Environment/Management III - Pathology II

T106 Prevalence of Salmonella on Raw Poultry in China, Colombia, Russia, and Vietnam

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Introduction: Data on Salmonella in raw poultry are not available from many countries which limits the ability for international organizations such as WHO and FAO to perform risk assessments that are representative for poultry production worldwide. Due to lack of internationally agreed standards on acceptable Salmonella levels in raw poultry and methods of testing poultry products for the presence of Salmonella, various countries are formulating policies that lack a scientific basis.

Purpose: The project goal was to determine the prevalence of Salmonella on raw poultry in various countries (China, Colombia, Russia and Vietnam) to increase the knowledge on how to protect the global food supply and enhance food safety data collection and risk assessment at the local level.

Methods: Whole chicken carcasses were collected from retail establishments (large, small, and wet markets), over a wide geographical range in these countries. Thus far, projects are completed in China and Colombia, while ongoing in Russia and Vietnam. Samples were collected from 6 provinces and 2 national cities in China (n=1,152); 22 provinces in Colombia (n=1,003); in 3 national cities in Russia (n=455); and 4 province and 3 national cities in Vietnam (n=494). All samples were analyzed for the presence of Salmonella using the USDA-FSIS method.

Results: The overall prevalences of Salmonella in locally-produced broiler chicken in China, Colombia, Russia, and Vietnam were 52.2%, 26.7%, 33.8%, and 47.8%, respectively. In all the countries, Salmonella prevalence was not significantly associated with one market type within each province or national city. Moreover, there was no significant difference in Salmonella prevalence between chicken carcasses purchased frozen or chilled at retail markets.

Significance: These data will be helpful to identify intervention opportunities as well as critical control points in poultry production. In addition, it will help in the development of a common standard for Salmonella in raw poultry.

Key Words: Salmonella, raw poultry, prevalence, international markets, food safety

T107 Effect of Vectormune® Mycoplasma gallisepticum vaccine on egg production and selected egg characteristics

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Commercial Hy-Line W-36 pullets were obtained from a commercial source and subsequently used in two trials. In each trial, treatments consisted of: 1) Control [mycoplasma clean], 2) 99th passage F strain Mycoplasma gallisepticum (FMG) vaccine at 10 weeks, 3) Vectormune at 6 ½ weeks, and 4) Vectormune at 6 ½ weeks followed by 99th passage FMG at 45 weeks of age. Eggs were collected from all treatments through 53 week of age. Hen-day egg production, egg weight, Haugh unit score, and eggshell breaking strength were determined weekly for each treatment.

Analysis of the results showed all treatments responded similarly through both trials except for egg weight; vaccination with FMG trended toward increased egg weight post-vaccination. Also of note, chickens administered both Vectormune and 99th passage FMG did not exhibit a decrease in egg production subsequent to overlay with the 99th passage FMG.

Key Words: Mycoplasma gallisepticum, vaccination, chickens

T108 Evaluation of drip water samples versus swab samples for determining level of microbial contamination in poultry drinking water systems

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The poultry industry places significant emphasis on drinking water quality and water system sanitation, particularly on farms with performance issues. For many years, an acceptable method for determining the level of microbial contamination in a water system was by collecting a drip sample from the end of the line within a poultry barn. However, this method may not accurately reflect the level of contamination in a system which has an established biofilm. A more accurate method of determining the level of contamination is swabbing the inside of the water lines. Four farms served as test sites for comparing these two methods. Sterile drip samples were taken from the ends of the water lines. A second sterile swab sample was taken by inserting a sterile 645 square mm cellulose sponge hydrated with 25 ml of buffered peptone dilution into approximately 10 cm of the end of water line. Samples were then plated on APC, E. coli and yeast and mold Petri Film®. Results showed that drip samples ranged from 2 to 8,200 cfu/ml APC with no E. coli and yeast and mold while swab samples ranged from 26,000 to 480,000 cfu/ml APC and mold levels ranged from 40 to 40,000 cfu/ml. No E. coli was present. The results of this evaluation indicate that there is a significant difference in the level of microbial contamination detected between swab and drip samples. Swabbing a water system is a better indication for the presence of a biofilm and could serve as a useful tool for establishing links between farm health issues and water systems as well as a tool for determining the effectiveness of water sanitation products.

