat cleaning before milking (method 1 - wet paper towel with a disinfectant; method 2 - washing with water containing a disinfectant, drying with a cotton towel; method 3 - dry paper towel; method 4 - washing with clean water, drying with a cotton towel). For the statistical analysis, data on somatic cells count (SCC) and total microorganisms count (TMC) were also used. Both variables were determined in bulk tank milk fortnightly. Before calculations, the raw data on SCC and TMC were transformed with the natural logarithm. The method of fore-stripping affected the SCC only: a lower SCC was found in herds practicing fore-stripping with a tester (12.27 vs. 12.45; $P \leq 0.01$), and in herds in which fore-stripping was not the first routine before milking (12.28 vs. 12.44; $P \leq 0.01$). Out of the methods of udder and teat cleaning before milking, method 2 was most effective in decreasing the SCC (12.25 vs. 12.35-12.44 for other methods; $P \leq 0.01$), whereas method 3 was most effective in decreasing the TMC (10.93 vs. 11.27-11.34 for other methods; $P \leq 0.01$).

Key Words: Pre-milking procedures, Milk, Hygienic quality

1496 Impact of lactoferrin or lactoferricin with or without penicillin G on the morphology and ultrastructure of *Staphylococcus aureus*. M.S. Diarra*¹, P. Lacasse¹, G. Grondin², C. Paradis-Bleau¹, and D. Petitclerc¹, ¹AAFC-Dairy and Swine Research and Development Centre, Lennoxville, Quebec, Canada, ²Sherbrooke University, Sherbrooke, Quebec, Canada.

In a previous study, we found a synergism between lactoferrin or lactoferricin and penicillin G against *S. aureus* (Diarra et al., J. Dairy Sci., in press). To investigate the mechanism of action of lactoferrin or lactoferricin with or without penicillin G, transmission electron microscopy was performed on thin sections of two penicillin-resistant *S. aureus* strains: a clinical bovine mastitis *S. aureus* strain SHY97-4320 and a reference strain PC-1. Lactoferrin affected the ultrastructure of both *S. aureus* strains and groups of multiple cells were observed after lactoferrin treatment with or without penicillin G. These results suggest that lactoferrin can affect staphylococcal cell separation. After treatment with lactoferrin, cells from *S. aureus* SHY97-4320 were less covered ($P < 0.05$) with WGA-gold thus suggesting that lactoferrin affected binding to N-acetyl- β -D-glucosamine and/or the synthesis of peptidoglycan. Lactoferricin with or without penicillin G induced the lysis of many bacteria. Lactoferricin also induced formation of merosomal structures. Our data indicate that lactoferrin can affect *S. aureus* cell separation thus preventing dissemination of daughter cells from spreading infection and increasing susceptibility to phagocytes. Furthermore, lactoferrin can induce a weakening of the cell wall that could enhance *S. aureus* killing by penicillin G.

Key Words: lactoferrin, *Staphylococcus aureus*, morphology

1497 Synergetic effect of neomycin and cefazolin with bovine lactoferrin and lactoferricin against *Escherichia coli* and *Klebsiella pneumoniae*. M. S. Diarra*, D. Petitclerc, and P. Lacasse, *Dairy and Swine Research and Development Centre, Lennoxville, QC, Canada.*

