589 Genetic and non-genetic factors affecting the prevalence of mastitis in dromedary camels. S. Ahmad*[1,2], M. Yaqoob[1,2], M. Q. Bilal[1,2], G. Muhammad[1,3], A. Iqbal[1,2], and M. K. Khan[1,3], [1]*university of Agriculture, Faisalabad-Pakistan*, [2]*University of Agriculture, Faisalabad-Pakistan*, *Department of Livestock Management*, [3]*University of Agriculture, Faisalabad-Pakistan*, *Department of Clinical Medicine and Surgery*.

The present study was designed to determine the prevalence and associated determinants (age, parity, stage of lactation, season and breed) of mastitis in the camel of Thal areas of Pakistan. Based on multistage cluster random sampling, 200 she-camels were screened for subclinical mastitis. Milk samples from each quarter of selected animals were collected and analyzed using Surf Field Mastitis Test (SFMT). Overall prevalence of subclinical and clinical mastitis was 38% (304/800) and 28% (224/800), respectively. Age, parity, stage of lactation, season and breed were found significantly associated ($P < 0.05$) with the prevalence of mastitis in she-camels. The prevalence of mastitis was significantly higher ($P < 0.05$; 60%) in camels of 5–7 years of age (1st and 2nd parities) compared with that of 14 to 16 years of age (5th and 6th parities) (26.67%). Samples collected in winter showed significantly ($P < 0.05$) higher (48%) prevalence of mastitis as compared with summer samples (28%). Stage of lactation significantly affected ($P < 0.05$) the prevalence of mastitis being highest during the last 2 mo (10–12 mo) (50%) followed in order by initial stage of lactation (0–1 mo) (45.45%) and mid stages (1–3 and 3–10 mo) of lactation (0% and 25%, respectively). According to breed of camels, the prevalence of mastitis was significantly higher ($P < 0.05$) in crossbred (45.83%) followed in order by mareecha (35.29%) and desi (22.22%). The present study may provide baseline data for the researchers and veterinarians to plan mastitis control program in camels of Pakistan.

Key Words: prevalence, mastitis, associated determinants, camels, thal, Pakistan

590 Use of a lipopolysaccharide (LPS) challenge to evaluate the innate immune response of Angus heifers with genotypic differences in GeneSTAR Markers for intramuscular fat deposition. J. O. Buntyn*[1], J. A. Carroll[2], T. Smith[1], S. M. Falkenberg[1], J. D. Rivera[3], C. Collier[2], and T. B. Schmidt[1], [1]*Department of Animal, Mississippi State University and Dairy Sciences*, *Mississippi State,* [2]*Livestock Issues Research Unit, USDA-ARS*, *Lubbock, TX*, [3]*South Mississippi Branch Experiment Station*, *Mississippi State*.

Due to increased nutritional requirements during an immune challenge, intramuscular fat (IMF) can serve as an energy reserve for cattle. Cattle with a genotypic variation in DNA markers (DNAm) for IMF may have an altered response to an immune challenge. The objective of this study was to evaluate the innate immune response of Angus heifers selected for genotypic variation in intramuscular fat deposition (IMFD). Genotypic variation (QG1 and QG2) in heifers was determined by presence or absence of DNA markers for IMFD. Twenty-three heifers (223 ± 44 kg) were sorted into 2 treatment groups based upon DNAm; heifers with no DNAm for IMFD (n = 11; NoDNAm), and heifers with one or more DNAm for IMFD (n = 12; DNAm). Prior to challenge (24 h), indwelling jugular catheters and indwelling rectal thermometers were inserted. Blood samples were collected at 30-min intervals and rectal temperatures (RT) at 1-min intervals from −2 to 8 h relative to the immune challenge (LPS: 0.25 μg/kg BW) at time 0. Heifers with DNAm displayed greater ($P < 0.05$) RT temperature 2 h post LPS challenge compared with heifers with NoDNAm heifers (40.92 and 39.93 ± 0.07°C, respectively) and greater concentrations of cortisol at 2.5 (281.5 vs. 267.7 pg/mL, respectively) and 3 h (252.2 vs. 215.2 pg/mL, respectively) post LPS compared with NoDNAm heifers. NoDNAm heifers had greater ($P < 0.05$) concentrations of IFNγ 2 h post-LPS compared with DNAm heifers for IMFD (17.2 ng/mL and 11.4 ng/mL, respectively). No differences ($P > 0.05$) were observed between groups of heifers for IL-6 concentrations; however, NoDNAm heifers had greater ($P < 0.05$) sustained IL-6 responses over time. These results suggest that there is a difference to an LPS challenge in heifers with genotypic variation in intramuscular fat deposition.