Key Words: water quality, microbial contamination, biofilm, water sanitation

T109 Novel Control of Fowl Mites

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The Northern fowl mite, Ornithonyssus sylviarum is the most important ectoparasite of commercial poultry in North America. Means of controlling or eliminating fowl mites, without pesticide resistance or residue concerns are needed. For this reason, three levels of a granular sulfur based miticidal treatment in the layer diet were tested as a potentially effective and safe “feed-through” miticidal treatment in laying hens. The test ran for 8 weeks to determine the time required for miticidal activity to become apparent, and to determine efficacy over several mite generations. Mite numbers on the hens as well as hen body weight, mortality, egg production and shell and interior egg quality were measured throughout the experiment. At the end of the experiment, hen tissues, eggs, and feces were analyzed to determine the distribution and fate of the compound in the birds, eggs, and waste. It was found that the miticidal treatment reduced mite numbers, did not alter feed intake, egg production, or quality, and did not accumulate in hens or eggs. The analysis for N, P, K and Ca as well as other minerals demonstrated that granular sulfur did not alter the way hens use these minerals, do not cause the hen to accumulate toxic minerals, or to lose valuable minerals, and do not alter fecal concentrations of these minerals. As a side benefit, the compound acidified hen waste and significantly reduced ammonia emissions. To the author’s
knowledge, this is the first study of its kind to examine the potential for using a granular sulfur product as a feed-through mite control agent in laying hens.

T110 Growth pattern of naturally heat resistant of growth-selected and randombred chickens Essam El-Gendy* Cairo University, Giza, Egypt

Four populations of native Egyptian chickens with different genetic backgrounds were used to study the growth patterns. Two crossbred lines genotyping for normally feathered (CE1) and homozygous naked-necks (CE3), selected for 6-week body weight for 8 generations were used accompanied with their two corresponding randombred control lines (CE2 and CE4). Both selected lines significantly achieved 2-fold increases over their control lines in body weights from hatch to 20 weeks of age overall the selected generations. The growth curve of the naked-neck selected line (CE3) showed variable increases in body weights and body weight gains more than that shown by the growth curve of the normally feathered selected line (CE1), while those of the two control lines were almost similar. Line CE1 showed response to selection at a rate significantly higher than that of line CE3 for up to 10 weeks, however line CE3 response to selection was higher than that of line CE1 between 10-20 weeks of age. In the 8th generation, line CE1 was heavier than its control line all over the growth period by 2.4% at hatch and increased to 46.0% at 20 weeks, however line CE3 was heavier than its control line by 8.2% at hatch and increased to 72.2% at 20 weeks of age. The dispersion of 6-week body weight of any of the selected lines was remarkably different from its controls, and differences were mainly attributed to the flow of selected genes over generations. Over generations, more variation was apparent in both selected lines CE1 and CE3 indicating more selection progress is anticipated in each line.

Key Words: body weight, growth, local breeds, naked-necks, selection

T111 An in situ broiler model to investigate host-enteric pathogen interactions Malcolm Mitchell1, Spiridoula Athanasiadou1, Stewart Burgess2, Eddie Clutton3, Chris Low1 SAC, Edinburgh, Midlothian, United Kingdom (Great Britain), 2Moreau Research Institute, Edinburgh, Midlothian, United Kingdom (Great Britain), 3Royal (Dick) School of Veterinary Studies, Edinburgh, Midlothian, United Kingdom (Great Britain)