The objective of the present study was to evaluate therapeutic potential of bovine lactoferrin (Lf) or lactoferricin (Lfcin) in combination with cefazolin and neomycin against *Escherichia coli* SHY97-3923-1 and *Klebsiella pneumoniae* SHY99-723-1 strains isolated from clinical bovine mastitis cases. Minimal inhibitory concentrations (MICs) of Lf, Lfcin, and tested antibiotics, were determined by macrodilution broth technique. Lf demonstrated a weak inhibitory activity against these strains with MICs >25 mg/ml. The MICs of Lfcin, cefazolin and neomycin were 256, 1 and 0.5 mg/ml in *E. coli* and >256, 2 and 1 mg/ml in *K. pneumoniae*, respectively. The effect of Lf (0 to 4 mg/ml) and Lfcin (0 to 64 mg/ml) alone and their combination with neomycin (0 to 1 mg/ml) and cefazolin (0 to 2 mg/ml) were evaluated on growth rate in both strains. Alone, Lf did not affect the growth of *E. coli* but, at concentration ≥ 0.5 mg/ml it partially inhibited ($P < 0.01$) the growth of *K. pneumoniae*. In *E. coli*, no synergetic effect was observed between cefazolin and Lf but, completed growth inhibition was obtained when 0.5 mg/ml or more of LF was combined to 1/2 MIC of neomycin. In *K. pneumoniae*, effects of Lf and cefazolin were additive while a strong synergism ($P < 0.001$) occurs with neomycin. At concentration sub-MICs, Lfcin alone, strongly inhibit the growth of *E. coli* ($P < 0.01$) but marginally decreased growth of *K. pneumoniae* ($P < .05$). Lfcin acted synergistically ($P < 0.1$) with sub-MIC of cefazolin and neomycin to reduce the growth of *E. coli* and with cefazolin in *K. pneumoniae*. Post-antibiotic effect (PAE) was studied by exposure of *E. coli* to 2 X MIC of neomycin, 1/8 MIC of Lfcin alone or in combination. After a 2 h incubation, cells were washed and incubated and the regrowth was monitored by standard count of cfu/ml and by determination of the culture turbidity. A negative PAE was induced by Lfcin alone but its combination to neomycin increased the PAE of this antibiotic. PAEs averaged - 53.33 3.84, 55.67 3.76 and 109.62 22 for Lfcin, neomycin and neomycin + Lfcin, respectively. These data suggest a potentiation effect of Lf and Lfcin with neomycin and cefazolin against environmental Gram negative bacteria pathogens isolated from bovine mastitis.

Key Words: Mastitis

1498 Bulk tank milk analysis inference program. B. M. Jayarao*¹ and T. Kim², ¹The Pennsylvania State University, PA, USA, ²Kyungshung University, Pusan, South Korea.

Data mining is the process of discovering interesting knowledge from the original raw data scattered as a natural state. The ability to make meaningful generalizations from a few scattered facts or to discover patterns in chaotic collections of observations is now of growing importance for the development of knowledge-intensive decision support systems. When milk produced on a farm is examined for bacteriological milk quality and mastitis causing bacteria it can disclose descriptive information about the general udder health status of the herd, milk hygiene, and milking practices on the farm. Many dairy producers periodically receive information about their bulk tank milk with reference to somatic cell counts, standard plate counts, and preliminary incubation counts. This information, when collected over a period of time, in combination with bulk tank mastitis culture reports can become a significant knowledge base. In this study, inference rules were established to evaluate the milking practices and milk quality based on bulk tank milk microbiology test results. Inductive decision trees were generated based on attribute selection measure, following which bulk tank milk quality was classified as good, cleaning problem, mastitis problem, or mixed with mastitis and cleaning problem. The results from induction rules were compared with those from K-means clustering algorithms. The findings of the study resulted in development of an induction-based data mining software for classifying bulk tank milk quality. It is anticipated that the software would be of great help to dairy farmers, extension specialists, dairy health consultants, and veterinary health professionals in the decision making process on issues related to milk quality and mastitis.

Key Words: milk quality, mastitis, decision trees

1499 Farm management practices that influence the number and type of Streptococci and Streptococci-like organisms in dairy herds. D. R. Wolfgang, B. M. Jayarao*, A. A. Sawant, S. R. Pillai, C. M. Burns, and L. J. Hutchinson, *The Pennsylvania State University, University Park, PA, USA.*