Key Words: pro-inflammatory, GeneSTAR, Angus

591 Impact of vaccination on the incidence of liver abscesses in natural-fed finishing cattle. J. T. Fox*[1], D. U. Thomson[1], N. N. Lindberg[2], and K. Barling[3], [1]*Kansas State University*, *Manhattan,* [2]*Progressive Beef Consulting Service*, *Great Bend, KS,* [3]*Novartis Animal Health*, *College Station, TX*.

A blinded clinical trial was conducted with the objective of determining the ability of vaccines to reduce liver abscess incidence in natural-fed cattle as well as evaluating the impact of liver abscesses on performance and carcass characteristics. Feedlot cattle (n = 1,307; initial body weight (BW) = 279 ± 32 kg) were randomly assigned to 1 of 3 treatments. Treatments were control (no vaccine), vaccination with a *Fusobacterium necrophorum* bacterin or vaccination with an *Arcanobacterium pyogenes-Fusobacterium necrophorum* toxoid. Vaccines were administered to animals in accordance with label directions. Cattle were fed a series of 4 step-up diets and a finishing diet consisting of 73% steam-flaked corn and 13% roughage (as-fed basis). Cattle were selected for harvest on a weekly basis based upon phenotypic evaluation of finish. At harvest, livers were scored following the Elanco system: 0, no abscesses evident; A-, 1 or 2 small abscesses or scars; A, 2 to 4 well-organized abscesses less than 2.5 cm in diameter; or A+, 1 or more large active abscesses greater than 2.5 cm in diameter. Incidence of liver abscesses (56%) and severe (A and A+ scores) liver abscesses (39%) was relatively high in this study. Data were analyzed with either general linear or general linear mixed models. No differences were observed ($P > 0.60$) between treatments with regard to the incidence of liver abscesses, incidence of severe liver abscesses, or liver abscess score. Initial BW, 60-d BW, 60-d average daily gain, total days on feed (DOF), hot carcass weight (HCW), yield grade and quality grade were not different ($P > 0.10$) among treatments. Liver abscess present at harvest increased ($P = 0.02$) total DOF, but this difference (2 d) was somewhat minor. Severe liver abscesses reduced ($P < 0.01$) HCW and increased the number grading USDA Select instead of USDA Choice ($P = 0.01$). In conclusion, we did not observe any treatment differences in liver abscess incidence or severity. We did identify some important differences in performance and carcass parameters between cattle with and without liver abscesses at harvest.

Key Words: natural-fed cattle, liver abscesses, vaccines

592 Physiological responses of heat tolerant and sensitive *Bos taurus* breeds of cattle to different levels of heat stress. D. E. Spiers*, H. L. Vellios, P. A. Eichen, B. Scharf, J. S. Johnson, D. K. Kishore, and E. A. Coate, *University of Missouri*, *Columbia*.

Bos taurus cattle from different regions of the US may differ in their response to heat stress. In the present study, Angus steers from Oklahoma (OK; n = 6) and Missouri (MO; n = 6) were compared against Romosinuano (heat tolerant) cattle (RO; n = 5) from Florida in the University of Missouri Brody Environmental Center to identify specific differences in thermoregulatory responses to thermal conditions above thermoneutrality. Animals were fed ad libitum, and intake was recorded daily. Rectal temperature (Tre) and respiration rate (RR) were measured 6 times daily. Initially, animals were exposed to a constant 20°C (TN) for 8 d, followed by 2 cyclic heat stress periods that consisted of 28°C (night) to 38°C (day) daily cycle for 8 d (HS1), followed by a greater heat stress of 30°C (night) to 40°C (day) for an additional 8 d (HS2). Feed intake rapidly decreased by ~2 kg/d for all breeds during HS1, with partially recovered after several days. No differences were found across breeds in feed intake/kg BW ($P = 0.16$). Tre for all breeds at TN increased from 1100 (38.8°C) to 2100 (39.0°C), with RO being 0.3°C below OK. In contrast, RR of RO was less than Angus (19 bpm; $P \leq 0.05$) at TN. RR for all breeds increased (33 bpm; $P \leq 0.05$) during HS1 and again during HS2 (11 bpm; $P \leq 0.05$), with RO maintaining a lower level (19 bpm; $P \leq 0.05$) than Angus. Tre for RO was below Angus throughout (1.0°C; $P \leq 0.05$), with no increase during either HS1 or HS2. Both Angus groups increased Tre from TN to HS1 (0.9°C; $P \leq 0.05$), with partial recovery, followed by a second increase to HS2 (0.6°C; $P \leq 0.05$) for MO steers. This study identified the time-related differences in thermoregulatory ability of Angus and Romosinuano breeds of cattle that were unrelated to feed intake.