The environment in the avian enteric system is both complex and dynamic. With more than 1012 viable bacteria per gram of digesta and still largely undescribed relationships between commensal and pathogenic bacteria and relative host responses, reliable experimental models are required to characterise the dynamic interactions. Here we describe a broiler in situ model to investigate morphological and gene expression changes in the enteric mucosa of birds infected with Clostridium perfringens (Cp) crude toxin. An in situ isolated loop of duodenum was prepared in anaesthetised, seventeen-day-old birds (mean weight: 913 ±29g). The duodenal loop was infused in random either with 1250 haemolytic units crude Cp toxin (500 µl of toxin preparation in PBS) or with a toxin-free preparation. Birds were monitored for 1h; their temperature was monitored 5 times/hour to ensure minimum impact of variation in body temperature on histo-pathological lesions. Broilers were euthanized 1h post toxin infusion. Toxin infusion resulted in ballooning degeneration of enteric cells, pathology consistent with cell death. Gene expression analysis showed 211 genes differentially affected by toxin infusion at P<0.05. Top biological functions affected by the infusion were related to cell morphology and cell-to-cell signalling; top pathways affected included cell apoptosis and p38 MAPK signalling. Up-regulation of pro-inflammatory pathways and immune modulation post toxin infusion shows that intestinal cells may exert protective activity against cell death regulated by the toxin. This in situ model can be further developed to characterise and quantify the temporal interactions between host-enteric pathogens and may lead to the identification of prevention strategies for enteric disease control.

Key Words: intestine, clostridium perfringens, model, enterocyte, broiler

T112 Evaluation of aqueous solvent extracted aflatoxin contaminated corn fed to day of hatch pouls. J. Allen Byrd1, Richard Clough2, Kyle Uselton1 USDA-ARS, Food and Feed Safety Research Unit, College Station, TX, 2Texas A&M University, College Station, TX, Food Protein Research and Development Center, Lynehh Inc., College Station, TX

Aflatoxins are produced by members of Aspergillus and colonize and contaminate grain before harvest or during storage. Increasing feed cost has made the development of technologies that remove aflatoxins from contaminated feed attractive. In the present study, aflatoxin-contaminated corn was extracted using an aqueous solvent-based method, fed to day-of-hatch turkey pouls, and evaluated for aflatoxin sensitive. The pre-extracted corn contained 269 ppb aflatoxins and was found to contain 6 ppb after extraction. Each of the three diets was fed to six replicate of six pouls from Day 1 to 21. Diets include: 1) Clean corn (CON); 2) Clean extracted corn with clean oil added (CNCO); and 3) aflatoxin-extracted corn with clean oil added (AFCO). Body weight gain was not affected by the AFCO diet as compared to the control diets (CON or CNCO). AFCO decreased (P < .05) spleen, bursa of Fabricius, and pancreas weights compared to the organ weights of pouls fed CON. Pouls fed AFCO had significantly lower kidney weights compared to pouls fed CON. Pouls blood serum parameters were unaffected by CON or AFCO diets. However, pouls fed CNCO had significantly higher serum protein, albumin, alkaline phosphate (ALP), mean corpuscular hemoglobin concentrations (MCHC), urea, uric acid, lactate dehydrogenase (LDH), and creatine kinase (CK) concentrations. The reductions in organ weights suggest that the toxic effects of aflatoxins were still present. Although AFCO had significant blood parameter differences compared to the CNCO diets, AFCO blood parameter comparisons to CON were minimal and suggest that the toxic effects of the aflatoxins remain although dramatic reductions in the aflatoxin activity was observed.

Key Words: aflatoxin, poult, serum

T113 Effect of Celmanax® SCP feed supplementation on performance of broilers either fed an anticoccidial drug or vaccinated Greg Mathis1, Brett Lumpkins1, Sangita Jalukar2 Southern Poultry Research, Inc., Athens, GA, 1Vi-Cor, Mason City, IA