Streptococci and streptococci-like organisms (SSLO) consist of a large heterogeneous group of organisms. Organisms belonging to the genera streptococci, enterococci, lactococci and aerococci have been isolated from bulk tank milk (BTM). In this study, four BTM samples were collected at interval of 15 days from each of the 126 dairy herds that participated in the study. The BTM samples were examined for; 1) Somatic cells (BTSCC), 2) Standard plate count (SPC), 3) Preliminary incubation count (PIC), 4) Laboratory pasteurization count (LPC), 5) *Staphylococcus aureus* (SA) count, 6) Coagulase negative staphylococcal (CNS) count, 7) Streptococci and streptococci-like organisms (SSLO) count, 8) Coliform count (CC), and 9) Gram-negative non-coliform (NC) bacteria. It was observed that an increase in the number of SSLO in BTM was associated with an increase in BTSCC, SPC, PIC, LPC, SA, and CNS. This observation clearly suggests when mean SSLO count (4 BTM samples) exceeds 1000 cfu/ml; it likely that milk quality is affected, and might indicate that cows with contagious and environmental mastitis exist in the herd. Mastitis pathogens including *S. uberis*, *S. agalactiae*, and *S. dysgalactiae* were isolated from BTM with elevated BTSCC (mean BTSCC 441667 cells/ml). The SPC of milk samples collected from 24 farms was influenced by the SSLO count. The predominant SSLO organisms observed in BTM were *A. viridans*, *S. uberis*, *S. dysgalactiae*, *S. equinus* and enterococcal spp. It was observed that the LPC (n=3) was also influenced by the SSLO count, the predominant organisms found in the laboratory pasteurized milk samples were enterococcal spp. The PIC (n=5) was influenced by the SSLO count. Enterococcal spp. were isolated from milk samples that were subjected to PIC assay. A critical review of farm management practices using a self-administered questionnaire followed by consultations with dairy producers strongly indicated that; 1) Having more than 40% of the cows that are in 4+ lactation in the herd (farm DHIA record analysis), 2) Expanding the herd with newly purchased lactating cows, 3) Use bedding materials other than sand, 4) Pre-dipping or post-dipping only, and 5) Failure to pre-rinse the milking system before milking, can in varying degrees contribute to high SSLO counts in BTM.

Key Words: streptococci, bulk tank milk, management practices

1500 Antimicrobial susceptibility patterns of streptococci isolated from quarter milk and bulk tank milk. A. A. Sawant*, B. C. Love, and B. M. Jayarao, *The Pennsylvania State University, University Park, PA, USA.*

Isolates of *S. agalactiae* (n= 37), *S. dysgalactiae* (n = 131), and *S. uberis* (n=165) from quarter milk (n=207) and bulk tank milk (n=126) were examined for their susceptibility to antimicrobial agents. Susceptibility to ampicillin, ceftiofur, cephalothin, erythromycin, oxacillin, penicillin, penicillin-novobiocin, pirlimycin, sulfadimethoxine, and tetracycline was determined. The findings of the study are presented in Table 1. The findings of the study suggest that selection of an antibiotic for treating mastitis should be based on antimicrobial susceptibility of isolates from quarter milk rather than isolates from bulk tank samples. All isolates of *S. agalactiae* isolated from quarter milk were susceptible to ceftiofur, cephalothin, and oxacillin. While most of the isolates of *S. uberis* from quarter milk samples were susceptible to penicillin-novobiocin (95%), ceftiofur (92%), and cephalothin (91%). *Streptococcus dysgalactiae* was observed to be susceptible to ampicillin (97%), ceftiofur (97%), penicillin-novobiocin (97%), cephalothin (96%), oxacillin (95%), and pirlimycin (91%).

	Quarter milk	Quarter milk	Quarter milk	Bulk tank	Bulk tank	Bulk tank
Susceptibility	<i>S. uberis</i>	<i>S. dysgalactiae</i>	<i>S. agalactiae</i>	<i>S. uberis</i>	<i>S. dysgalactiae</i>	<i>S. agalactiae</i>
Ampicillin	77%	97%	94%	100%	100%	100%
Ceftiofur	92%	97%	100%	100%	100%	95.2%
Cephalothin	91%	96%	100%	100%	100%	100%
Erythromycin	60%	88%	75%	82.7%	92.4%	90.5%
Oxacillin	85%	95%	100%	98%	100%	100%
Penicillin	52%	83%	81%	84.6%	98%	100%
Penicillin/Novbiocin	95%	97%	94%	100%	100%	100%
Pirlimycin	55%	91%	75%	69.2%	84.9%	95.2%
Sulphadimethoxine	0.8%	12%	12%	1.9%	11.3%	19%
Tetracycline	49%	32%	63%	61.5%	41.5%	76.2%