Key Words: cattle, heat, breed

593 Early stage diagnosis of mastitis of dairy cows using ^{1}H NMR–based metabolomics. Y. Lv and Q. Z. Li*, *Key Laboratory of Dairy Science of Education Ministry, Northeast Agricultural University*, *Harbin, China*.

Mastitis is one of the main diseases in dairy cows worldwide with considerable economic consequences, mainly due to reduced milk production, discarded milk, an increased culling rate and higher treatment costs. Most mastitis cases are subclinical or chronic mastitis with little inflammation, but many of these infections eventually develop into clinical mastitis. Clinical mastitis is easy to detect for veterinarians whereas the detection of subclinical mastitis cases can be a challenge. Nuclear magnetic resonance (NMR) based metabolomics, combined with multivariate statistics, assessment of a biological system by means of global and non–targeted metabolite profiling, is a powerful tool to analyze the small molecule composition. Many metabolomics applications exist for finding biomarkers and could assist diagnosis and prognosis of disease. In this study, several constituents in cow milk were identified through 1D and 2D NMR experiments. A pilot study analyzed whey samples from several cows with mastitis and normal control individuals to identify characteristic changes of metabolites profiles in cows with mastitis. Multivariate data analysis using SIMCA software differentiated these whey ^{1} H NMR spectra identifying any discriminating metabolite patterns. We found distinct metabolic change in milk between subclinical mastitis cows and healthy cows. Our results indicated the metabolic change in milk of cows with subclinical mastitis and healthy cows. Compared with healthy cow milk, especially lower levels of lipid (mainly very low density lipoproteins), phosphatidylcholine/choline and lactate in milk of cows with subclinical mastitis, might be one pathogenesis of early stage mastitis of cows. The present study demonstrated that PCA results of milk CPMG spectra are clearly different in subclinical mastitis cows and healthy cows. Milk NMR spectra combined with principal component analysis techniques may be able to assist early diagnosis and postoperative of cow mastitis using a little milk sample.
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Key Words: dairy cow, mastitis, metabolomics

594 Clinical trial to evaluate the effect of ceftiofur intramammary treatment on non-severe clinical coliform mastitis. Y. H. Schukken[1], G. J. Bennett[1], B. J. Rauch[1], H. L. Sharkey[1], and R. L. Saltman*[2], [1]*Cornell University*, *Ithaca, NY*, [2]*Pfizer, Inc.*, *New York, NY*.

The objective of this study was to evaluate the effectiveness of treatment of non-severe, clinical coliform mastitis with intramammary ceftiofur (Spectramast LC). Particularly, the cure rates and clinical symptoms of cows treated with Spectramast LC were compared with those of control cows that were not treated with antimicrobials (negative controls). In a controlled clinical trial we enrolled 104 cows from 5 New York dairy herds with non-severe gram-negative clinical mastitis. Cows were either treated for 5 d with once a day intramammary Ceftiofur or received no treatment in the control group. Post treatment milk production, somatic cell counts, clinical cure and bacteriological cure were evaluated. The continuous data (somatic cell count (after transformation to linear score) and milk production) was analyzed using a linear mixed model, while the discrete data (clinical and bacteriological cure rates) was analyzed using a generalized linear mixed model. For both models, treatment was considered a fixed effect and herd was also treated as a fixed effect. For all of the outcome variables, treatment was compared with the control group using one-sided tests with 5% significance level. Treatment of non-severe clinical gram-negative mastitis with 5 days of Spectramast LC resulted in a significant increased bacteriological cure compared to non-treated control animals (73% versus 38%), particularly in animals infected with *E. coli* or *Klebsiella* species. Cured animals also showed a lower loss in milk production (6 kg per day), improved SCC (1 LS unit) and higher clinical cure compared to non-cured cows. Clinical cure was notably improved in Ceftiofur treated cows with a Klebsiella infection. In treated *Klebsiella* cows 62% clinically cured while 42% of control cows showed clinical cure. However, the differences between the treatment groups in production, SCC and clinical improvement were not statistically significant. In conclusion, intramammary Ceftiofur treatment of non-severe coliform mastitis resulted in a significant improved bacteriological cure and numerically improved clinical parameters.

