

Wednesday, July 15, 2009

## POSTER PRESENTATIONS

### Animal Health

**W1 The economic impact of five dairy cattle clinical diseases as measured by the correlation between Lactational incidence risk and the income over feed cost in Wisconsin dairy herds.** M. C. Ruiz\* and V. E. Cabrera, *University of Wisconsin, Madison.*

The objective of the study is to show the reduction in profit associated with herd level disease. The association between the lactational incidence risk (LIR) of five production diseases and the income over feed cost (IOFC) is being established in 30 Wisconsin dairy herds. The studied diseases are: (1) milk fever, (2) retained placenta, (3) displaced abomasum, (4) clinical ketosis, and (5) ovarian cyst. The incidences of these diseases is monthly calculated using standardized definitions to report cases. The IOFC is calculated for each herd according to DHI production records, milk check prices and feed costs reported by the producers. The IOFC is regressed against the LIR of the diseases to obtain the economical losses associated to each of the studied diseases. Preliminary results are showing that the LIR of the diseases found in this study are inside the LIR ranges previously reported in the literature, with exception of displaced abomasum, which seems to be higher than previously reported. Results are suggesting that the 2 most economically important diseases impacting the IOFC are clinical ketosis and displaced abomasum. Inferences from our regression models are indicating that 1% of LIR increase is associated with \$0.15/cow/day and \$0.08/cow/day of IOFC losses for clinical ketosis and displaced abomasum, respectively.

**Key Words:** disease economic impact, production disease, profitability measurement

**W2 Cows response to glucose tolerance test (GTT) and periparturient diseases: Preliminary study.** G. Matteo\*, C. Chiara, C. Mauro, and M. Massimo, *Department of Veterinary Clinical Sciences. University of Padua, Legnaro, Padova (PD), Italy.*

Most of the metabolic diseases occur within the first 2 weeks of lactation and most periparturient abnormalities have some metabolic element as a component of the sufficient cause of clinical disease. In pregnancy and lactation the glucose requirements are considerably high than and many studies on ewes demonstrated that as pregnancy advances, circulating maternal insulin concentrations decline and the insulin response to glucose is reduced. Insulinemia decreases during the last third of gestation and early lactation: this have been postulated to be the result of a decreased response of the pancreas to insulinotropic agents. Additionally, the sensitivity of peripheral tissues to insulin is reduced. The objective of this study was to evaluate cows response to glucose load in order to identify potential differences in insulin sensitivity/glucose resistance by circulating concentrations of glucose. Eighteen dairy cows in late dry period (10±5 days from predicted calving) have been submitted to glucose load that consisted in i.v. injection of 0.5g/kg bw (using 50% glucose solution). Glycaemia was measured before the glucose infusion (T0) and at 10 minutes (T10), T20, T40, T80 after the infusion. The basal glycaemia of cows (T0) was 59.60±5.39mg/dl; the mean glycaemia at T10 was 155.40±21.83 at T20 was 128.80±20.05 and decreased progressively until T80. A difference was observed at T80

when some cows reached again the initial glycaemia but others did not. According to this difference we divided cows into two classes: 1 (normal cows) with ratio T80/T0≤1.05, 2 (glucose resistant cows) with T80/T0≥1.05. This classification is justified by the statistically significant difference present between T80 in group 1 and group 2 (P≤0.001). We think that these results are important to start a research about glucose metabolism of dairy cows in the transition period and to understand their susceptibility to periparturient diseases related to their ability to metabolize glucose in peripheral tissues. We could suppose that cows with different response to glucose load will probably present different clinical situation after parturition.

**Key Words:** dairy cows, pregnancy, glucose metabolism

**W3 Effect of modified yeast extract and HSCAS containing mycotoxin adsorbent on blood metabolites of dairy cows challenged with aflatoxin B1.** M. R. Akkaya<sup>1</sup>, M. A. Bal<sup>1</sup>, F. Inanc Tolun<sup>1</sup>, F. Bilge<sup>1</sup>, Y. Atli<sup>1</sup>, and V. Akay\*<sup>2</sup>, <sup>1</sup>Kahramanmaraş Sutcu Imam University, Turkey, <sup>2</sup>Global Nutritech Ltd., Kocaeli, Turkey.

Mycotoxins are secondary metabolites of fungus and cause economical losses in livestock production. An experiment was conducted to test the efficacy of modified yeast extract and HSCAS containing mycotoxin adsorbent (MP; MYCOPURGE®) on blood metabolites of dairy cows fed an aflatoxin B1 (AFB1) containing diet. Eighteen lactating Holstein cows were used in a 3×2 factorial arrangement of randomized block design. Cows were assigned to one of the six treatments of a 14 d period. Treatments (T) were: 1) control (no MP and no AFB1); 2) no MP + 0.6 mg AFB1; 3) 10 g/d/cow MP + no AFB1; 4) 10 g/d/cow MP + 0.6 mg AFB1; 5) 20 g/d/cow MP + no AFB1; and 6) 20 g/d/cow MP + 0.6 mg AFB1. Blood samples were taken from d 1 through d 8 and again on d 14 before feeding. Blood urea nitrogen concentration was lower (P<0.05) for T6 (12.3 mg/dL) than T2 (14.3 mg/dL). Creatinine concentration was higher in MP supplemented cows fed with AFB1 than cows fed no AFB1 (MP\*AFB1 interaction; P<0.01). Although total cholesterol level was reduced by AFB1 feeding (193.6 vs. 240.9 mg/dL for T2 and T1; P<0.01), MP supplementation effect was not observed across treatments. The total triglyceride level was lower for cows that received T4 (16.5 mg/dL) and T6 (17.7 mg/dL) compared to T1 (25.6 mg/dL; MP\*AFB1 interaction; P<0.01). Although serum alanine aminotransferase level was reduced by AFB1 challenge (57.5 vs. 77.4 U/L for T2 and T1), MP supplementation increased the level of this enzyme in both T4 (65.1 U/L) and T6 (70.5 U/L; P<0.01). However, alkaline phosphatase level was reduced by MP supplementation in both T4 (34.9 U/L) and T6 (30.9 U/L) compared to the AFB1 challenged cows in T2 (70.5 U/L; P<0.01). Although serum albumin concentration was reduced by AFB1 feeding (1.49 vs. 1.63 g/dL for T2 and T1; P<0.01), MP supplemented cows resulted in a higher serum albumin regardless of AFB1 challenge, averaging 1.67 g/dL (MP effect; P<0.01). Results indicate that impaired blood profiles in AFB1 challenged cows may be controlled by supplementing modified yeast extract and HSCAS containing mycotoxin adsorbent.

**Key Words:** modified yeast extract, aflatoxin, dairy cows

**W4 Comparison of rectal and vaginal body temperatures in lactating dairy cows.** L. A. Vickers\*<sup>1</sup>, M. A. G. von Keyserlingk<sup>1</sup>, D. M. Veira<sup>3</sup>, D. M. Weary<sup>1</sup>, and W. Heuwieser<sup>2</sup>, <sup>1</sup>*Animal Welfare Program, Faculty of Land and Food Systems, University of British Columbia, Vancouver, British Columbia, Canada*, <sup>2</sup>*Clinic for Animal Reproduction, Faculty of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany*, <sup>3</sup>*Agriculture and Agri-Food Canada, Pacific Agriculture Research Station, Agassiz, British Columbia, Canada*.

