Machine milking may influence the defense mechanisms of the teat by altering teat tissue fluid-dynamics. The skin temperature reflects the underlying circulation and tissue metabolism. Use of thermography can focus, collect and transform the infrared range of the electromagnetic spectrum that is emitted from any body in a heat dependant fashion. Thermography images a pictorial summary of the heat gradients generated and can thereby visualize the thermal patterns of the skin resulting in useful mapping of the underlying circulation. Two healthy cows and one heifer with moderate teat oedema where milked with a conventional liner and a very soft experimental liner in a split udder design mode. Thermographic pictures where taken before teat preparation with a wet cloth, immediately after preparation, and successively after milking for 10 min. Skin temperatures were measured approximately 5 mm from the teat apex, at the mid, and at the base of the teat. The thermograms were statistically visually different between teats milked with different liners. During preparation, teat apex-, mid teat- and teat base-temperature fell 3.61 ± 4, 3.41 ± 4 and 17.09 ± 4 respectively. The decrease at mid teat and teat base temperature where however less distinct among teats with moderate oedema. Immediately after milking, all teats milked with the soft liner where colder at the teat apex (mean 2.10 ± 4C) and slightly warmer at the middle (1.10 ± 4C). During milking, temperature at the teat base decreased of teats without oedema and milked with the conventional liner but did however rise among teats milked with the soft liner and among teats with moderate oedema. Present findings may be explained by the soft liner having a relatively low ability to massage the teat apex combined with a relatively good capacity to massage the teat sinus and maintain fluid circulation at the teat base. We conclude that thermography is useful for study and evaluating the effects of different milking techniques on teat fluid dynamics.

Key Words: Milking, Teat, Thermography

Bedding amendments for environmental mastitis control in dairy cattle. E. K. Kupprion, J. D. Toth*, Z. Dou, H. W. Aceto, and J. D. Ferguson, University of Pennsylvania, Kennett Square, PA/USA.

Coliform bacteria are environmental mastitis pathogens that thrive in manure and bedding and are often responsible for transient peracute and acute mastitis. The purpose of this experiment was to investigate if acid and alkaline amendments added to dairy cow bedding are effective in controlling mastitis-causing bacteria populations. Alum, fluidized bed combustion coal flyash (FBC), fly ash desulfurization flyash (FGD), or hydrated lime were added to kiln-dried sawdust bedding material (1:10 amendment:bedding, DM basis) overlaying mattresses in dairy tie-stalls with no-amendment control included for comparison. Each treatment was replicated three times. Bacteria counts were made by plating samples of bedding, mattress swab, and teat end swab, collected on day 1, 2, 3; colonies were identified as total Gram-negative bacteria, E. coli, and Klebsiella spp. pH was also determined on bedding samples. All amendments but FGD exhibited antibacterial effect. Flyash FBC appeared to be most effective on day 1; the hydrated lime treatment suppressed bacteria growth on day 1 and 2 with the antibacterial effect diminished on day 3. Alum was able to suppress bacteria populations throughout the 3-day sampling period. The antibacterial effect of the amendments was apparently related to pH alteration of the bedding material. Hydrated lime raised pH by about 5 units during day 1 and 2, FBC by nearly 5 units on day 1, whereas alum reduced pH by about 3 units throughout the 3-day period. Bedding pH was not changed by the FGD treatment.

Key Words: Vaccination, Mastitis, Coliform

Multiple boosters of J5 vaccine elicit strong lactational antibody responses in dairy cows. R.A. Darch1, L. Nielsen1, P. Saama1, R.J. Erskine2, A.P. Belschner3, and J.L. Burton3, 1Animal Science, Michigan State University, 2Large Animal Clinical Sciences, Michigan State University, 3Pharmacia Animal Health.