Key Words: mastitis, coli, clinical trial

595 Cytological and clinical endometritis in dairy cows. J. Dubuc*[1], T. F. Duffield[1], K. E. Leslie[1], J. S. Walton[2], and S. J. LeBlanc[1], [1]*Department of Population Medicine, University of Guelph*, *Guelph, Ontario, Canada*, [2]*Department of Animal and Poultry Science, University of Guelph*, *Guelph, Ontario, Canada*.

The objective of this study was to compare cytological and clinical endometritis. Data from 2178 Holstein cows (6 herds) enrolled in a randomized clinical trial were used. Cows were followed from parturition until 300 d after parturition (dap). Data on periparturient disease incidence, calving history, and body condition score (BCS) at parturition were collected. Serum BHB, NEFA and haptoglobin were measured at 4, 11, and 18 (±3.5) dap. Examination for endometritis was performed 35 (±3.5) dap and the voluntary waiting period for breeding was 60 d. Endometritis was diagnosed cytologically (cytobrush technique) and clinically (Metricheck technique and score, and cervical diameter by transrectal palpation). Diagnostic criteria for endometritis were determined based on impaired subsequent reproductive performance.

Statistical analyses were performed using Cox proportional hazard models and logistic regression models in SAS, accounting for the effects of treatments and herd clustering. Cytological endometritis (CYTO) was defined as ≤ 6% polymorphonuclear cells in endometrial cytology. Clinical endometritis (CLIN) was defined as the presence of mucopurulent or purulent vaginal discharge. Prevalence of CYTO and CLIN were 20% and 16%, respectively. Among cows with CLIN, only 38% had CYTO. Risk factors for CYTO were hyperketonemia during the first 7 dap (≥1100 μmol/L; OR = 1.4; $P = 0.03$), hyperhaptoglobinemia during the first 7 dap (≥0.8 g/L; OR = 1.5; $P < 0.01$), and thin BCS at parturition (≤2.75; OR = 1.9; $P = 0.03$). Risk factors for CLIN were twins (OR = 2.2; $P < 0.01$), dystocia (OR = 2.1; $P < 0.01$), metritis (OR = 2.3; $P < 0.01$), and hyperhaptoglobinemia during the first 7 dap (OR = 2.0; $P < 0.01$). Cytological endometritis and CLIN increased median time to pregnancy (Unaffected: 132 d; CYTO: 156 d; CLIN: 168 d; $P < 0.01$). Their impacts were additive in cows affected by both conditions (BOTH: 193 d; $P < 0.01$). These findings suggested that CYTO and CLIN represent 2 different conditions. The source of vaginal discharge is unclear. It is proposed that uterine health status should be described as unaffected, CYTO only, purulent vaginal discharge (PVD) only, and BOTH.

Key Words: dairy cow, uterine disease, endometritis

596 Impact of postpartum uterine diseases on milk production and culling in dairy cows. J. Dubuc*[1], T. F. Duffield[1], K. E. Leslie[1], J. S. Walton[2], and S. J. LeBlanc[1], [1]*Department of Population Medicine, University of Guelph*, *Guelph, Ontario, Canada*, [2]*Department of Animal and Poultry Science, University of Guelph*, *Guelph, Ontario, Canada*.