The most commonly used method to identify illness in dairy cows is measuring body temperatures with a rectal thermometer. Although a circadian body temperature rhythm has been described for healthy dairy cows little is known of how illness affects the circadian body temperature rhythm. The objectives of this study were: 1) to validate measures by comparing rectal and vaginal temperatures in fresh cows and, 2) to investigate whether cows at high risk for illness (i.e. retained placenta) have a different diurnal temperature pattern than healthy cows. A total of 27 Holstein cows were enrolled 2 ( $\pm$ 0) days after calving (20 healthy, 7 RP). Rectal temperatures were taken at 6:30, 9:30, 12:30, 15:30, 18:30, and 21:30 ( $\pm$ 30 min) with a digital thermometer (GLAM750, GLA Agricultural Electronics, San Luis Obispo) for 8 consecutive days. During the same 8 d period vaginal temperatures were measured every 10 min with a modified vaginal controlled internal drug release (CIDR) insert fitted with a microprocessor controlled data logger (Minilog 8, Vemco Ltd., Halifax, Canada). The temperature loggers were inserted into the cows' vaginal cavity 2 d after calving. Approximately 2.4% of vaginal recordings could be objectively identified as extreme outliers. With these points removed there was a strong correlation between rectal and vaginal temperatures ( $n=1282$ ;  $R^2=0.64$ ). The RP cows had consistently higher body temperatures for the majority of the day; however both groups had a similar pattern of diurnal temperature rhythms. Highest temperatures were observed at night, while the lowest values were observed between 8:00-10:00 for cows who shed their placenta and 11:00-13:00 for cows with retained placenta.

**Key Words:** rectal temperature, vaginal temperature, temperature rhythm

**W5 Effects of prepartum dietary carbohydrate source on reproductive performance and metabolic disorders in Holstein cows during the periparturient period.** H. R. Mirzaei Alamouti\*<sup>1</sup>, H. Amanlou<sup>2</sup>, K. Rezaayazdi<sup>1</sup>, and A. Towhidi<sup>1</sup>, <sup>1</sup>*University of Tehran, Karaj, Tehran, Iran*, <sup>2</sup>*Zanjan University, Zanjan, Zanjan, Iran*.

Eighty Holstein cows, 46 primiparous and 34 multiparous cows, were used in a randomized complete block design and assigned at random to 1 of 2 treatments to evaluate the effects of 2 diets varying ruminal fermentable carbohydrate sources, ground corn (GC) and rolled wheat (RW), on health problems and reproductive performance of primiparous and multiparous cows after calving. The cows were fed diets as total mixed ration (TMR) with similar energy and crude protein content including 1) 18.57% GC, or 2) 18.57% RW from  $-23.1 \pm 9$  d relative to expected calving until calving. At parturition, animals were switched from a close-up dry cow diet to a lactation cow diet and, all animals received the same lactation diet until 28 d. Animal were blood sampled every week and days of -1, 0,+1 relative to parturition. The cows were monitored for all disorders and problems. Reproductive data were analyzed by using PROC MIXED of SAS software. The effects of treatments on incidence of health disorders were analyzed by Fisher Exact Test using the FREQ procedure of SAS. The results showed that, the RW diet in prepartum decreased number of artificial insemination, days open, days to first insemination and gestation length ( $P<0.05$ ). There was no diet effect on

udder edema, calving difficulty, and calf birth weight. The incidence of health problems for each treatment cannot be accurately assessed in trial of this size. However, the RW diet decreased overall incidence rates for health problems. In conclusion, feeding prepartum diets with rapidly fermentable source of starch (rolled wheat) can improve reproductive performance and ease metabolic adaptation from gestation to lactation in Holstein cows.

**Key Words:** periparturient period, carbohydrate source, metabolic disorders and reproductive performance

**W7 Factors affecting milk ELISA scores of cows tested for Johne's disease.** H. D. Norman<sup>1</sup>, J. R. Wright\*<sup>1</sup>, and T. M. Byrem<sup>2</sup>, <sup>1</sup>*Animal Improvement Programs Laboratory, ARS, USDA, Beltsville, MD*, <sup>2</sup>*Antel BioSystems, Lansing, MI*.

Infection with *Mycobacterium avium* ssp. *paratuberculosis* (Johne's disease) has been estimated to cost dairy producers over \$1.5 billion per year. Effects of environmental and genetic factors on ELISA milk scores for Johne's disease were examined using scores collected through Dairy Herd Improvement testing. Mean and standard deviation for ELISA scores were 0.04 and 0.18. Effects examined were test year, parity, days from calving until test (test stage), and birth and test seasons. Scores ( $n = 29,389$ ) with information for all effects designated in the model were from 25 herds and 139 herd-years. Distribution of tested animals was 49% for parity 1, 25% for parity 2, 13% for parity 3, and 13% for parities  $\geq 4$ . Test stages were seven 60-d increments from calving through  $\geq 361$  d and represented 10, 7, 6, 9, 23, 22, and 23%, of the data. Birth and test seasons were four 3-mo seasons beginning with January; scores were distributed uniformly among season. Distribution of scores by test year from 2002 to 2008 (incomplete year) was 3, 6, 12, 16, 19, 26, and 17%. Least square differences ( $P < 0.001$ ) were  $-0.04, -0.03, -0.01, 0.00, 0.01, 0.00$ , and  $0.00$  between test years;  $-0.03, -0.01, 0.01$ , and  $0.00$  between parities; and  $-0.02, -0.03, -0.02, -0.02, -0.02$ , and  $0.00$  between test stages. Interaction between parity and test stage showed that ELISA scores were higher near peak yield (61 to 120 d in milk) relative to later test stages for parities 1 and 2 than for parity 3 or 4. Effects of birth ( $P = 0.72$ ) and test ( $P = 0.38$ ) seasons were nonsignificant. Variance components were estimated with AIREMLF90 software using the same model but with random effects for sire and cow added. Heritability was low (1%), but repeatability was moderate (21%). The repeatability of milk ELISA scores suggests that the incidence of Johne's disease can be reduced, but the possibility of improving genetic resistance to Johne's is uncertain.

**Key Words:** paratuberculosis, milk ELISA, DHI

**W8 Characteristics of milk ELISA results for Johne's disease in US dairy cows.** T. M. Byrem\*<sup>1</sup>, H. D. Norman<sup>2</sup>, and J. R. Wright<sup>2</sup>, <sup>1</sup>*Antel BioSystems, Inc., Lansing, MI*, <sup>2</sup>*Animal Improvement Programs Laboratory, Beltsville, MD*.

The expanding practice of using antibody-capture ELISA on Dairy Herd Improvement (DHI) milk samples to test cows for infection with *Mycobacterium avium* subsp. *paratuberculosis* (Johne's disease) produced data for further study. Milk ELISA results (196,412) from 696 herds in 16 states between 2002 and 2008 had a mean score of 0.04, a standard deviation (SD) of 0.18, and revealed 3.2 and 6.1% positives based on cutoffs of 0.40 and 0.10, respectively. A subset of data (42,778) from more comprehensive testing in 25 herds from Michigan and Wisconsin had a mean score of 0.04, a SD of 0.18, and 3.0 and 5.6% positives based

on cutoffs of 0.40 and 0.10, respectively. For cows with multiple tests within parity (12%), those with negative scores (<0.10) on the first test were negative on the last test 94.6% of the time. Cows with positive scores on the first test were positive on the last test 51.7% of the time. For cows with multiple tests across parities (36%), equivalent frequencies were 90.9 and 47.0%. Within herd and year, differences in milk yield (kg) between cows with negative and positive ELISA results based on cutoffs of 0.40, 0.10, 0.06, 0.04, 0.02, and 0.00 were 528, 479, 404, 315, 295, and 305, respectively. Differences in milk yield were similar until the cutoff for ELISA score exceeded 0.05, suggesting a point where a notable percentage of infected cows were included in the positive group, thereby revealing their lower productivity through mean milk yield. Untested cows had lower mean milk yield than tested cows, even those whose test was positive. Examining the termination code for positive, negative, and untested cows revealed an unusually high percentage (44%) of the untested cows were removed from the herd by the end of the current lactation. This was in contrast to 15% of the positive cows and 12% of the negative cows being removed from the herd. Further analysis of the data will demonstrate the utility of DHI records in the evaluation of milk testing programs for Johne's disease.