J5 E. coli vaccines have done well to protect cows from coliform mastitis in early lactation. However, data from our group show that peak rates of coliform mastitis occur between 3 and 5 months of lactation, even in J5 vaccinated herds, suggesting that protective antibody responses wear off quickly after the final dose of vaccine is administered. The objective of this study was to determine if multiple boosters of J5 vaccine maintain strong anti-coliform antibody responses throughout lactation. Commercial J5 bacterin was used to immunize two groups of cows (n = 4 multiparous, 2 primiparous per group); control cows received the recommended 3 doses of J5 vaccine (at dry off, 30 days dry, and 14 days postpartum) while treated cows received 12 doses (the recommended 3 doses plus 9 additional doses at 30-day intervals). Weekly blood samples were collected from all cows throughout the trial for ELISA assay of serum anti-J5 E. coli IgM, IgG1, and IgG2 antibody responses. ELISA test data were normalized against negative control values and resulting
data analyzed by repeated measures (SAS). Results showed that all cows mounted clear IgM, IgG1, and IgG2 antibody responses when adminis-
istered 3 doses of vaccine. However, treatment influenced ($P < 0.0001$) the shape of each antibody response profile. Control cow responses de-
clined once vaccinations were terminated while treated cow responses increased steadily throughout lactation. Differences between treatment
groups were particularly striking for the IgG1 and IgG2 response pro-
files. Results show that multiple boosters of J5 bacterin sustains strong
serum antibody responses in lactating cows.

Key Words: Coliform Mastitis, Antibodies, Response Antibody

338 An evaluation of the ColiMast test for detection of coliform mastitis in dairy cattle. S.K. Gavrylash1, K.E. Leslie1, M. Archambault2, and A. Bashiri1, 1University of Guelph, De-
partment of Population Medicine, 2University of Guelph, Animal Health Laboratory.

A rapid and accurate method to determine the type of pathogen caus-
ing clinical mastitis would be useful. The ColiMast test is an enriched
growth media in a vial. After incubation, a color change indicates the
presence of coliforms. This project has evaluated the test characteris-
tics of the ColiMast test for detecting coliforms in clinical mastitis milk
samples. Samples were obtained from submissions to the University of Guelph.
ColiMast vials were inoculated with 2 ml of milk and incubated at 37°C. Color change was evaluated at 12 and 24 hours.
The original milk samples underwent standard culture. In addition,
four farms inoculated a ColiMast test with milk from each case of clinical
mastitis. The producer checked the ColiMast test at the next two
milking to observe and record any color change. The original milk sam-
ple was then sent to the University of Guelph. A second ColiMast test
was done on the same sample after thawing, and sent for bacterio-
logical culture. Sensitivity and specificity of ColiMast were calculated.
In addition, reasons for false positive and false negatives were identi-
fied. A Kappa Value for the agreement between the ColiMast tests done
on-farm and in the lab was calculated. Complete results were obtained from
505 samples. A total of 172 samples were positive for coliforms. After 24 hours of incubation, 128 of these lab-positive samples were also
positive on ColiMast (sensitivity = 0.74). Of the 333 samples that were
negative for coliforms on culture, 261 were ColiMast negative (speci-
ficity = 0.78). This means that there were 72 ColiMast tests that gave
a false positive result. It is noteworthy that the ColiMast test uses 2
ml of milk in an enriched liquid growth medium as compared to a 0.01
loop inoculum in milk culture. Of the 72 false positive tests, 26 had no
significant growth on culture. The larger volume of milk may allow for
relatively small numbers of coliforms to grow and cause a color change.
The Kappa Value was 0.85 when the test was read at 12 hours suggest-
ing excellent agreement between the ColiMast tests done on the farm and
in the lab. The agreement was substantially less at 24 hours (K=0.48).
In conclusion, the ColiMast test offers great promise for use in a treatment
decision-making protocol.

Key Words: Mastitis, Clinical, Diagnosis


Bovine mastitis is an extremely costly disease of dairy cattle because of
its frequent occurrence and impact on milk production. Microbiologic
examination of milk samples from mastitic cows is useful in determin-
ing the cause of the infection and deciding on appropriate preventative
and therapeutic strategies. The objective of this study was to examine the
characteristics of milk samples submitted for culture in Wisconsin
from 1994 to 2001. Clinical case records from milk samples submitted
to the Wisconsin Veterinary Diagnostic Laboratory from January 1994
until June 2001 were retrieved, and the test results were copied from
original paper records into a computer spreadsheet for analysis. Test
results (n=83,650) were recorded as no growth, contaminated or iden-
tified. A Kappa Value for the agreement between the ColiMast tests done
on-farm and in the lab was calculated. Complete results were obtained from
505 samples. A total of 172 samples were positive for coliforms. After 24 hours of incubation, 128 of these lab-positive samples were also
positive on ColiMast (sensitivity = 0.74). Of the 333 samples that were
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In conclusion, the ColiMast test offers great promise for use in a treatment
decision-making protocol.