Key Words: antimicrobial susceptibility, mastitis, streptococci

1501 Thermographic measurement of udder temperature: Predictability and potential of an early warning system for mastitis. R. J. Berry¹, A. D. Kennedy^{*1}, S. L. Scott², B. Kyle¹, and A. L. Schaefer³, ¹University of Manitoba, Winnipeg, Manitoba Canada, ²Agriculture and Agri-Food Canada, Brandon, Manitoba Canada, ³Agriculture and Agri-food Canada, Lacombe, Alberta, Canada.

An increase in udder temperature is an important indicator of mastitis onset in dairy cows. The ability to detect the early onset of mastitis will ameliorate the potential damage of a case by ensuring prompt treatment, hence reducing economic losses (drug costs, decreased yield and milk quality). Previous work by Scott (*et al*) showed that endotoxin infusion into the udder caused an increase in udder temperature by 2.3 C from the pre-infusion baseline, as measured by infrared thermography (IRT). Implementation of an IRT mastitis detection system requires reference data on the daily variation and predictability of udder temperature of non-mastitic animals. The udder temperatures of 10 multiparous Holstein cows (mean parity 2.5, DIM 104) were measured over a 51-day period between May and July 2000 using IRT. Cows were housed in tie stalls, milked twice daily and allowed a 2 h outdoor exercise period between 9-11 am. Measurements were taken 30 min prior to the exercise period (following milking) and immediately after the exercise period. Care was taken to ensure udders were clean and dry before IRT measurement. Rectal temperatures were recorded at each sampling and ambient barn temperature was automatically recorded every 20 min. Udder temperature increased significantly after exercise. Udder temperatures post exercise were less variable (mean udder temperature pre exercise=33.44 C SEM 0.35, post exercise=34.61 C SEM 0.22, P<0.001). Autoregression modeling showed that animal factors (rectal temperature, udder area) rather than environmental factors (ambient temperature at sampling, mean ambient temperature over the previous 2h, 12 h and 10 d) were good determinants of udder temperature both before and after exercise (R² 0.57, p<0.001). Udder temperature on the previous day was not a reliable determinant of current udder temperature (P>0.05). This preliminary study confirms that daily variation in udder temperature is smaller than the rise resulting from an induced mastitis response. Current research investigating seasonal and farm differences will determine if IRT technology has future application for early mastitis detection.

Key Words: Dairy Cattle, Mastitis, Infrared Thermography

1502 Effect of copper source on resistance to coliform mastitis. R. W. Scaletti*, C. H. Hamilton, and R. J. Harmon, University of Kentucky, Lexington, KY.

The objective was to determine the effect of copper (Cu) source on response to intramammary challenge with *Escherichia coli*. Twenty primigravid Holstein heifers were maintained on a basal diet (6.5 ppm Cu; CON) or diets supplemented (10 ppm) with copper sulfate (CUS) or Cu proteinate (Bioplex; Alltech, Inc.; CUP) beginning 60 d prepartum through 49 d of lactation. Liver biopsies were taken to determine liver Cu concentration. Milk samples were taken weekly postpartum for bacteriology and somatic cell count (SCC) determination. The overall