**Key Words:** paratuberculosis, milk ELISA, DHI

#### **W9 Johne's outreach survey.** K. E. Olson\*, *KEO Consulting, Schaumburg, IL.*

The Voluntary Bovine Johne's Disease Control Program (VBJDCP), operational since 2002, is available to producers in all states. The program includes 'test negative' or 'Status Herds' who have found no Johne's positive animals in one or more years of testing, as well as 'management' herds who have conducted a risk assessment and implemented a Johne's management plan, but who may not have tested for the disease. Federal funding for the program has decreased from \$21m in 2003 to \$10.05m in FY08. Metrics used to evaluate effectiveness of the program have included herds enrolled as well as 'official' samples tested. In FY07 8,818 herds were enrolled in the program, including approximately 10% of the dairy herds and roughly 0.3% of the beef cow-calf operations. In contrast, 94.1% of participants in the NAHMS Dairy 2007 study indicated they were fairly knowledgeable or knew some basics about Johne's and 30% reported participation in a Johne's program. In addition, responding to producer interest, many DHIA organizations now offer Johne's milk ELISA testing. It is important to document indicators of program impact, beyond herd enrollment, in order to maintain Congressional program funding and effectively implement the new Johne's Strategic Plan based on public private partnership. To document outreach activities not captured in current metrics, surveys were developed and distributed to Designated Johne's Coordinator in each state as well as select extension, DHIA and industry representatives. Preliminary responses found: – A cadre of over 2,000 trained Johne's certified veterinarians available across the nation available to work with producer Johne's programs – Meetings held with industry groups are reaching substantial numbers of producers. – Nearly 200,000 milk ELISA samples are being run annually by DHIA with producers paying the cost – DHIA is seeking new ways to provide milk ELISA results with management information to producers. Final results from the survey will demonstrate the scope of outreach activities that have occurred. They will be used to help set directions for implementation of the new strategic plan and provide information useful in maintaining financial support for the program.

**Key Words:** Johne's, strategic plan, outreach

#### **W10 Perceptions of and participation in a Johne's control program.** E. Hovigh\*<sup>1</sup>, K. E. Olson<sup>2</sup>, and J. McDonald<sup>3</sup>, <sup>1</sup>*Pennsylvania State University, University Park,* <sup>2</sup>*KEO Consulting, Schaumburg, IL,* <sup>3</sup>*University of Wisconsin, Madison.*

Recently, the United States Department of Agriculture has promoted a voluntary Bovine Johne's Disease control program in the United States (US). Funds were available to states to support the implementation of this program. Enrollment of herds showed evidence of reaching a plateau and information was desired about the reason that herds did or did not participate in the program, and the value of the program to producers. A team of Johne's Disease (JD) experts developed a survey which was mailed to a systematic random sample drawn from a list of 48,078 US dairy herds. The initial mailing (N=8,013) was followed up with a reminder postcard, and a 3rd mailing of the survey to non-responders. 2601 surveys were returned. Of the 555 blank returns, 302 included a notation that the recipient was no longer dairy farming. 28 surveys (1%) were returned stating that the recipient refused to participate. The respondents reported an average of 160 lactating and dry cows in their herd (min=10, max=7200). 48% of the respondents "agreed" or "strongly agreed" that JD was currently a concern in their herd whereas 55% indicated they expected it to be a concern in the future. 27% of 1363 respondents were participating in their State's JD program at some level, a number slightly higher than the participation rate in the USDA's aggregated state-level data. This indicates that participating herds were slightly over-represented in the dataset. 24% of responders not participating in the state program felt that they were already doing everything they could to manage JD, and that participation in the program would provide no additional benefit. Questions intended to gauge the respondents knowledge of JD indicated that there appears to be a reasonable grasp of how new infections occur, but some misunderstanding about the interpretation and use of diagnostic test results. A number of questions were asked to determine the economic importance of JD. 74% of 1677 respondents indicated that they would be willing to pay a premium for replacement animals that had at least a 95% probability of being free of JD. 18% indicated a willingness to spend an additional \$200 per head.

**Key Words:** Johne's disease, survey

#### **W11 Relationship between lying patterns, feeding management, and udder health in lactating dairy cows.** B. L. Kitts\*<sup>1</sup>, S. Dufour<sup>2</sup>, D. T. Scholl<sup>2</sup>, and T. J. DeVries<sup>1</sup>, <sup>1</sup>*Department of Animal and Poultry Science, University of Guelph, Kemptville Campus, Kemptville, ON, Canada,* <sup>2</sup>*Faculté de Médecine Vétérinaire, Université de Montréal, Saint-Hyacinthe, QC, Canada.*

Fresh feed is often provided to dairy cows either right before or during milking to encourage cows to stand and feed rather than lay down. It is believed that keeping cows standing after milking provides time for the teat canal to close, reducing the chance of penetration by environmental pathogens and, thus, the risk of intramammary infection (IMI). The objective of this study was to investigate whether feeding management influences the latency in time to lay down following milking, and to determine if this time relates to incidence of IMI. Fifteen lactating dairy cows (5 most recently fresh, 10 randomly chosen) from each of 6 tie-stall dairy farms, were enrolled for a total of 90 cows. Mammary quarter samples of milk were taken (for bacterial culture of environmental pathogens: coagulase-negative streptococci, *Corynebacterium bovis*, *Escherichia coli*, *Streptococcus* spp, *Streptococcus uberis*, *Streptococcus dysgalactiae*, and *Klebsiella* spp) from each cow once every 3 wks, for a total of 3 samplings. A new IMI was defined as a positive culture

sample following a negative culture sample. Data on lying behaviour patterns were collected using data loggers for every cow for 7 d prior to each milk sampling. For these 7 d, individual milking and feeding times of the cows was also recorded. Delivery of fresh feed and/or concentrate  $\pm$  45 minutes from the onset of milking resulted in cows having a longer latency to lie down following both the AM ( $80.1 \pm 5.0$  vs.  $71.5 \pm 5.3$  min;  $P=0.048$ ) and PM milkings ( $98.4 \pm 5.5$  vs.  $73.5 \pm 5.4$  min;  $P<0.001$ ). Interestingly, the odds of a new IMI caused by any one of the environmental bacteria increased by 1.09 for every 10-min increase in latency to lie down following milking ( $P_{\text{Wald}}=0.01$ ; 95% confidence interval = 1.02, 1.17). Given that this logistic model only accounted for 2% of the variation in risk of a new IMI ( $R^2=0.02$ ,  $P_{\text{Likelihood Ratio}}=0.01$ ) and that the increase in odds was very small, it appears that the amount of time cows spend standing following milking, in the range of that observed, has little effect on the incidence of new IMI caused by environmental pathogens.

**Key Words:** dairy cow, lying behavior, intramammary infection

**W12 Using gait score and resting behavior to detect hoof lesions in cows.** N. Chapinal<sup>2</sup>, A. M. de Passillé<sup>1</sup>, D. W. Weary<sup>2</sup>, M. A. G. von Keyserlingk<sup>2</sup>, and J. Rushen\*<sup>1</sup>, <sup>1</sup>*Agriculture and Agri-Food Canada, Agassiz, BC, Canada*, <sup>2</sup>*University of British Columbia, Vancouver, BC, Canada*.

