Metabolism & Nutrition IV

T93 Use of Actigen® as a tool to reduce the impact of necrotic enteritis in broilers  
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The efficacy of Actigen® (AG) as a replacement for zinc bacitracin (ZB) and salinomycin (SM) was investigated using necrotic enteritis (NE) challenge feeding study model. 480 40-day-old male Ross 308 chicks were assigned to 48 floor pens (75 x 60 cm) in 2 rooms. Treatments were arranged in a 2 x 4 factorial design: challenge, - or +; feed additive, control (none), ZB 100/50 ppm; AG 800/400/200 ppm and SM 60 ppm in S, G, and F respectively. Wheat, sorghum, SBM, MBM, canola diets were formulated according to Ross 308 nutrient specifications. Birds in one room were gavaged on day 9 with 1 ml saline containing sporulated oocysts of vaccine strain E. maxima (5000), E. acervulina (2500) and E. brunetti (2500) following gavage on days 14 and 15 with 1 ml thiglycollate broth (TB) containing 108 CFU of Clostridium perfringens (strain EHE-NE18, CSIRO). Unchallenged birds were dosed with saline or TB. Results on d 35 showed lower livability (LV), weight gain (WG) and feed intake (FI) in challenged vs unchallenged birds (P<.05). ZB, Actigen and SM increased LV, WG and FI on d 35 (P<.05). Challenge X additive interactions were observed for LV, WG and FI on d 35 (P<.01). In the - vs + challenge groups, LV was 92 vs 52, 97 vs 90, 92 vs 82 and 93 vs 93% while WG was 2541 vs 2105, 2597 vs 2474, 2699 vs 2561 and 2575 vs 2740g for control, ZB, Actigen and SM respective­ly. Control birds had greater incidence of NE lesions when challenged (P<.01). None of the additives completely protected birds from NE or coccidiosis. Actigen was as effective as ZB and SM in preventing performance decline from coccidiosis. This study indicates that yeast based Actigen® has promise as a tool for controlling necrotic enteritis.

Key Words: necrotic enteritis, coccidiosis, yeast cell wall, bacitracin, salinomycin

T94 The effects of necrotic enteritis and aflatoxin on growth performance, lesion scores, and mortality in young broilers and products to alleviate them  
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Cobb 500 chicks (2,640, male) were used to determine the effects of disease challenge and products to decrease those effects. Three challenge levels were used; 1) no challenge; 2) necrotic enteritis (CPP) challenge; and 3) CPP+1 ppm aflatoxin B1. Products tested to alleviate disease challenges were: 1) no product (NP); 2) a proprietary clay-based product (CL1); 3) a second proprietary clay-based product (CL2); 4) a third proprietary clay-based product (CL3); and 5) virginiamycin (VM). In the 24 d study, 22 chicks (equalized to 20 on d-7) per pen were allotted to 15 treatments (3x5 factorial arrangement) with 8 replications (ex­perimental unit = pen). Significant difference was set at P<.05. Weights were taken on d-0, 10, and 24 for calculation of feed intake, gain, and feed:gain. Birds consumed feed and water ad libitum. Increased negative responses to the combination of NE and AFL were seen in this study as FI (d-0–10), gain (d-10–24, d-0–24), and F:G (d-10–24) were increasingly poorer as challenge level went from no-challenge to CPP challenge to CPP+AFL challenge (P<.05). Other growth responses were worse than non- or CPP-challenges when both CPP+AFL were applied (P<.05). Lesion score was higher in CPP challenged birds with or without AFL (P<.05). Feeding VM improved performance in non-challenged birds (P<.05). In CPP challenged birds, adding CL1 or CL2 improved FI and gain compared to NP; with CL2 being equal to those fed VM during the challenge period (P<.05). Birds given CL1 had the highest gain and feed conversion when challenged with both CPP and AFL; feeding CL2, CL3, and VM had higher gains than adding NP (P<.05). In conclusion, increasing challenge level decreased bird performance. Birds with necrotic enteritis fed CL2 had gain that was equal to those fed VM during the challenge period. Feeding the clay-based products improved performance during a CPP+AFL challenge.