Key Words: Mastitis, Milk samples, Milk quality


This study was conducted to evaluate the shedding patterns of ten lact-
tating dairy cows with mycoplasma intramammary infections. Milk
samples were collected daily for 28 days using aseptic techniques. My-
ycoplasma isolation in milk samples was initiated by directly plating a
fresh milk sample onto a mycoplasma agar plate. Isolation was also at-
tempered by inoculating a mycoplasma enrichment broth, to increase the
likelihood of isolation for 4 days and then transferring broth to an agar
plate. Agar plates from direct culture and enrichment broth were incu-
bated at 37°C, 10% CO2, for 10 days before examination. Agar plates
were examined for growth of mycoplasma colonies and the numbers of
colonies forming units (CFU) were recorded. Mycoplasma was isolated
from milk samples of 8 cows by direct plate inoculation, with and with-
out enrichment. In samples from 2 cows mycoplasma was only detected
from agar plating of broth culture. Contrasting isolation frequencies of
direct plate versus broth culturing resulted in isolation of mycoplasma
species 68% of the time from both direct plate and broth culturing meth-
ods. Mycoplasma species were isolated in 23% of the broth cultures
alone and 9% of the time through direct plate only. A bimodal frequency
distribution of mycoplasma species was evident in the mycoplasma culture
and milk samples was observed. In composite milk samples, mycoplasma
was never recovered in 35% of the samples, while 54% of the samples
had more than 6 million colonies recovered. In 43% of the quarter milk
samples mycoplasma was never recovered while in 39% of the samples
there were greater than 6 million colonies. The use of enrichment broth
has the potential to improve detection of cows with mycoplasma intra-
mammary infections. Data indicated that periods of latency might exist
when cows with mycoplasma mastitis may not be shedding this pathogen
in milk. These latent periods can affect diagnosis of this disease

341 Impact of intramammary treatment of CMT positive early postpartum dairy cows. J.A. Wallace*, K. Stipetic2, K.E. Leslie1, R.T. Dingwell1, Y.H. Schukken4, and P. Baillargeon3, 1University of Guelph, Department of Population Medicine, 2Cornell University, 3Clinique de St-Louis/Embryobec.

1781 quarters of 489 cows from dairy herds in Quebec (n=14), Ontario
(n=2), and New York (n=7) were enrolled. All quarters from each cow
were tested by the dairy producer using the California Mastitis Test
(CMT) between calving and day 3 in milk, and sampled aseptically
for milk bacteriology. A CMT score 0 was considered positive. Cows
with a positive CMT were randomly assigned to receive either the label
dose of intramammary cepharin sodium (Cefa-Lak) or no treatment.
All CMT positive cows were sampled for bacteriological culture on two
more occasions (10-16 DIM, and 17-23 DIM) to determine cure of infec-
tions. Outcomes evaluated included the effect of treatment on cure for
major pathogens, and the effects of treatment on linear score (LS) and
milk production for the first three DHI tests post calving. The sensi-
tivity (56%) and specificity (86%) of CMT for detecting cows infected
with major pathogen infections was relatively good, although the test
characteristics varied among farms, particularly in relation to the rate
of IMI in fresh cows. There was a significant difference in cure rates for
major pathogens (p<0.01), especially for the environmental strepto-
cocci (p<0.0001) between the 135 treated quarters and the 186 controls.
The impact of CMT score, treatment group, and cure were assessed by
measuring changes in LS and milk production using a mixed model pro-
cedure, controlling for herd, lactation, and treatment. Overall, cows
with a CMT 3 had a higher LS (p<0.05). Treated cows were 3.6 times more
likely to cure a major pathogen infection (p<0.02). Cows that cured a
major pathogen had a lower LS on test date 3 (p = 0.08). As LS increased milk production decreased. There was a trend in the data that indicated that untreated cows with high CMT score at calving (score 2 and 3) had a lower milk production on the first test days, whereas this effect was not present in treated cows with a high CMT score. In conclusion, early antibiotic treatment of CMT positive quarters had a significantly greater cure rates than controls, particularly with the environmental pathogens.