mean liver Cu concentration was about threefold higher (P = 0.003) for CUS and CUP groups (171 and 147 µg/g DM) compared to CON cows (62 µg/g DM). At d 32 of lactation, one pathogen-free quarter per animal was infused with 27 colony-forming units (cfu) of *E. coli* strain 727. Quarter foremilk samples were aseptically collected for bacterial enumeration and SCC determination. Whole blood was collected for determination of packed cell volume and white blood cell enumeration. Udders were given a clinical score and rectal temperatures were determined. Measurements were taken 24 h preinfusion, 0 h, and 6, 12, 18, 24, 36, 48, 72, 96, 144, 192, and 240 h postchallenge. Milk production (MP) and DMI were measured daily following challenge. Milk bacteria count (log₁₀ cfu/ml) was lower (P < 0.08) for the CUP group at 24 h compared to CON and CUS groups (1.90 vs 3.19 and 3.12). Clinical score was lower at 144 h (P < 0.1) in CUP cows compared to CON cows (1.38 vs 2.43). Rectal temperature was lower at 24 h (P < 0.04) and 144 h (P < 0.1) in the CON and CUS groups compared to CUP cows. Overall white blood cell count was greater for CUP cows than CON (P < 0.06) and CUS (P < 0.1) cows. Dry matter intake following challenge was greater (P < 0.03) on d 4 postchallenge for CUP and CON groups compared to CUS cows. Overall MP was greater for CUP cows compared to CON (P < 0.12) and CUS (P < 0.05) cows. Packed cell volume and SCC did not differ among groups following challenge. No differences in peak responses were noted among treatments, but moderate improvements in some clinical parameters were observed with CUP supplementation.

Key Words: Mastitis, Copper, *Escherichia coli*

1503 Effect of prepartum milking of primigravid cows on mammary gland health and lactation performance. J.E.P. Santos^{*1}, R.L.A. Cerri¹, J.H. Kirk¹, S.O. Juchem¹, M. Villaseñor¹, and M.A. Ballou¹, ¹University of California Davis.

Objectives were to determine the effects of prepartum milking of primigravid cows on udder health, lactation, and metabolic parameters during late gestation and early lactation. Primigravid Holstein cows, 267, were blocked according to age and day of expected calving and randomly assigned to one of the two treatments at 15 d prepartum. Treatments consisted of either no milking or milking 3 x daily prepartum. The study finished at 135 days in milk (DIM). Cows in both treatments were housed together during the pre- and postpartum periods and fed the same ration. Milk samples were collected for microbiological culture at d -15 prepartum (milking group) and at 3 and 29 DIM (all cows). The degree of udder edema was determined in each cow once at 3 DIM by measuring the udder floor areas before and after milking. The greater reduction in size upon removal of milk from the mammary gland indicated less edema. Blood was collected from 40 cows/treatment at d -11 and -4 relative to calving, and at 4 and 17 DIM for the analyses of plasma glucose, b-OH-butyrate, and nonesterified fatty acids. Continuous data were analyzed using the PROC MIXED procedure of SAS. The Kaplan-Meier model, for the survival analysis procedure of Minitab, was used to assess the effect of treatment on DIM when a cow left the study (culled or dead). Incidence of health disorders was analyzed by Chi-square. Prepartum milking of primigravid cows increased the reduction of udder floor area (23.9 vs 16.9%; P < 0.001), decreased SCC score (2.39 vs 3.23; P < 0.0001) and incidence of mastitis (6.1% vs 14.1%; P < 0.04) during the first 135 DIM. Prepartum milking increased yields of milk (36.6 vs 34.9 kg/d; P < 0.001), 3.5% FCM (37.0 vs 35.9; P < 0.004), and milk true protein (1,041 vs 994 g/d; P < 0.001), and tended to increase yields of milk fat (1,308 vs 1,282 g/d; P < 0.12). Plasma glucose decreased in the milking group just prior to calving (66.5 vs 72.6 mg/dl; P < 0.0008). Incidence of diseases and culling did not differ between the two groups. Prepartum milking of primigravid cows reduced udder edema, improved udder health and lactation performance with minor effects on metabolic parameters.

Key Words: Prepartum cows, Milking, Mastitis

1504 Effect of clinical mastitis incidence on lactational and reproductive performance of Holstein dairy cows. J.E.P. Santos^{*1}, R.L.A. Cerri¹, M.A. Ballou¹, G. Higginbotham¹, J.H. Kirk¹, and S.O. Juchem¹, ¹University of California Davis.