Key Words: necrotic enteritis, aflatoxin, virginiamycin, clay

T95 The effects of necrotic enteritis, aflatoxin, and virginiamycin on growth performance, lesion scores, and mortality in young broilers  
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A total of 2,112, male, Cobb 500 chicks were used to determine the effects of increasing aflatoxin concentration (AFL; 0, 0.75, 1.5 ppm) on broilers with or without necrotic enteritis or virginiamycin (VM). In the 23 d study, 22 chicks (equalized to 20 on d-7) per pen were allotted to 12 treatments (3x2x2 factorial arrangement) with 8 replications in a randomized complete block design; pen was the experimental unit. Significant difference was set at P<.05. Weights were taken on d-0, 16, and 23 for calculation of feed intake, gain, and feed:gain. Birds consumed feed and water ad libitum. AFL increased lesion score and feed intake and resulted in poorer feed:gain, mortality, and lesion scores (P<.05). Inducing necrotic enteritis (CPP) using Clostridium perfringens contaminated litter and a 10 x dose of coccidioses vaccine administered on d-10 increased lesion score and decreased feed intake and gain (P<.05). Adding VM to the diets improved gain, feed intake, and feed conversion, and decreased mortality (P<.05). However, there were interactions (P<.05) as challenging birds in the second period with CPP and feeding 0.75 ppm AFL had a negative synergistic effect on gain while even an additive effect was not seen when birds were fed 1.5 ppm AFL. At 1.5 ppm AFL non CPP-challenged birds fed VM had higher gain that those birds not fed VM, which was equal to gain from challenged birds with or without VM. A similar interaction (P<.05) was seen in the overall feeding period although VM helped challenged birds at 0.75 ppm overall. Virginiamycin improved feed conversion with the greatest improvement at 1.5 ppm. AFL increased lesion scores in unchallenged but not challenged birds. Unexpectedly, VM increased lesion scores in challenged but not unchallenged birds (P<.05). AFL and necrotic enteritis decrease broiler performance and interact to decrease weight gain; VM helps improve gain in challenged birds at 0.75 ppm AFL but not at 1.5 ppm AFL.

Key Words: necrotic enteritis, aflatoxin, virginiamycin

T96 Performance of broilers fed a broader spectrum antibiotic (virginiamycin) or a narrower spectrum antibiotic (bacitracin methylene disalicylate) over 3 consecutive growout cycles  
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Virginiamycin and bacitracin are widely used in commercial broiler feed regimens to improve performance, likely due to inhibition of intestinal clostridial populations. A floorpen study of 3 consecutive growout cycles was conducted using 4 feed regimens containing bacitracin (treatment 1), virginiamycin (treatment 2), or combinations of both after cycle 1 (treatments 3 and 4). On study day 0, 46 day-of-age, male
Cobb birds were placed in 11 pens per treatment group, with 1 extra pen per treatment group providing replacement birds for any mortalities. For cycle 1, virginiamycin-treated birds had significantly greater hot carcass weight, boneless skinless breast weight, and leg quarter weight than bacitracin-treated birds. For cycle 2 there were no significant differences. In cycle 3, treatment 4 weights were significantly greater than treatments 2 and 3, with treatment 1 intermediate. Across cycles for live weight and hot carcass weight, treatment 4 was significantly greater than 3, with 1 and 2 intermediate. Across cycles for breast weight, treatment 4 was significantly greater than 2, and treatments 4 and 1 significantly greater than treatment 3. Across cycles, there were no significant differences among treatments in leg quarter weight.

For cycle 3, post-7-day mortality attributable to bacterial infection other than with *C. perfringens*, treatments 2 (6.72%) and 4 (6.72%) were significantly higher than treatment 1 (2.3%), with treatment 3 intermediate (3.56%). Across cycles, there were no significant differences in post-7-day mortality.

During cycle 1, adjusted feed conversion ratios at day 43/44 were significantly (3.56%) lower than treatment 1 (2.3%), with treatment 3 intermediate and treatment 4 lower than bacitracin-fed birds. For cycle 3, there were no significant differences among treatments in leg quarter weight. Across cycles, there were no significant differences among treatments in leg quarter weight.

For cycle 3, post-7-day mortality attributable to bacterial infection other than with *C. perfringens*, treatments 2 (6.72%) and 4 (6.72%) were significantly higher than treatment 1 (2.3%), with treatment 3 intermediate (3.56%). Across cycles, there were no significant differences in post-7-day mortality.
T100 Comparison of copper sources in broilers from 0 to 21 days of age

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The source and level of copper used in broiler feeders for maximum performance can be financially rewarding to producers, especially when feed prices are high. A trial was designed to accurately differentiate between Intellibond® C (IBC – Micronutrients) and basic copper carbonate (BC Carb) under field stress conditions. Birds were housed on recycled litter inoculated with E. coli and E. coli at day 7. Performance was measured from 0-21 days of age and intestinal lesions scored at day 21 (4 random birds / pen). Ten treatments were fed mash diets and replicated with 8 pens of 50 mixed-sex Ross 708 birds / pen. The treatments were 1) negative control (4 ppm Cu from CUSO4), 2) 100, 125, 150 and 200 ppm Cu from BC Carb, (6-9) 100, 125, 150, and 200 ppm Cu from IBC and 10) 125 ppm Cu from CUSO4. Using the technique of Littell et al., 1997, analysis was conducted to statistically determine if the slopes of the performance data and lesion scores were significantly different between Cu sources. All of the required assumptions were met so a slope ratio analysis could be performed on the data. The slopes between copper sources were significantly different (P<0.03) for day 21 body weight, 0-21 body weight gain, 0-21 FCR and 21 day lesion scores with IBC out-performing BC Carb for every measured parameter. At 125 ppm copper there was a significant difference (P<0.05) in 0-21 day FCR between IBC and CUSO4 with BC Carb being intermediate. Using regression equations from the analysis, in order to replace 125 ppm Cu from IBC, it would take 160-180 ppm BC Carb to provide equal performance between the two sources. Based on the higher inclusion level of BC Carb needed for equal performance in this study and the lower concentration of copper in BC Carb, BC Carb would need to be priced at $5.75/kg to equate a price of $8.15/kg for IBC in order for diet costs not to increase at 125 ppm of dietary Cu (70% of IBC). In conclusion, IBC is a more efficacious in maximizing broiler performance than BC Carb.