Key Words: Mastitis, Postpartum, Therapy

342 Reported antimicrobial usage on organic and conventional dairy farms in the Midwest and Northeast. A. M. Gilek1,2, L. F. Waterkamp3, J. B. Kanene3, S. J. Wells4, C. Fossier1, and L. Halbert3. 1University of Wisconsin, Madison, WI, 2Cornell University, Ithaca, NY, 3Michigan State University, East Lansing, MI, 4University of Minnesota, St. Paul, MN.

A longitudinal study is evaluating risk factors for antimicrobial resistance on dairy farms. The objective of this part of the project was to compare antimicrobial usage on conventional (CON) versus organic (ORG) dairy farms. A questionnaire (n = 131) was administered at an initial visit by trained personnel. Data were entered into a central database and analyzed using SAS. Conventional dairies used significantly more ionophores and coccidiostats in weaned calves (p = 0.0038). More milk from cows treated with antibiotics (p = 0.004) were used to feed calves on CON farms. Significantly more CON dairies used antibiotics (p = 0.0003) to treat respiratory disease in cows. There was no significant difference in the use of antibiotics to treat respiratory diseases or scours in calves. The use of Tetracycline (p = 0.002) and Trimethoprim-Sulfua (p = 0.049) was higher in CON dairies. No ORG dairies but 40.4% of CON dairies reported the use antibiotics to treat mastitis (p = 1.307*10^-6). The most common antibiotics used to treat mastitis on CON dairies were: Penicillin (42.42%), Ampicillin (26.26%), Amoxicillin (15.15%), and Oxytetracycline (18.18%). Comprehensive dry cow therapy was used by 97.98% of CON versus 3.13% of ORG. Significantly more conventional dairies used antibiotics to treat metritis or retained placenta (p = 0.0001). Significantly more conventional dairies used antibiotics to treat foot problems in adult cows (p < 0.0001). Although there was no significant difference in the use of antibiotics in footbaths, significantly more CON dairies used tetracycline in the footbath (p = 0.0214). No ORG herds but 17.17% of CON used antibiotics in the water or feed of weaned calves and heifers (p = 0.0122). Of the organic dairies, 50% reported the use of antibiotics in their dairy cattle. After antibiotics had been used, 10% of ORG herds reported using animals for organic milk production after a withdrawal has passed. No ORG herds used animals for organic meat production after administering antibiotics. As expected, this study found that the use of antibiotics is significantly higher on CON farms as compared to ORG farms.

Key Words: Antimicrobial, Organic, Drugs

343 Influence of environmental stressors and prophylactic antibiotic on serum antioxidant concentrations and incidence of bovine respiratory disease of feeder steers. N. K. Chirase1,2, C. W. Loan1, R. Briggs2, G. Duff3, J. Avampato1, and D. Murray4. 1Texas Agricultural Experiment Station, Amarillo and West Texas A&M University, Canyon, 2USDA/ARS, Bushland, TX and Ames, IA, 3Texas A&M University, College Station, 4Arizona State University, Tucson, Arizona,5OXIS International, Portland, OR.

Feeder cattle often encounter many environmental stressors and pathogens associated with the marketing process and translocation to the feedyard. Exposure to stressors could compromise the antioxidant and immune defense systems, resulting in morbidity and mortality of these calves. An experiment was conducted to determine the effects of prophylactic antibiotic treatment and posttransit commingling of feeder calves obtained from two sources (New Mexico and Tennessee), to measure immune and antioxidant concentrations and assess the rate of bovine respiratory disease (BRD). One hundred twelve (121) crossbred feeder steers (average BW 190 kg) were purchased in NM and calves were vaccinated, weighed, and blood obtained via jugular venipuncture. The calves were randomly allotted into 3 commingling treatment groups (3 replicates per group): 1) New Mexico (NM), 2) Tennessee (TN) and 3) Commingled (Mixed). One-half of the steers in each treatment group received pretransit prophylactic Nuflor (1 mL/15 kg of BW, s.c.). Upon arrival at the feedyard in Clayton, NM, all steers were managed using commercial feedyard management protocols. Steers were also scored daily for BRD and blood was obtained upon arrival (d 0) and on morbid steers on various days. All the oxidative stress biomarkers were standardized using HB content of the cell. The data were subjected to the analysis of variance using the General Linear Models procedure of SAS. Pretransit HB (mg/dL), cGPx (mU) and GSSG (nmol) were lower (P < 0.05) in TN steers than NM steers. On the contrary, the GSH concentrations of the NM steers were lower than the TN steers. Pretransit cGPx values for TN calves correlated (r = 0.27; P < 0.01) with episodes of BRD at the feedyard. As incidence of BRD increased from 0 to 4, cGPx concentrations decreased from 95.3 to 20.3 mU/L, respectively. Superoxide dismutase and GSH responses were inconsistent among all treatments. These results suggest that oxidative stress biomarkers could be used as biomarkers of BRD susceptibility. Furthermore, antioxidant supplementation may be required to restore the antioxidant defense system.