One thousand Holstein cows from 3 commercial dairy farms were divided into 4 groups: control (G1), first clinical mastitis prior to first postpartum AI (G2), first clinical mastitis between first postpartum AI

and pregnancy diagnosis (G3), and first clinical mastitis after diagnosed pregnant (G4). Within each dairy, every cow in the mastitis groups was matched with a control cow that was in the same lactation, calved in the same month and had a similar 305-d milk yield in the previous lactation. Data were collected for the first 320 days in milk (DIM). Mastitis diagnosis was performed at every milking by the herd personnel. A fore sample of milk was collected from every clinical case for microbiological culture. Reproductive management consisted of estrus synchronization with PGF2a prior to 70 DIM and timed AI afterwards for the first postpartum AI. Cows diagnosed as open at rectal palpation were re-inseminated following a timed AI protocol. Pregnancy was diagnosed 35 d after AI and reconfirmed either at 160 d pregnant or at 300 DIM. Continuous and binomially distributed data were analyzed by the GLM and the LOGISTIC procedures of SAS, respectively. The Kaplan-Meier survival analysis procedure was used to assess the effect of treatment on days open. Results are presented according to the following sequence: G1, G2, and G3. Conception rate at first postpartum AI was decreased by mastitis (28.7 vs 22.1 vs 10.2%, $P < 0.001$). Pregnancy rate at 320 DIM also decreased for cows with mastitis (85.4 vs 72.3 vs 58.5%; $P < 0.001$). Days open were extended for cows with mastitis ($P < 0.001$). Incidence of abortions was 5.8, 11.8, 11.6, and 9.7% for G1, G2, G3, and G4, respectively ($P < 0.04$). Mastitis prior to first AI decreased yields of milk (35.9 vs 34.4 vs 35.3 kg/d; $P < 0.001$) and 3.5% fat-corrected milk (36.5 vs 35.1 vs 36.0 kg/d; $P < 0.01$). Mastitis also increased linear SCC score (1.78 vs 2.75 vs 2.80; $P < 0.001$). Mastitis either prior to or after first postpartum AI decreases conception, increases incidence of abortions and decreases milk production in lactating dairy cows.

Key Words: Mastitis, Reproduction, Milk production

1505 Bacterial counts in bedding and on teat ends of cows housed on sand and sawdust. M. Zdanowicz*, J. A. Shelford, C. B. Tucker, and D. M. Weary, *University of British Columbia, Vancouver, Canada.*

The objectives of the study were to compare bacteria counts of mastitis causing organisms in sand and sawdust bedding, and determine the relationship between bacteria counts in bedding with those on the cows' teats. Sixteen cows were housed on either sand or sawdust bedded free-stalls using a cross over design with 3 weeks per bedding type. Fresh bedding was added every 7 days. Visible fecal matter was removed daily as needed to keep stalls clean and dry. Bedding samples were collected on day 0 (prior to cows lying on the bedding), day 1, 2 and 6. Teat ends were sampled prior to the morning milking on day 1, 2 and 6. All samples were analyzed for the growth of coliforms, *Streptococci spp.*, and *Klebsiella spp.*. Bacteria counts in bedding and on the teat ends were analysed using analysis of variance. Treatment differences on each day were tested by Bonferroni multiple comparison test. Correlations among bacterial counts in bedding and on teat ends were determined by Pearson's correlation coefficients. For both bedding and teat end samples, there were significantly more coliform and *Klebsiella* bacteria

associated with sawdust than with sand ($P < 0.01$) but there were more *Streptococcus* associated with sand than with sawdust ($P < 0.01$). In both sawdust and sand bedding, coliform and *Klebsiella* and *Streptococcus* counts increased over the week, although patterns varied with the bedding and the bacteria type. Bacteria counts in bedding were highly correlated to bacteria counts on teat ends. In conclusion, coliform and *Klebsiella* bacteria are more numerous when using sawdust bedding, but *Streptococcus* bacteria are more numerous in sand.