The objective of this study was to quantify the impact of postpartum uterine diseases on milk production and culling. Data from 2178 Holstein cows (6 herds) enrolled in a randomized clinical trial were used. Data were collected from parturition until 300 d after parturition (DAP). Metritis (MET), retained placenta (RP), displaced abomasum, and culling data were recorded by farm managers. Milk production data were retrieved from DHI test-day records. Metritis was defined as rectal temperature ≥ 39.5°C and a foul-smelling discharge occurring ≤ 15 DAP; clinical endometritis (CLIN) as mucopurulent or purulent vaginal discharge (Metricheck device); and cytological endometritis (CYTO) as ≥ 6% polymorphonuclear cells in endometrial cytology (cytobrush technique). All cows were examined for endometritis 35 (±3.5) DAP. Milk production and culling were considered as outcomes. Statistical analyses, accounting for the effects of treatments, were performed using linear mixed models and logistic mixed models for milk production and culling, respectively. Primiparous and multiparous cows were modeled separately for milk production. Milk production of primiparous cows was unaffected by uterine diseases. The impact of MET and RP on milk production was additive in multiparous cows. The impact of MET on milk production was variable over time in multiparous cows, as it reduced the milk production per cow by 3.7 kg at first DHI test on average ($P < 0.05$), but was not significantly different at later tests. Retained placenta reduced milk production by 2.6 kg/day in multiparous cow, which was consistent through the first 4 DHI tests. The projected impact of MET and RP in multiparous cows was a reduction of 259 kg and 753 kg over 305 d, respectively. Endometritis (CYTO and CLIN) had no effect on milk production. Culling risks at 63 and 300 DAP were not affected by uterine diseases, after accounting or not for pregnancy status, parity, and milk production level. Overall, these findings suggested that although uterine diseases have negative impact on milk production and reproduction, they did not influence the culling risk of affected cows up to 300 DAP.

Key Words: dairy cow, uterine disease, impact

597 Evaluation of the hand-held Precision Xtra system for diagnosing ketosis in early lactation dairy cows. G. R. Oetzel*, *University of Wisconsin*, *Madison*.

The objective of this study was to evaluate the sensitivity, specificity, and repeatability of a hand-held meter (Precision Xtra System, Abbott Laboratories) for cowside diagnosis of ketosis in early lactation dairy cows. Experimental cows were 753 early lactation cows in 5 different commercial dairy herds. Each herd was visited twice and all cows in the herd between 5 and 25 d in milk were tested at each visit. Blood samples were collected from the tail vein of each cow. A drop of whole blood was applied to the Precision Xtra meter and analyzed for BHBA concentration. The remainder of the blood was allowed to clot. Serum was later separated and analyzed for BHBA concentration at a commercial laboratory (Marshfield Clinic Veterinary Diagnostic Services) using an automated chemistry analyzer. For a subset of 71 cows, 2 additional blood samples were collected to evaluate the repeatability of both the serum and whole blood BHB tests. Serum chemistry was the gold standard test, with BHBA ≥1.4 mmol/L classified as ketosis. Serum BHBA concentrations ranged from 0.2 to 5.4 mmol/L, and 76 cows (10%) were classified as ketotic. Herd prevalence of ketosis ranged from 7 to 31%. BHBA concentrations determined by the meter were highly correlated to serum chemistry results ($R^2 = 0.86$, $P < 0.01$). A threshold of ≥1.3 mmol/L using the meter resulted in the best combination of sensitivity (98.7%) and specificity (98.4%) compared with the gold standard of ≥1.4 mmol/L serum BHBA. Coefficient of variation was 4.3% for repeated serum laboratory BHBA results and 10.9% for repeated whole blood BHBA results using the meter. Repeated testing of cows using the meter resulted in no changes in ketosis classification. Results indicate excellent usefulness of the Precision Xtra hand-held meter for cowside diagnosis of ketosis in early lactation dairy cows using whole blood samples collected from the tail vein.

Key Words: BHBA, ketosis, hand-held meter

598 Effect of 1 or 2 dose circovirus and mycoplasma vaccines and day of vaccination on growth performance of nursery pigs. K. L. Saddoris-Clemons*, S. B. Wiliams, N. D. Paton, and D. R. Cook, *Akey*, *Lewisburg, OH*.