Improved gait scoring to detect lameness requires knowing which changes in gait best indicate hoof lesions. We examined whether changes in gait or resting time predict the development of hoof lesions. Forty-seven Holstein cows housed in a free-stall barn were gait scored every 4 wks from 4 wks before to 24 wks after calving. We assessed overall gait (scored 1 to 5) and 7 gait attributes (abduction/adduction of the back legs, back arch, head bob, tracking-up, joint flexion, asymmetric gait, and reluctance to bear weight) (scored 0 to 100). Activity loggers attached to the cows' legs measured resting time over 24h. Cows' hooves were inspected every 4wks and the occurrence of sole ulcers or sole hemorrhages was noted. Six cows developed sole ulcers after calving and showed no hoof lesions or signs of lameness before calving. These were matched with 6 cows that developed only sole hemorrhages and 6 cows that did not develop any sole lesions and that were of the same parity and DIM. Before calving, there were no differences (PROC GLM  $P>0.10$ ) between these three groups of cows in any measure of gait. After calving, cows that developed sole ulcers scored higher than cows that did not develop sole ulcers for overall gait score (cows with no lesions vs cows with ulcers; mean  $\pm$  SE;  $2.3 \pm 0.1$  vs  $3.1 \pm 0.1$ ), back arch ( $24.9 \pm 2.8$  vs  $45.0 \pm 2.8$ ), joint flexion ( $41.2 \pm 2.9$  vs  $55.4 \pm 2.9$ ), asymmetric gait ( $40.3 \pm 2.8$  vs  $62.2 \pm 2.8$ ) (PROC MIXED  $P<0.05$ ) and reluctance to bear weight ( $1.3 \pm 0.8$  vs  $11.7 \pm 4.2$ ,  $P<0.05$ ; Wilcoxon). There were no differences between cows that did not develop any lesion and those that only developed hemorrhages. Overall gait score, back arch and asymmetric stepping were higher ( $P<0.05$ ) among cows that developed an ulcer 4 wks before the ulcer was diagnosed. An interaction between hoof health and time was found for lying time ( $P = 0.02$ ). Daily lying time decreased more quickly before calving and increased more quickly after calving in cows that developed an ulcer. Regular gait scoring can detect cows lame from a sole ulcer before the ulcer is apparent on the hoof. An arched back and asymmetric stepping are the gait attributes that best indicate sole ulcers.

**Key Words:** lameness, gait, welfare

**W13 Effect of metritis on health, fertility and milk production in two subsequent lactations in dairy cows.** J. R. Lima\*<sup>1</sup>, J. E. P. Santos<sup>2</sup>, and R. G. S. Bruno<sup>1</sup>, <sup>1</sup>*University of California - Davis, Tulare*, <sup>2</sup>*University of Florida, Gainesville*.

Lactating Holstein cows ( $n=953$ ) in their first lactation were monitored daily during 28 d after calving for postpartum diseases. Animals with watery, fetid, reddish/brownish uterine discharge with or without fever were defined with metritis and received intrauterine infusion (IU infusion) with 6 g of oxytetracycline. IU infusions were performed every other day until signs of metritis recede. Cows were monitored in two subsequent lactations. Cows were presynchronized with two injections of PGF at 37 and 51 d in milk (DIM), and those cows not observed in estrus after the second PGF were enrolled in a timed AI program starting at 62 DIM. Milk yield was recorded once a month during the first two lactations. Data were analyzed by ANOVA and logistic regression using SAS. A total of 379 cows (49.6%) and 166 cows (21.7%) were identified with metritis in the first and second lactations, respectively. Out of 166 cows with metritis in the second lactation, 99 cows (59.6%) were also diagnosed with metritis in the first lactation. Dystocia was the main risk factor for metritis in both lactations (odds ratio, OR=4.8; 95% confidence interval, CI=3.15-7.45; and OR=6.0, CI=3.38-10.62 for 1st and 2nd lactations, respectively). Metritis affected ( $P>0.01$ ) the proportion of pregnant cows at first AI at the 1st lactation (35.3 vs 44.0%) but not ( $P=0.67$ ) in the 2nd lactation (34.0 vs 38.4%). In the 1st lactation, cows without metritis had increased ( $P=0.008$ ) pregnancy at first AI than cows receiving 1 or 2 IU infusions, but it was not different ( $P=0.61$ ) than cows receiving more than 2 IU infusions (44.0, 30.3 and 42.6% respectively). Incidence of metritis affected ( $P>0.01$ ) milk production on the first month postpartum in both lactations ( $25.6 \pm 0.30$  vs.  $27.6 \pm 0.31$  Kg/d in the 1st lactation, and  $33.3 \pm 0.62$  vs.  $37.9 \pm 0.36$  Kg/d in the 2nd lactation for metritis and no metritis cows, respectively). An increased proportion ( $P=0.007$ ) of cows with metritis was eliminated from the herd before the 2nd lactation compared with cows without metritis (20.1 vs 13.5%). Metritis negatively impacted performance in the first and subsequent lactation.

**Key Words:** dairy cow, intrauterine therapy, metritis

**W14 Effects of feeding menhaden fish meal or Ca salts of fish oil fatty acids on some cytokine genes expression and endometrial cytology in early lactating cows.** A. Heravi Moussavi\*<sup>1</sup>, H. B. Roman<sup>2</sup>, T. R. Overton<sup>2</sup>, D. E. Bauman<sup>2</sup>, W. R. Butler<sup>2</sup>, and R. O. Gilbert<sup>2</sup>, <sup>1</sup>*Department of Animal Science and Excellence Center for Animal Science, Ferdowsi University of Mashhad, Mashhad, Khorasan Razavi, Iran*, <sup>2</sup>*Cornell University, Ithaca, NY*.

The study was designed to test the effects of dietary fatty acid supplementation on IFN- $\gamma$ , IL2, and IL10 genes expression, and also endometrial cytology in early lactating cows. From d 5-50 postpartum (PP), cows ( $n = 30$ ; 6/treatment) were fed diets that were isonitrogenous, isoenergetic and isolipid containing 0 (Control), 1.25, 2.5 or 5% menhaden fish meal or 2.3% Ca salts of fish oil fatty acids. Samples for endometrial cytology (low-volume uterine lavage) were obtained on days 25 and 50 PP. A subjective score of 0-3 was assigned with 0 representing the absence of inflammation and 3 as a severe inflammation. On day 50 postpartum, uterine endometrial biopsies were collected for gene expression analysis. Expressions of IFN- $\gamma$ , IL2, and IL10 were tested by real-time PCR using TaqMan primers/probes. Results were analyzed using comparative critical threshold ( $\Delta\Delta\text{CT}$ ) method in which the amount of target RNA was adjusted to a reference, glyceraldehyde-

3-phosphate dehydrogenase. The initial cytology data were transformed and then were analyzed using mixed models for a completely randomized design with repeated measures. The gene expression data were analyzed using general linear models for a completely randomized design. The cytology data showed that the dietary groups had no effect on uterine inflammation ( $P=0.07$ ). The effect of time and the interaction of time and treatment were not significant ( $P>0.16$ ). Compared with the Control, gene expression of IFN- $\gamma$  ( $P=0.65$ ; 0.75, 0.58, 0.65 and  $0.37 \pm 0.22$ , respectively), IL2 ( $P=0.079$ ; 0.81, 0.26, 0.36 and  $0.35 \pm 0.14$ , respectively) and IL10 ( $P=0.087$ ; 2.76, 0.83, 1.75 and  $0.39 \pm 0.63$ , respectively) were all similar among the supplemented groups. The results demonstrated that the dietary treatments had no apparent effect on the cytokines gene expression and uterine inflammation.