Key Words: Environmental bacteria, Stall management, Udder cleanliness

1506 Sensitivity and specificity of MAS-D-TEC to detect subclinical mastitis in dairy cattle. H. Ghasemzadeh-Nava*¹, M. R. Hosseini², and F. Gharagozloo¹, ¹Dept. of Large Animal Clinical Sciences, Faculty of Vet. Med; University of Tehran, ²Private Practitioner, Garmsar, Iran.

Early diagnosis of subclinical mastitis in dairy cows may be important in reducing production losses and enhancing prospects of recovery. In recent years, most effort has gone into the system that uses changes in the electrical conductivity of milk. The purpose of this study was to evaluate the Sensitivity (Se) and Specificity (Sp) of MAS-D-TEC (a manually cow-side detector of mastitis test) for detection of subclinical mastitis by changes in electrical conductivity of foremilk. Fore milk samples of each cow (n=236 quarters) were first examined by MAS-D-TEC device (Westcor Inc; Logan, USA). MAS-D-TEC graded from 0 to 9. On the basis of the factory recommendation, sample grades ≥ 5 are highly indicative of presence of infection. Quarter milk samples were then collected aseptically and sent to the diagnostic lab for bacteriological cultures on blood agar and MacConkey agar media. The results of this study revealed that Se of MAS-D-TEC for detection of subclinical mastitis was 100% (137/137, that means all of 137 specimens with ≥ 5 grades in MAS-D-TEC procedure were positive in bacteriological cultures), but the Sp of this device was 43.3% (26/60, that means only 26 out of total 60 negative culture specimens in MAS-D-TEC procedure had ≤ 4 grades, so 34 of negative culture specimens had ≥ 5 grades in MAS-D-TEC procedure). The false positive results of this device to detect subclinical mastitis may be attributed to the stage of lactation, parity, presence of the bacteria in the milk cells (more commonly about the presence of *Staphylococcus aureus* in the macrophage cells), presence of other microorganisms other than bacteria in the milk samples and so on. In conclusion, the present study revealed that milk specimens with degrees ≤ 4 in MAS-D-TEC procedure are highly indicative of absence of pathogens in the udder, so it is not necessary to take samples from them for bacteriological cultures, but specimens with degrees ≥ 5 may be indicative of subclinical mastitis which bacteriological cultures must be done to ascertain the presence of bacteria and kind of the pathogens involved, necessary for control and preventive mastitis programs in dairy herds.

Key Words: Mastitis, Electrical Conductivity, Cattle

Animal Breeding and Genetics Molecular Genetics

1507 The bovine gastrointestinal tract: A gene expression profile. C. Hansen¹, A. Fu¹, Y. Meng¹, C. Li¹, E. Okine¹, C. W. Sensen², P. Gordon², and S. S. Moore*¹, ¹Dept. of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, Canada, ²Dept. of Biochemistry and Molecular Biology, University of Calgary, Calgary, AB, Canada.

The bovine gastrointestinal (GI) tract is a complex system of chambers that function to break down and absorb what is often low quality feed. Although genes expressed along the GI tract have been intensely studied, for the most part experiments have only reported on one or a few genes at a time. We have used gene expression profiling to catalogue the genes and their level of expression in various tissues of the bovine GI tract and thus gain insight into the functionality of these tissues. Directionally cloned cDNA libraries of each of the segments of the tract were constructed using the Stratagene ZAP cDNA synthesis kit and approximately 2000 expressed sequence tags (ESTs) were generated for each region. Sequences were submitted to the MAGPIE program, a system for the automated analysis of biological sequences, and functional assignments were made for the various ESTs. Gene ontology assign-

ments were made using the GO classification system. Gene expression differences were analyzed statistically using the chi-square test. Tissue specific transcripts were found highly expressed in some regions. For example, the lysozymes were very abundant in the abomasum, but they are virtually absent from other regions. Ribosomal proteins too showed differences in level of expression between regions, indicating differences in the level of protein synthesis. Interestingly enough, a number of the GI regions did not appear to express a particular type of sequence preferentially. Rather, there was a steady, low level of expression of all genes observed. A comprehensive overview of the differences found will be presented.

Key Words: Gene Expression, Gastrointestinal Tract, Bovine