Key Words: Feeder Steers, Oxidative Stress, Bovine Respiratory Disease

344 Effect of environmental stressors and prophylactic antibiotic on serum antioxidant concentrations and incidence of bovine respiratory disease of feeder steers. N. K. Chirase1,2, C. W. Loan1, R. Briggs2, G. Duff3, J. Avampato1, and D. Murray4. 1Texas Agricultural Experiment Station, Amarillo and West Texas A&M University, Canyon, 2USDA/ARS, Bushland, TX, 3Texas A&M University, College Station, TX, 4USDA/ARS, Ames, IA, 5Arizona State University, Tucson, AZ.

Feeder cattle often encounter many environmental stressors and pathogens associated with the marketing process and translocation to the feedyard. Exposure to stressors could compromise the antioxidant and immune defense systems, resulting in morbidity and mortality of these calves. An experiment was conducted to determine the effects of prophylactic antibiotic treatment and posttransit commingling of feeder calves obtained from two sources (New Mexico and Tennessee), to measure immune and antioxidant concentrations and assess the rate of bovine respiratory disease (BRD). One hundred twelve (121) crossbred feeder steers (average BW 190 kg) were purchased in TN and eighty four (84) crossbred steers of similar size and age were purchased in NM and calves were vaccinated, weighed, and blood obtained via jugular venipuncture. The calves were randomly allotted into 3 commingling treatment groups (3 replicates per group): 1) New Mexico (NM), 2) Tennessee (TN) and 3) Commingled (Mixed). One-half of the steers in each treatment group received pretransit prophylactic Nuflor (1 mL/15 kg of BW, s.c.). Upon arrival at the research feedyard in NM, all steers were managed similar to commercial feedyard management protocols. Steers were also scored daily for BRD and blood was obtained via jugular venipuncture upon arrival (d 0), 7, and 28 d posttransit. The data were subjected to the analysis of variance using the General Linear Models procedure of SAS. There was no antibiotic treatment by commingling interaction (P > 0.05) for serum free retinol, α- and γ-tocopherol concentrations and incidence of BRD. Regardless of commingled group, transit stress decreased (P < 0.01) serum free retinol and α-tocopherol concentrations of feeder steers on d 7 and 28 posttransit. By d-28, serum α-tocopherol concentrations decreased from 6.3 µg/mL to 1.65 µg/mL, far below the critical levels for cattle.

Prophylactic antibiotic treatment did sustain (P < 0.05) serum antioxidant concentrations of steers. Although, γ-tocopherol also decreased regardless of commingled or antibiotic treatment, they increased threefold (P < 0.01). These results suggest that transit stress reduced serum antioxidant concentrations to critical levels at the feedyard and supplementation may be required to maintain.

Key Words: Feeder Steers, Oxidative Stress, Bovine Respiratory Disease

345 Development and validation of a pruritic index to assess the impact of choanotic mange infestation in dairy cows. K. Day1,2, K. Leslie3, T. Duffield4, D. Kelton1, J. Jansen1, and W. Sears1. 1University of Guelph, Guelph, ON, 2Ontario Ministry of Agriculture, Food, and Rural Affairs, Fergus, ON.