**Key Words:** dairy cows, endometrial cytology, gene expression

**W15 Feeding dairy cows barley grain treated with lactic acid and heat modulated diurnal patterns of selected plasma metabolites.** S. Iqbal, Q. Zebeli, A. Mazzolari, S. M. Dunn, and B. N. Ametaj\*, *University of Alberta, Edmonton, Alberta, Canada.*

The aim of this study was to evaluate the effects of feeding barley grain treated with lactic acid (LA) and heat on diurnal patterns of plasma metabolites in dairy cows. Eight ruminally cannulated Holstein cows (170 DIM) were fed once daily a TMR based on rolled barley grain (32.8% on DM basis) steeped for 48h in equal quantity of water (CTR) or with 1.0% LA (v/v) and heated in an oven at 55°C (TRT). Cows were assigned to the treatments according to a replicated  $2 \times 2$  Latin square design with two 21-d periods, where the first 11d were used for diet adaptation. Blood samples were collected from the tail vein on d 10 of each period shortly before (i.e., at 0h) and at 2, 4, 6, 8, 10, and 12h post-feeding, and analyzed for glucose, lactate, beta-hydroxybutyric acid (BHBA), non-esterified fatty acids (NEFA), and cholesterol. Results showed that feeding the TRT diet decreased concentration of glucose in the plasma (52.7 vs. 49.7 mg/dL;  $P=0.04$ ), and increased that of BHBA (1,111 vs. 1,502  $\mu\text{mol/L}$ ;  $P<0.01$ ). The time after feeding also affected concentration of metabolites ( $P<0.01$ ) in the plasma. For example, the effect of TRT diet was more pronounced at 8 and 10h post-feeding for glucose and at 6h for BHBA. Further, feeding the TRT diet tended to increase the overall concentration of circulating NEFA (109 vs. 117  $\mu\text{Eq/L}$ ;  $P=0.08$ ). Additionally, cows fed the TRT diet had greater plasma NEFA (110 vs. 78  $\mu\text{Eq/L}$ ;  $P=0.01$ ) at 12h post-feeding indicating an influence of time after feeding on this variable. However, no effect of diet was obtained for diurnal patterns of plasma lactate (629 vs. 648  $\mu\text{mol/L}$ ;  $P=0.61$ ) or cholesterol (121 vs. 120 mmol/L;  $P=0.89$ ). In conclusion, feeding 32.8% of diet DM barley grain treated with lactic acid and heat modulated diurnal patterns of selected plasma metabolites. Further research is warranted to establish the influence of these metabolic changes on the health and productivity of early lactating dairy cows.

**Key Words:** barley grain, diurnal response, dairy cows

**W16 Treating barley grain with lactic acid and heat modulates selected plasma metabolites in dairy cows.** D. Mansmann, Q. Zebeli, A. Mazzolari, S. M. Dunn, and B. N. Ametaj\*, *University of Alberta, Edmonton, Alberta, Canada.*

Barley grain contains high amounts of degradable starch and is a potential alternative to corn as a digestible energy source in western Canada.

However, feeding dairy cows diets high in readily degradable starch increases the incidence of metabolic diseases. Chemical and thermal processing of barley grain might modify ruminal starch degradation modulating blood metabolic profile. The objective of this study was to investigate the effects of feeding barley grain treated with lactic acid (LA) and heat on variations of plasma metabolites. Eight ruminally cannulated Holstein cows (170 DIM) were offered once daily at 0800 a TMR containing rolled barley grain (32.8% on DM basis) steeped in equal quantity of water (CTR-diet) or with 1.0% LA (v/v) and heated in an oven at 55°C (TRT-diet). The cows were assigned to the treatments according to a replicated  $2 \times 2$  Latin square design with two 21-d periods where the first 11-d were used for diet adaptation. Blood samples were collected from the tail vein at 0730 on days 1, 3, 5, 7, and 10. Cows fed the TRT-diet had similar DMI with controls (19.8 vs. 20.0 kg/d;  $P=0.28$ ). Results showed that TRT-diet tended to decrease the overall plasma cholesterol (122.1 vs. 118.0 mmol/L;  $P=0.10$ ). In contrast, cows fed the TRT-diet showed higher circulating plasma lactate (663 vs. 537  $\mu\text{mol/L}$ ;  $P=0.02$ ). Other plasma metabolites including beta-hydroxy butyric acid (575 vs. 535  $\mu\text{mol/L}$ ;  $P=0.76$ ), glucose (54.8 vs. 52.4 mg/dL;  $P=0.36$ ), and non-esterified fatty acids (0.134 vs. 0.128  $\mu\text{Eq/L}$ ;  $P=0.34$ ) were not affected by TRT- and CTR-diets, respectively. Additionally, all plasma metabolites measured, except for cholesterol ( $P=0.73$ ), changed with the day of sampling ( $P<0.05$ ). This suggests that it is important to take into consideration the day of sampling when interpreting the effect of diets on the blood metabolites measured. In conclusion, the results suggest that feeding dairy cows barley grain treated with lactic acid and heat modulated selected plasma metabolites.

**Key Words:** barley grain, lactic acid, dairy cows

**W17 Effects of *Bacillus subtilis* on antioxidant capacity and immunity of broilers.** Y. Dongyou, M. Xiangfei, Q. Yan, and L. Weifen\*, *College of Animal Science, Feed Science Institute, Zhejiang University, Hangzhou, Zhejiang, China.*

This study was conducted to examine the effects of *Bacillus subtilis* on antioxidant capacity and immunity of broilers. A total of 216 one day-old Ross 308 broilers were divided into 2 groups, the control group (basal diet) and the treatment group (basal diet supplemented with 105 CFU/g *B. subtilis*). Each group had three replicates and each replicate included 36 broilers (half male and half female). The experiment was carried out for 6 weeks. Results showed that T-AOC and the activity of GSH-Px of the treatment group was increased significantly ( $P<0.05$ ), while level of serum MDA, NO and liver MDA were decreased significantly ( $P<0.05$ ). *B. subtilis* did improve thymus index, bursa index and the level of serum IgG, but did not significantly affect Spleen index, serum lysozyme, IL-2, TNF- $\alpha$  ( $P<0.05$ ). These results indicate that antioxidant capacity and immunity of Ross 308 broilers were improved by basal diet supplemented with *B. subtilis*.

**Key Words:** *Bacillus subtilis*, broiler, immunity

**W18 Melamine residues in tissues of ducks fed diets containing graded levels of melamine.** M. Lü\*, L. Yan, J. Guo, Z. Sun, and S. Zhu, *Research and Development Center, Liuhe Feed Co., Ltd., Qingdao, Shandong, China.*

An experiment was conducted to determine melamine residual levels in the tissues of ducks fed diets containing graded levels of melamine. 300 day-old ducks (Cherry Valley duck SM3) were assigned to 10

dietary treatments. Ten experimental diets were developed to contain 0, 2, 5, 10, 20, 50, 100, 200, 500, and 1000 mg of melamine per kg of diet. Each diet was offered three replicate pens (10 ducks per pen) from d 1 to 42, followed by a 7-d feeding of a withdrawal diet that contained no melamine. On d 14, 28, 42, and 49, one duck was randomly selected from each replicate pen and euthanized by cervical dislocation, then samples of the breast meat, liver and kidney were obtained. The melamine concentrations were determined using high-performance liquid chromatography. The data was analyzed by the Kruskal-Wallis one-way ANOVA. There were no visible signs of ill health or changes in the behaviour of ducks, and no difference ( $P > 0.05$ ) in weight gain among different treatment groups during the 49-d experimental period. The residual levels of melamine in duck tissues were below the detection limit when diets contained less than 50 mg/kg melamine. On d 42, melamine levels in breast meat, liver and kidney increased linearly ( $P < 0.05$ ) with the increasing levels of melamine in diets containing more than 50 mg/kg melamine ( $R^2 = 0.95$ ;  $R^2 = 0.96$ ;  $R^2 = 0.94$ , respectively). The distribution of melamine differed varied in different tissues, kidney was found to accumulate the highest concentration of melamine. On d 42, when diets contained 1000 mg/kg melamine, the residual levels of melamine in the kidney (18.33 mg/kg) was higher than in the breast meat and liver (9.20 and 8.27 mg/kg) ( $P = 0.05$ ). After a 7-d withdrawal period, melamine was not detected in the duck tissues, it showed that ducks had the ability to quickly deplete the melamine that accumulated in tissues.