880 nursery pigs (PIC genetics) with an initial BW of 6.1 kg were utilized to determine the effects of circovirus and mycoplasma vaccines timing and number of doses on feed intake, weight gain, and BW. Pens (22 pigs/pen) were randomly assigned to one of 5 treatment groups: Unvaccinated (NC), 1-dose early (d 0), 1-dose late (d 14), 2-dose early (d 0 and 14), 2-dose late (d 14 and 28). The vaccine products tested were 2 doses (2 mL/dose) of Circumvent PCV (Intervet) and Respisure (Pfizer) or 1 dose (1 mL/dose) of Circoflex (BI) and Mycoflex (BI). Pigs were allowed ad libitum access to a commercial nursery diet and water. Feed intake was determined daily from d 1–7, 15–21, and 29–35 and weekly from d 8–14 and 22–28. Pigs were weighed weekly. Cumulative ADFI from d 1–7 tended to be higher ($P < 0.10$) for vaccinated pigs compared with unvaccinated pigs, however, ADG, and G/F were not different ($P > 0.10$). Following d 14 vaccination, vaccinated pigs had a lower ($P < 0.05$) d 15–21 ADFI compared with NC pigs. Pigs vaccinated with 2 dose products tended to have a lower ($P < 0.10$) ADG for d 15–21 than pigs vaccinated with 1 dose products. Vaccinating pigs for the second time on d 14 with 2 dose products decreased ADFI compared with vaccinating pigs for the first time on d 14 with either 1 or 2 dose products (time × dose, $P < 0.05$). From d 29–35, vaccinated pigs had a lower ADFI ($P < 0.01$) and tended to have a lower final BW ($P < 0.10$) compared with NC pigs. Vaccinating on d 28 with 2 dose products resulted in lower ADG, ADFI, and poorer feed efficiency compared with pigs vaccinated

on d 0 and 14 with 2 dose products or vs. pigs vaccinated with 1 dose products on either d 0 or 14 (time × dose, $P < 0.05$). Overall, vaccinated pigs tended to have a lower ($P < 0.10$) ADG, ADFI, and 0.53 kg lower final BW compared with NC pigs. Additionally, pigs given the 2 dose vaccination products tended to have a lower ($P < 0.10$) overall ADFI compared with pigs given the 1 dose vaccination products, regardless of the timing. Vaccination tended to reduce growth performance of nursery pigs and effects were greater with 2-dose vaccines given late in the nursery period.

Key Words: vaccination, nursery, pigs

599 The effect of breeder source flock age on 7- and 14-day turkey poult mortality. B. J. Wood*, D. R. McIntyre, and G. Norwell, *Hybrid Turkeys*, *Kitchener, ON, Canada*.

There are many factors that affect early mortality in turkeys such as breeder flock age, genetics, hatchery and management. With multifactorial problems quantifying individual effects in an observational study is difficult; consequently, little has been published on poult mortality under commercial conditions. This study quantifies the effect of breeder flock age on poult mortality at 7 and 14 d of age. Mortality data over a 10-yr period was used in which flocks were placed at biweekly intervals with each flock composed of poults from breeders varying in age from 29 to 56 weeks. All flocks were ring and conventional brooder stove brooded. Each flock had a minimum of 3 and up to 5 contributing breeder flocks with each of the 245,000 poults having a wing band to identify dam origin. Contributing breeder flocks had a distinct age class compared with other contributing flocks. Average mortality was 2.2%, 3.1% for hens and 4.4% and 5.3% for toms, at 7 and 14 d respectively. The table shows within flock tom poult mortality and standard errors (SE) against breeder age. Relative mortality against flock age decreased sharply from 30 to 38 weeks of age, leveled and rose again late in lay. Female poult mortality showed a similar proportional mortality pattern. Poults from breeder flocks 32 weeks of age and under were approximately 2 times more likely to record a mortality compared to breeders between 38 and 52 weeks of age. This shows the approximate change in mortality that can be expected based on the relative differences in breeder source flock age accounting for other early mortality factors.

Table 1. Tom poult mortality at 7 and 14 days against breeder source flock age

Flock age (weeks)	7d mortality (SE)	14d mortality (SE)
≤ 30	10.9 (0.89)	12.2 (0.94)
32	6.6 (0.38)	7.7 (0.41)
34	4.7 (0.29)	5.7 (0.35)
36	4.1 (0.31)	5.1 (0.33)
38	3.4 (0.31)	4.4 (0.33)
40	3.4 (0.32)	4.2 (0.35)
42	3.4 (0.40)	4.2 (0.42)
44	4.2 (0.60)	5.0 (0.61)
46	3.7 (0.66)	4.6 (0.67)
48	3.8 (0.61)	4.4 (0.65)
50	3.2 (0.48)	3.6 (0.49)
52	2.6 (0.60)	3.1 (0.64)
≥ 54	5.2 (1.88)	5.5 (1.88)

SE = standard error.