Recent studies have reported a significant association between presence of mange lesions, vaccinated in early lactation. In addition, there was a significant positive production response to minoxidin therapy in the transition period. However, the biological reasons for these
Feeder cattle often encounter many environmental stressors and pathogenic associations with the marketing process and translocation to the feedyard. Exposure to stressors could compromise the antioxidant and immune defense systems, resulting in morbidity and mortality in these calves. An experiment was conducted to determine the effects of prophylactic antibiotic treatment and posttransit commingling of feeder calves obtained from two sources (New Mexico and Tennessee), to determine performance and rate of bovine respiratory disease (BRD). One hundred twenty-one (121) crossbred feeder steers (average BW 190 kg) were purchased in TN and eighty-four (84) crossbred steers of similar size were obtained in NM and calves were vaccinated, weighed, rectal temperature (RT) measured, and randomly allotted into 3 commingling treatment groups (3 replicates per group): 1) New Mexico (NM), 2) Tennessee (TN) and 3) Commingled (Mixed). One-half of the steers in each treatment group received pretransit prophylactic Nulfor (1 mL/15 kg of BW, s.c.). Upon arrival at the Clayton Livestock Research Center, Clayton, NM, all steers were housed by groups and managed similar to commercial feedyard management protocols. Steers were also scored daily for BRD, weighed and rectal temperatures measured upon arrival (d 0), 7, 14, 21 and 28 d posttransit. The data were subjected to the analysis of variance using the General Linear Models procedure of SAS. There was no antibiotic treatment by commingling interaction (P > 0.05) for ADG, RT or BRD rates. Bovine respiratory disease rate was higher in the TN and Mixed groups than the NM group (2.22 and 1.72 vs 0.92, respectively). However, on d 7, 14, 21 and 28 of the study, the NM calves gained less (P < 0.01) and also had higher RT on d 28 than the TN and Mixed calves. Prophylactic antibiotic had no effect (P > 0.05) on RT or ADG of calves of all treatment groups but lowered (P < 0.05) BRD rates (1.33 vs 1.91). As the BRD rates or episodes of sickness increased, the ADG of calves decreased. These results suggest that more studies are required to understand the role of environmental stressors on feeder cattle performance and health.

Key Words: Feeder Steers, Performance, Bovine Respiratory Disease

348 A comparison of the effect of Neospora caninum on milk production in two populations of Ontario dairy herds. Jamie Hobson1,2, Todd Duffield1, Dave Kelton1, Bev McEwen2, Sharon Hetitala3, Ken Lissemore1, Gerard Cramer1, and Andrew Peregrine3, 1Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada, 2Animal Health Laboratory, University of Guelph, Guelph, Ontario, Canada, 3California Animal Health and Food Safety Laboratory System, Davis, University of California, U.S.A.

Studies on Neospora caninum infection in dairy cattle and its effect on milk production have yielded conflicting results, possibly due to differences in study methodology or to an as-yet-undetermined biological effect. The objective of this work was to compare these effects and propose a theory explaining the association between N. caninum serostatus and milk production. Group A consisted of cows from 28 case herds of a large study into N. caninum in Ontario dairy herds conducted in 1999. These herds had experienced at least one N. caninum abortion based on fetal histopathology in 1998/99; subsequent whole herd serology was completed in 1999. Group B comprised 57 herds that were sampled in the 1998 Ontario Sentinel Herd Project and were considered representative of Ontario herds. Cow-level completed 305-day milk production records were obtained for all cattle from the Ontario Dairy Herd Improvement program from the parity corresponding to the time of serum collection. Cow-level serostatus was determined with a kinetic-ELISA, using a sample-to-positive control ratio cutoff of > 0.45. Data were analysed using a linear regression model with the GENMOD procedure in SAS ver.8 controlling for parity, days in milk at test date, and the random effect of herd clustering. Seropositive cows in Group A produced 276 kg less 305-day milk than seronegative cows (n=1196, p < 0.05). In contrast, Group B seropositive cows produced 151 kg more 305-day milk (n=3162, p = 0.10) than seronegative cows. Therefore, if N. caninum caused abortion problems in a herd, milk production was negatively affected in seropositive cows, but when N. caninum did not cause an abortion problem, milk production was enhanced in seropositive cows. The authors theorize that the effect of N. caninum infection on cow-level milk production is dependent on the immunological ability of cattle to control N. caninum infection.

Key Words: Neospora caninum, Milk production, Abortion