**Key Words:** melamine, duck, residual

**W19 Metabolic and histological evaluation of quails fed with or without genetically modified Bt-maize.** N. Scholtz<sup>\*1</sup>, G. Flachowsky<sup>2</sup>, I. Halle<sup>2</sup>, and H. Sauerwein<sup>1</sup>, <sup>1</sup>University of Bonn, Bonn, Germany, <sup>2</sup>Friedrich-Loeffler-Institute, Braunschweig, Germany.

Feeding *Bacillus thuringiensis* transgenic (Bt)-maize is suspected for potential adverse effects on animal health by some groups. Using quail as a model for up to 20 generations, no consistent and analogous alterations in serum biochemistry and liver histomorphology in the 17th to 20th generation of Bt-feeding occurred. In multigenerational experiments, genetic drift might be an issue and therefore we extended the examinations to animals fed ad libitum with diets containing 50% Bt maize or isogenic maize of the same cultivar (REF1) in first generation. To elucidate the naturally occurring variance of all variables tested, two further controls with isogenic hybrid reference maize (REF2, REF3) were included. The quails were kept in breeding pairs and comprised 30 male and 30 female animals per feeding group. At 16 weeks of age, all animals were slaughtered; blood samples were collected and analysed for serum biochemical parameters. In addition, liver samples from these animals were histomorphometrically evaluated. Statistical analyses were done by ANOVA. Significant ( $P < 0.05$ ) findings (means  $\pm$  SD) are presented in the following table. The statistical differences observed herein were not limited to Bt  $\times$  REF comparisons and thus give no indication for targeted pathophysiological alterations induced by Bt feeding. The lack of obvious adverse effects in our quail studies is of general importance to animal science.

**Table 1.**

Variable	Bt	REF1	REF2	REF3
male				
Hepatocyte nuclear size ( $\mu\text{m}^2$ )	18.1 $\pm$ 1.2 <sup>a</sup>	17.1 $\pm$ 1.3 <sup>b</sup>	17.7 $\pm$ 1.1 <sup>ab</sup>	17.4 $\pm$ 1.4 <sup>ab</sup>
AST (U/l)	493 $\pm$ 134 <sup>a</sup>	419 $\pm$ 105 <sup>ab</sup>	377 $\pm$ 83.8 <sup>b</sup>	407 $\pm$ 85.3 <sup>b</sup>
ALT (U/l)	14.8 $\pm$ 6.3 <sup>a</sup>	13.6 $\pm$ 6.6 <sup>a</sup>	9.9 $\pm$ 2.7 <sup>b</sup>	10.5 $\pm$ 1.7 <sup>b</sup>
Glu (mM)	106 $\pm$ 92.1 <sup>a</sup>	97.7 $\pm$ 98.8 <sup>a</sup>	190 $\pm$ 22.9 <sup>b</sup>	183 $\pm$ 20.5 <sup>b</sup>
female				
Hepatocyte nuclear size ( $\mu\text{m}^2$ )	20.6 $\pm$ 2.1 <sup>a</sup>	19.2 $\pm$ 2.0 <sup>b</sup>	19.7 $\pm$ 1.8 <sup>ab</sup>	19.7 $\pm$ 1.5 <sup>ab</sup>
$\gamma$ -GT (U/l)	2.0 $\pm$ 1.7 <sup>a</sup>	1.2 $\pm$ 0.5 <sup>b</sup>	1.3 $\pm$ 1.3 <sup>ab</sup>	1.0 $\pm$ 0.0 <sup>b</sup>
Glu (mM)	101 $\pm$ 76.0 <sup>a</sup>	41.1 $\pm$ 69.4 <sup>b</sup>	173 $\pm$ 19.6 <sup>c</sup>	164 $\pm$ 15.1 <sup>c</sup>

Means within rows with different superscript letters differ significantly

**Key Words:** genetically modified, Bt-maize, Japanese quail

**W20 Immune response in quail fed with or without genetically modified Bt-maize.** N. Scholtz<sup>\*1</sup>, G. Flachowsky<sup>2</sup>, and H. Sauerwein<sup>1</sup>, <sup>1</sup>University of Bonn, Bonn, Germany, <sup>2</sup>Friedrich-Loeffler-Institute, Braunschweig, Germany.

Potentially adverse effects of diets containing transgenic plants are a concern for many consumers, particularly in Europe. For *Bacillus thuringiensis* transgenic (Bt) maize, a number of studies in livestock and poultry is available, showing that both zootechnical as well as blood chemistry data give no indication for such adverse effects. These studies were all done in homeostatic situations; it remained open whether a deflection of the regulatory physiological systems might yield divergent dynamic responses in Bt-maize fed animals. We therefore tested the effect of an active immunisation against BSA in feeding regimen with or without Bt-maize using quail as a model organism. Japanese quail were randomly allocated after hatching to two feeding groups (n=120 per group): group Bt received diets containing Bt-transgenic maize (40% in starter and 50% in grower diets), whereas the control group was fed with analogous rations but with isogenic maize of the same cultivar. After 16 weeks on the experimental diets, one half of each group was immunized intramuscularly with 1 mg BSA in 100  $\mu$ l Freund's complete adjuvant. The remaining animals were sham-immunized with NaCl. Egg yolk samples were obtained biweekly from 0 to 6 wk following the injection and were analyzed for egg yolk total IgY concentration and BSA-specific IgY titers. Statistical analyses were done by the mixed model; fixed effects included time of sampling, feeding group, immunization mode, and their respective interactions. Expectedly, total IgY as well as BSA-specific IgY titers increased ( $p < 0.05$ ) with time in the BSA-immunized quail. In contrast to sampling time, the response of both variables to the BSA injections was not different between the feeding groups. Our results indicate that feeding of transgenic Bt-maize does not impair the immune system of Japanese quail and thus gives no indication for respective concerns. The lack of obvious adverse effects is something of general importance to animal science.

**Key Words:** genetically modified Bt-maize, Japanese quail, immune response

**W21 Ameliorating effect of ascorbic acid on subacute endosulfan toxicity in male New Zealand White rabbits.** F. S. Hatipoglu<sup>1</sup>, O. Ozmen<sup>2</sup>, A. Ata<sup>3</sup>, T. Ileri-Buyukoglu<sup>4</sup>, S. Sahinduran<sup>5</sup>, F. Mor<sup>6</sup>, O. Yildiz-Gulay<sup>1</sup>, and M. S. Gulay\*<sup>1</sup>, <sup>1</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Physiology, Burdur, Turkey, <sup>2</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Pathology, Burdur, Turkey, <sup>3</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Reproduction and Artificial Insemination, Burdur, Turkey, <sup>4</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Biochemistry, Burdur, Turkey, <sup>5</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Internal Medicine, Burdur, Turkey, <sup>6</sup>Mehmet Akif Ersoy University, Faculty of Veterinary Medicine, Department of Pharmacology, Burdur, Turkey.