The purpose of this study was to determine the effect of Celmanax® SCP dietary supplementation on the performance of coccidia-vaccinated, or anti-coccidial drug fed broilers. A 42 day broiler, floor-pen study was conducted using the following treatments: T1) vaccinated control, T2) vaccinated + SCP supplementation (200, 100 and 50 g/MT in starter, grower and finisher phase respectively), T3) Salinomycin at 40, 50 and 0 g/T in starter, grower and finisher phase respectively), T4) anticoccidial (same as T3)+ SCP supplementation (same concentration T2). A randomized block design with 8 replications of 50 birds per pen was used. Treatments 1 and 2 chicks, were spray vaccinated with the label recommended dosage of Coccivac-B prior to placement in pens. Feed and water were available ad libitum. Bird weights and feed consumption (kg) by pen were recorded at study initiation, Day 21, and Day 35. Individual bird weights (kg) by pen were recorded at the termination of the study (Day 42). Weight gain, feed intake, FCR, mortality, and uniformity of bird size at time of slaughter were calculated. The data was analyzed statistically by Tukey’s mean separation test. There were no significant differences in feed intake and mortality. Celmanax® SCP supplementation significantly (P<0.05) improved Day 42 weight gain in both vaccinated and Salinomycin fed birds. Celmanax SCP increased the average weight in the vaccinated group by 62 g and FCR by 5 points and in the Salinomycin group by 39 g and FCR by 4 points compared to controls. Celmanax SCP significantly improved FCR at all stages of growth compared to the control treatments. Supplementation of Celmanax® SCP also improved uniformity in bird size and weight resulting in lower standard deviation. The supplementation of Celmanax® SCP in broiler diets effectively enhanced bird performance by significantly improving weight gain,
lowering feed conversion ratio and improving bird uniformity at slaughter under the current anticoagulant control program practices.

**Key Words**: Celmanax SCP, Vaccination, Salinomycin, Anticoccidial, Broilers

**T114 Broiler chickens fed anticoccidial drug feeds supplemented with AGPs and or Actigen®, a specific traceable carbohydrate fraction derived from the cell wall of yeast**

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A 52 day broiler study was conducted to compare the performance of commercial broilers fed Actigen®, a specific traceable carbohydrate fraction derived from the cell wall of yeast, versus a traditional AGP program of Bacitracin Methylene Disalicylate (BMD) and Virginiamycin (VIR). The treatments were T1 no additive (control), T2 Actigen™ 400 g/t (D0-52), T3 BMD 50 g/t (D0-31), VIR 20 g/t (D31-52), and T4 (T2 + T3). Starter feed was fed from D0-17, grower D17-31, and finisher D31-52. The treatments were replicated in twelve blocks, randomized within blocks of four pens each. Fifty commercial strain (Cobb X Cobb) male broiler chickens were placed into each pen. Floor space was 0.77 sq. ft. per bird. Birds were raised on built-up litter. Virginiamycin (60 g/t) + 3-Nitro (45.4 g/t) were added to all starter and grower feeds. Live bird weights and feed consumptions were measured on D17, 31, 42, and 52. The inclusion of Actigen™, AGP program, and the combination program significantly (p<0.05) improved FCR at each weigh period compared to T1 (control). At D52 the combination T4 program average FCR (1.777) was significantly better than either single program T2 (1.820) or T3 (1.807) or T1 (1.872) FCRs. On D31, 42, and 52, the average bird weight gain for all supplement programs T2 (2.865 kg), T3 (2.900 kg), and T4 (2.928 kg) were significantly improved compared to T1. At each weigh period, there was no significant difference in average bird weight gain between the Actigen™ and AGP fed birds. Thus, both Actigen™ and AGPs improved performance of broiler chickens fed an anticoagulant program, with the greatest improvement coming from the birds fed the combination of Actigen™ and AGPs.