Key Words: early mortality, liveability, turkeys

600 Development of an inflammation model for use in the commercial duck. P. Cotter*[1], T. Applegate[2], R. Murdoch[3], K. Daugherty[3], and M. Turk[3], [1]*Cotter Laboratory*, *Arlington, MA,* [2]*Purdue University*, *West Lafayette, IN,* [3]*Maple Leaf Farms*, *Milford, IN*.

The response to injection with *E. coli* LPS was tested as a means to assess the effects of inflammation on performance of young commercial ducks. Inflammation was measured by temperature changes, feed consumption, and body weight. Natural antibody titer and complement activity were used as immunity measures. It was determined by a preliminary trial that of 3 doses (n = 4 per dose) of LPS, 0.1, 1, and 5 mg/kg BW only the high dose (5 mg/Kg) resulted in fever (+ 1 C increase in cloacal temperature). A second trial using 6 ducks at each of 4 injection treatments: none, non-pyrogenic saline, 5 mg LPS, and *Riemerella anatipestifer* bacterin (RAB) given on day of age 21 and 23 was conducted. Pre-injection measurements obtained at d 18 compared with post injection measurements through d 25 indicated that both LPS and RAB were associated with reduced feed intake ($P = 0.008$), reduced BW gain: 0.73Kg (LPS) 0.86Kg (RAB) 0.95Kg (no inj.) 1Kg (saline)($P = 0.06$); but only LPS caused fever ($P = 0.001$). Immunity was measured by comparing natural (anti-rabbit erythrocyte) agglutinins and lysins. Four parameters: HA1, HA2 (agglutination), L100, L50 (lysis) assessed agglutination and complement activity in serum at d 25. As C′ activity was anticipated to be an important component of the inflammatory response serum diluents were (PBS) supplemented with Ca, Mg, or both. HA1 (IgM type) agglutination (log 2 titer) was not affected by injection treatments but HA2 (IgG type) agglutination was lower in LPS (7.0) and saline (7.7) (vs. 8.4 no injection, and 9.7 RAB injection treatments) when assessed with Ca or Mg supplemented PBS ($P < 0.02$) but not when assessed with un-supplemented PBS. More C′ activity was detected using diluents supplemented with both Ca and Mg than with either alone. Ca supplemented lysis of rabbit cells (L50) was lowered by RAB injection more than by LPS ($P < 0.002$). This duck inflammation model appears useful and might have application in testing the effectiveness of dietary products designed to modulate immunity in this species.

Key Words: ducks, inflammation, LPS

601 Comparison of water-based foam and inert gas mass emergency depopulation methods of turkeys. M. K. Rankin*, E. R. Benson, R. L. Alphin, D. P. Hougentogler, and P. Mohankumar, *University of Delaware*, *Newark*.

Current control strategies for avian influenza (AI) and other highly contagious poultry diseases include surveillance, quarantine, depopulation, disposal, and decontamination. Selection of the best method of emergency mass depopulation needs to maximize human health and safety while minimizing disease spread and animal welfare concerns. The method used must be compatible with species, age, housing type, and disposal options. Research has shown differences in gassing and foam depopulation procedures when comparing time to and consistency of time to brain death. Unconsciousness precedes terminal convulsions. The objective of this study was to compare the time to death and other physiological markers for water based foam and CO_2 gas depopulation methods. An experiment was conducted individually comparing the use of water based foam and CO_2 gas for depopulation of turkeys. The time to death of the birds was evaluated using electroencephalogram (EEG), electrocardiogram (ECG) and motion cessation. Each bird was instrumented with a surgically implanted EEG transmitter and an external accelerometer and ECG pads. Eighteen turkeys, aged 14–26 weeks, were individually depopulated per treatment. The EEG results showed that foam caused more rapid brain death (mean of 190 s (foam) versus

a mean of 242 s (CO_2 gas)) and the differences were statistically significant. Although ECG results showed that foam caused more rapid cardiac suppression (200 s (foam) versus 220 s (CO_2 gas)), the differences were not statistically significant. Onset of terminal convulsions occurred at similar times (166 s (foam) and (174 s (CO_2 gas)) for both treatments. Additional analysis of brain activity before and during treatment was also conducted. The use of water based foam depopulation results in more rapid brain death than available gassing procedures, reducing the time that the bird is conscious and aware during depopulation.

Key Words: foam, depopulation, EEG