The present study was conducted to evaluate the protective role of oral ascorbic acid (AA) against some hematological parameters and histopathological changes in male New Zealand White rabbits (NZW) treated with endosulfan. Rabbits (6 to 8 months old) were divided into 4 groups of 6 animals each. Rabbits in T-I served as control and received corn oil for 6 weeks. Rabbits in T-II received endosulfan (1 mg/kg bw per day) in corn oil. T-III group received corn oil daily and AA (20 mg/kg bw) every other day for 6 weeks. T-IV received the same amounts of endosulfan and AA. All treatments were given by oral gavages. Total erythrocyte, leukocyte, trombocyte and percent hemoglobin, hematocrit, lymphocyte, granulocyte and monocyte for rabbits in T-I, II, III, and IV were 6.99, 6.91, 6.6 and 6.63×10<sup>6</sup> /μL; 9.13, 8.41, 7.91, and 6.27 ×10<sup>3</sup> /μL (P<0.04); 480.8, 471.5, 438.5 and 407.3×10<sup>3</sup> /μL; 13.45, 12.76, 13.07 and 13.56 g%; 40.7, 38.0, 37.4 and 39.0% (P<0.05); 40.0, 37.8, 35.8 and 41.2%; 52.5, 49.3, 52.6 and 45.9%; and 11.5, 12.9, 11.6 and 12.7%, respectively. The plasma glucose, AA, malondialdehyde, glucose 6 phosphatedehydrogenase, glutathion peroxidase and erythrocyte catalase for same treatment groups were 139.9, 148.6, 121.8 and 128.2 g/dL (P<0.09); 1.60, 1.43, 1.72, and 1.44 mg/dL (P<0.01); 1.73, 1.51, 1.77 and 1.44 nmol /mL; 3.78, 3.61, 3.90 and 4.88 U/gHb; 11.2, 12.2, 12.1 and 13.0 U/gHb ; and 23.2, 24.1, 26.0 and 23.0 U/gHb , respectively. Gross post-mortem and histopathological changes in liver, kidney, and testes of rabbits in T-II were observed with typical organochlorine dose-dependent signs of toxicity. Degenerative regions in liver, testis and kidney, hyperplasic tissue in gall bladder, and decreased number of spermatozoon in seminiferous tubules were apparent. High numbers of caspase positive cells were visible in the liver. However, AA treatments in T-IV were able to decrease the negative effect of endosulfan in tested organs and numbers of caspase positive cells were lower than T-II. Thus, results suggested beneficial influences of AA in neutralizing some toxic effects of endosulfan in male NZW.

**Key Words:** blood parameters, histopathology, antioxidant enzymes

**W22 Effect of autolysed yeast on macrophage activation in vitro and performance of weaning piglets.** A. Ganner\*<sup>1</sup>, S. Nitsch<sup>2</sup>, and G. Schatzmayr<sup>1</sup>, <sup>1</sup>BIOMIN Research Center, Technopark 1, Tulln, Austria, <sup>2</sup>BIOMIN Holding GmbH, Industriestr. 12, Herzogenburg, Austria.

The target of the present study was to investigate the ability of yeast autolysate to activate macrophages in vitro and additionally to evaluate the performance and health status of weaning piglets. As an in vitro model a chicken bone marrow-derived macrophage cell line (HD<sub>11</sub>) transformed by a retrovirus (MC29, v-myc oncogene) was used. The nitric oxygen production was determined as an indicator for immune stimulation. It was determined after 48 h of incubation with or without yeast product in the supernatant of the cultures using a Griess reagent which provides a colorimetric reaction. Results were compared with

the positive control (LPS *E. coli* 0127; 20ng/mL ±10 μMol NO) and calculated as a % of the positive control. Nitric oxygen production was enhanced up to 60% compared to the positive control. In contrast to yeast autolysate beta-glucans and nucleotides enhanced the macrophages up to 100%. Subsequently, a feeding trial with weaning piglets was conducted to evaluate the efficacy of yeast autolysate on performance and health status of weaning piglets in a 56 days study. 60 mixed sexed 4 weeks old (average weight approx. 7.47 kg) piglets were divided into 2 experimental groups (30 pigs per group) with 3 replicates: control group A and trial group B with 4kg/T yeast autolysate. Results of the feeding trial indicate a positive influence of yeast autolysate on performance of weaning piglets. Body weight (32.84 kg, P-value >0.05) and daily weight gain (449 g, P-value >0.05) were clearly improved as well as FCR (1.62) in comparison to the control (31.92 kg live weight; 432 g daily weight gain; FCR 1.73). In the yeast autolysate supplemented group no mortality was recorded, whereas mortality was 6% in the control group. In vitro and in vivo results indicate that this particular yeast autolysate product is a health and performance improving agent.

**Key Words:** yeast, macrophages, animal performance

**W23 Monitoring of the efficacy of SOP GOLD PIG on the reduction of the microbial load in an Italian commercial fattening piglet farm.** G. Tacconi<sup>1</sup>, A. Covarelli<sup>1</sup>, and A. Zanierato\*<sup>2</sup>, <sup>1</sup>Veterinary Medicine Faculty, Department of Biopathological Science and Hygiene of Food and Animal Productions, Perugia, Italy, <sup>2</sup>SOP Srl, Busto Arsizio, Italy.

This study was conducted in order to evaluate in field, over the period 2006-2008, the efficacy of a new technological additive SOP<sup>®</sup> GOLD PIG. This product is a natural silicate of magnesium, aluminium and iron, modulated by the technology SIRIO OPERATING PROCESS<sup>®</sup> to control the growth of some bacteria in pig manure. Two units on a pig farm, treated (T) and control (C), were selected for their similarity in size, pig age and number and farm management. In the treated unit, the product was added to the dry feed, using 80 g of SOP GOLD PIG per 1 ton of dry feed. Manure samples were taken monthly both in the unit with pigs receiving the treated food (T) and in the unit with pigs receiving untreated food (C), for a period of 23 months. These samples were analyzed for the presence of the Total Aerobic Bacterial Count (TABC), *Enterobacteriaceae*, *Micrococcaceae* and *Streptococcaceae*, using selective media. The results (Table 1) show significant reductions in the manure of the TABC (-73.1%; P<0.01), *Enterobacteriaceae* (-67.6%; P<0.001), *Micrococcaceae* (-62.8%; P<0.01) and *Streptococcaceae* (-66.9%; P<0.01) in unit T. The control of the microbial load in commercial pig farms is essential in order to improve the health and welfare of the animals, and consequently their production performance.

**Table 1. Mean values, as log<sub>10</sub> (CFU/ml) in pig manure of unit C and T, and statistical evaluations.**

Parameters	TABC		Micrococcaceae		Streptococcaceae		Enterobacteriaceae	
	C	T	C	T	C	T	C	T
Geometric mean	8.00	7.30	7.75	7.54	5.03	4.53	4.51	4.18
Mean	7.89	7.32	7.96	7.53	5.02	4.54	4.65	4.16
Std error	0.16	0.14	0.09	0.10	0.09	0.11	0.08	0.08
Std deviation	0.68	0.57	0.43	0.45	0.41	0.47	0.37	0.34
Variance	0.47	0.32	0.18	0.20	0.17	0.22	0.14	0.12
N. samples	19	17	21	19	21	19	21	19
LOC(95%)	0.33	0.29	0.20	0.22	0.19	0.23	0.17	0.17
%reduction		73.1		62.8		66.9		67.6
P=		0.002		0.01		0.00005		0.00003

**Key Words:** pig health, environment, microbial load

**W24 Effect of timing of *Mannheimia haemolytica* challenge following short-term exposure to bovine viral diarrhoea virus type 1b on serum cytokine concentrations and muscle and fat gene expression changes in growing beef steers.** L. Carlos-Valdez\*<sup>1</sup>, L. Burciaga-Robles<sup>1</sup>, D. L. Step<sup>2</sup>, R. W. Fulton<sup>3</sup>, A. W. Confer<sup>3</sup>, U. DeSilva<sup>1</sup>, and C. R. Krehbiel<sup>1</sup>, <sup>1</sup>Oklahoma State University, Department of Animal Science, Stillwater, <sup>2</sup>Oklahoma State University, Department of Veterinary Clinical Sciences, Stillwater, <sup>3</sup>Oklahoma State University, Department of Veterinary Pathobiology, Stillwater.