**Key Words**: Actigen, BMD, Virginiamycin, Salinomycin, Anticoccidial

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**Nutrition V**

**T115 Evaluation of a multispecies probiotic for the control of Campylobacter in poultry**

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The use of specific probiotics has been shown to be an effective means for controlling pathogens in poultry flocks. Potential probiotic candidates were isolated out of the gastro-intestinal tract of chickens and tested in vitro with a co-cultivation agar plate assay for the ability to inhibit the growth of Campylobacter jejuni spp. jejuni. The most promising strains with inhibition indexes ranging from 1.27 to 1.50 were evaluated for further important probiotic criteria. Based on these results a multispecies probiotic product consisting of strains belonging to the genera Enterococcus, Pediococcus, Lactobacillus and Bifidobacterium was designed (PoultryStar®, BIOMIN GmbH). The efficacy of the product to reduce C. jejuni in experimentally infected broiler chicks was evaluated in a series of experiments. In one in vivo experiment where all chicks were orally challenged with C. jejuni it was shown that the application of 2 mg/bird/day of the multispecies probiotic via the drinking water resulted in a significant reduction (P<0.05) of the cecal colonization of C. jejuni. In another in vivo experiment 72 day old broiler chicks were randomly assigned to three treatment groups, a positive control group, a trial group which received 2 mg/ bird/day and a trial group which received 20 mg/bird/day of the multispecies probiotic product via the drinking water. The chicks were challenged with C. jejuni on day one by introducing 4 seeder birds per group which were orally inoculated. At day 8 and 15 the birds in the probiotic group obtained Campylobacter counts in the cecal content of less than 2 log10 cfu/g whereas the mean log counts in the positive control group were with 7.81 log10 cfu/g at day 8 and 7.85 log10 cfu/g at day 15 significantly higher (P<0.05). In conclusion the data of these studies suggest that the multispecies probiotic caused a significant reduction in cecal colonization of C. jejuni and might be beneficial for the control of Campylobacter in poultry flocks.

**Key Words**: multispecies, probiotic, Campylobacter jejuni, food-borne illness

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**T116 Evaluation of Poultrygrow 250™ (a protease) supplemented in a broiler diet with two decreased levels of Digestible Lysine and Crude Protein from 0 to 42 days of age**

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In today's rising economic climate the ability to formulate diets has become more difficult with the increased cost of feed ingredients. Feed enzymes have become a focal point for nutritionists as a means of helping to lower feed cost. The purpose of this study was to determine the effect of supplementing Poultrygrow 250™ (a protease) in a broiler diet with two decreased levels of digestible lysine and crude protein. A 42 day broiler floor-plane study was conducted feeding the following treatments in a three phase feeding program: T1) commercial grade corn soybean meal diet (1.21, 0.96, and 0.81% digestible lysine; 22.50, 20.00, and 17.25% crude protein in the starter, grower, and finisher diets, respectively), T2) same as T1 with a decrease of digestible lysine and crude protein by 5%, T3) same as T2 plus protease, T4) same as T1 with a decrease of digestible lysine and crude protein by 8%, and T5) same as T4 plus protease. All feeds were pelleted. A randomized block design with 8 replications of 50 birds per pen was used. Feed and water were available ad libitum. Bird weights and feed consumption (kg) were recorded by pen at the initiation of the study, 19, 35 and 42 d of age. Weight gain, feed intake, FCR, were calculated and the data were analyzed statistically by Tukey’s mean separation test. At 19, 35 and 42 d, birds fed T2 and T4 had a significant (P<0.05) depression in performance (FCR and BWG) compared to the birds on the commercial diet (T1). At 19 d when the birds were fed the diets with Poultrygrow 250™ (T3 and T5) there was a significant improvement in FCR by 1.7 and 1.8%, respectively, bringing the values similar to the T1 fed birds. In addition at 35 and 42 d, the supplementation of Poultrygrow 250™ improved significantly both FCR and BWG over the birds fed the decreased protein diets, the birds fed T3 were similar (P>0.05) to the T1 fed birds. In conclusion the data of these studies suggest that the multispecies probiotic caused a significant reduction in cecal colonization of C. jejuni and might be beneficial for the control of Campylobacter in poultry flocks.

**Key Words**: Digestible Lysine, Crude Protein, Protease, Performance, Broilers

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**T117 Efficacy of a modified 6-phytase on apparent P and Ca digestibility in laying hens**

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The efficacy of different application rates of a thermostolerant 6-phytase (QPT2) was studied in laying hens fed phosphorus reduced diets.

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