The objective of this study was to determine the effects of an intratracheal *Mannheimia haemolytica* biotype 1A (MH) challenge following short-term exposure (72 h) to Bovine Viral Diarrhoea Virus (BVDV) type 1b persistently infected calves (PI) on serum concentrations of IL-6, TNF $\alpha$  and IFN $\gamma$  and gene expression changes of TLR4, NF $\kappa$ B, TNF $\alpha$ , and IL6 in subcutaneous fat (SCF) and longissimus dorsi muscle (LDM) of growing beef steers. Eighteen crossbred steers (initial BW = 314  $\pm$  31 kg) were randomly allocated to one of the following treatments: 1) steers

not exposed to steers PI with BVDV or challenged with MH (CON); 2) steers exposed to steers PI with BVDV for 72 h followed by an intratracheal challenge with MH 12 h post BVDV exposure (EarlyCh); and 3) steers exposed to steers PI with BVDV for 72 h followed by an intratracheal challenge with MH 72 h after BVDV exposure (LateCh). Blood samples were collected during the first 336 h for serum cytokine analysis and biopsies were performed for the collection of LDM and SCF at -156, 12, 24, 48 and 72 h relative to MH challenge. Serum concentrations of IL6 (P = 0.001), TNF $\alpha$  (P = 0.04), and IFN $\gamma$  were increased (P < 0.001) in EarlyCh and LateCh steers compared with CON steers. Expression of TLR4, NF $\kappa$ B, TNF $\alpha$  and IL6 in LDM were up-regulated (P < 0.02) for EarlyCh steers compared with LateCh and CON steers. Similarly, TLR4 (P < 0.03), NF $\kappa$ B (P = 0.07), and IL6 (P < 0.03) were up-regulated in SCF for EarlyCh and LateCh steers compared with CON steers. We conclude that muscle and adipose tissue alter expression of cytokines in response to pathogens related to bovine respiratory disease.

**Key Words:** beef cattle, bovine respiratory disease, cytokines, gene expression

## Beef Species: Growth, Concentrate Level, Meat Quality, and Production Traits

**W25 Effect of time of ractopamine feeding on growth, carcass characteristics, and muscle biology of steers.** M. Hill\*<sup>1</sup>, K. Chapalamadugu<sup>1</sup>, C. Schneider<sup>1</sup>, R. A. Hill<sup>1</sup>, G. Gaylord<sup>2</sup>, J. K. Ahola<sup>1</sup>, C. W. Hunt<sup>1</sup>, J. Szasz<sup>1</sup>, and G. K. Murdoch<sup>1</sup>, <sup>1</sup>University of Idaho, Moscow, <sup>2</sup>USDA/ARS/PWA/SGPGRU, Hagerman, ID.

The labeled use of the  $\beta$  adrenergic agonist; Optaflexx<sup>TM</sup> in cattle during the last 28-42 days prior to harvest has some practical limitations such as the need to sort cattle. Studies have shown that  $\beta$ -agonists can increase protein accretion and feed efficiency, while potentially decreasing tenderness, marbling, and palatability. An earlier administration of  $\beta$ -agonist (RAC) may enhance the ease of use while maintaining beneficial aspects of late stage RAC supplementation in steers. Eighteen Angus  $\times$  Hereford steers were evaluated for the effects of a 35 d early (BW = 306 kg) administration of RAC versus 35 d late (BW = 508 kg) administration of RAC. Treatments were; no RAC (CON), early RAC (ER), and late RAC (LR) with 6 steer per treatment. Dosage of RAC was based on metabolic body weight (1.15mg RAC kg<sup>-1</sup> BW<sup>0.75</sup>hd<sup>-1</sup>d<sup>-1</sup>). Samples of the biceps femoris of each steer were collected before the trial, during the last 2 d of ER, and post-mortem and were evaluated for fiber type. Urine was collected at the end of each administration period for 1-methylhistidine (1METH) analyses, which serves as an indicator of myofibrillar protein turnover. From the first urine collection, ER showed a decrease in 1METH (P < 0.01) as compared to all other steers, from the second collection both ER and LR showed decreases in 1METH (P = 0.03) from CON. Carcass characteristics and sensory panel analyses were collected and compared among treatments. No significant differences in fiber-types were found between ER and LR. The ER increased ADG during the administration period (P < 0.01) when compared to CON and LR. Over the entire trial ADG was not different among the 3 treatments (P = 0.98). Values from carcass evaluations (HCW, REA, YG, KPH, fat thickness) were not significantly different between ER and LR. Our study suggests that ER performance is not statistically different from LR; therefore it may be more cost effective and practical to administer ractopamine at an earlier growth stage than the final 35 days pre-slaughter.

**Key Words:** muscle, beef, beta-agonist

**W26 Residual feed intake in progeny of Nellore bulls.** Y. B. Farjalla<sup>1</sup>, C. U. Magnabosco<sup>2</sup>, F. Manicardi<sup>3</sup>, F. R. C. Araújo<sup>4</sup>, D. P. D. Lanna\*<sup>1</sup>, and R. D. Sainz<sup>5</sup>, <sup>1</sup>Universidade de São Paulo, Piracicaba, São Paulo, Brazil, <sup>2</sup>Embrapa Cerrados, Planaltina, Distrito Federal, Brazil, <sup>3</sup>Guaporé Pecuária, Pontes e Lacerda, Mato Grosso, Brazil, <sup>4</sup>Aval Serviços Tecnológicos, Uberaba, Minas Gerais, Brazil, <sup>5</sup>University of California, Davis.

Residual feed intake (RFI), defined as the difference between observed intake and that predicted from average weight and daily gain, has been proposed as a criterion for genetic selection. There has been very little work with this trait in *Bos indicus* breeds. The objective of this study was to assess the genetic variability in RFI in Nellore cattle and to determine the relationship between RFI and carcass and performance characteristics. Seventy-five Nellore steers, progeny of eight bulls (minimum five progeny/bull), were fed individually for 85 days. The diet contained 25% sorghum silage and 75% concentrate on a dry matter basis, and was supplied *ad libitum*. The prediction equation was DMI = 0.0766  $\times$  Average BW<sup>0.75</sup> + 1.94  $\times$  ADG (RSD = 0.725). Animals were classed as low or high RFI if their RFI fell 0.5 SD or more below or above the mean (zero). Individual values of RFI ranged from -1.306 to 2.169 kg/d. Mean RFI for the low and high RFI groups were -0.875 and 0.756 kg/d, respectively; by definition, weights and ADG were similar between RFI groups. There was no difference among RFI groups for hip height and carcass traits. However, intakes and feed:gain were greater (P < 0.05) in high as compared to low RFI steers. There was no difference among progeny groups for height, initial and final weight, RFI, carcass weight or marbling score. Progeny groups differed (P < 0.01) in dressing percentage (range 53.6 to 55.8%), backfat (range 4.1 to 6.3 mm), 24-hour pH (range 5.57 to 5.84) and shear force (range 3.92 to 6.42). There were tendencies (P < 0.10) for differences among progeny groups for DMI, ADG, gain:feed, and ribeye area. None of the carcass traits were clearly related to RFI. These results show the genetic variability in RFI and other traits among progeny of Nellore bulls.

**Key Words:** beef cattle, carcass, genetic selection