Key Words: Copper, Copper Hydroxychloride, TBCC, CUSO4, Broiler
at a commercial feed mill and were of similar nutritional composition. Feed form variations were made by grinding a portion of the pellets produced for each diet phase. The HQP diets averaged 78.6% intact pellets and the GP diets averaged a 1.08% micron particle size. On D42, YP1 improved ending weight (EW; P=0.022) and feed conversion ratio (FCR; P=0.022). However, no YP Carryover effect was demonstrated for any of the D42-118 performance variables (P>0.05). Feeding HQP produced toms that were 0.29 kg/bird heavier (P=0.001) with 9.8% (R2=0.9587). These data show that an investment in producing HQP may be economical due to returns on turkey performance.

Key Words: yeast product, brooder period, feed form, pellet quality, turkey performance

T103 PROPIONIC ACID INCLUSION WITH PRESTARTER FOR POULTS FROM YOUNG BREEDERS Ed Morana1 Department of Poultry Science, Auburn University, Auburn, AL

Supplemental organic acids benefit first wk production, particularly hatchlings from small eggs. Present experimentation employed commercial source toms from 35 wk old breeders while using a corn-soybean meal crumbled basal starter that included fish and corn gluten meals. A separate 3% addition of starch to the crumbled basal was progressively replaced with 1, 2 and 3% propionic acid (PA) and offered for the first 7 D to comprise 4 treatments of similar nutritional value (28.5 CP, 2900 kcal ME/kg). After 7D, the basal feed having only starch continued until 21D. Each treatment represented 6 replicates of 10 poult in raised wire pens. All PA additions improved live performance similarly beyond the starch basal after 2D (L, P<.05) which was less apparent 2-7D (L, P<.07). Total 0-7D mortality progressively decreased from 5.8% for the basal to 1.7% with 3% PA (L, P<.05). Half of each pen’s birds provided body measurements at 7D. Blood glucose increased from 120 to 258 mg/Dl as PA increased while liver glycogen followed in parallel from 37 to 47 mg/100g with 1% PA providing the most dramatic responses (Q, P<.001). No treatment differences in contents pH with either crop (ca. 5.0) or ceca (ca. 6.5) were apparent. During the subsequent 14 days when all poult’s received the starch basal feed, birds that had not been given PA 0-7 days compensated in gain and F/G such that all treatments were similar at 21D; however, benefit of previous PA to mortality continued. Total 0-21D mortality progressively diminished from 15.5 to 1.7% as dietary PA that had been received 0-7D deceased from 0 to 3% (L, P<.01). PA is a gluconogenic organic acid that provides survival advantages to the post-hatch bird.

Key Words: propionic acid, poult, prestarter, blood glucose, liver glycogen

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T104 In-vitro antimicrobial susceptibility of Clostridium perfringes from broiler origin Jaime Ruiz1, Hector Cervantes1, Samuel Christenberry1, Ken Bafundo2 1Phibro Animal Health, Poultry Technical Services, McKinney, TX 2Phibro Animal Health, Global Technical Services, Teaneck, NJ

Clostridial enteritis is a common disease affecting the intestinal health of many US commercial broiler flocks. Several antibiotic feed additives have been used to control this costly disease condition. Field isolates of Clostridium perfringes were collected between 2011 and 2012 in several broiler production complexes located in the Southern United States. These isolates were tested for their ability to produce visible growth in the presence of antibiotics on a series of agar plates containing dilutions of the antimicrobial agent (agar dilution). Updated information regarding Minimum Inhibitory Concentrations (MICs) against virginiamycin and other commonly used antibiotic feed additives will be presented.

Key Words: Enteritis, Necrotic, Clostridium, MICs

T105 Factors to consider in choosing poultry house lighting Brian Fairchild1, Mike Czarick, John Worley Department of Poultry Science, University of Georgia, Athens, GA

Energy conservation is as important as ever. Growers pay energy bills out of their earnings. The more they pay for power the less net return on the flock. Efforts to install motors, fans and lights, the components that use the most electricity in poultry houses, are being considered by growers. However, it is not as simple as replacing an old 60 watt incandescent bulb with a newer energy efficient bulb. Factors such as light intensity at floor level, uniform light distribution, life of the bulb and ease of maintaining it should be considered. The current field study evaluated incandescent, compact fluorescent (CFL), cold cathode and LED light bulbs in poultry houses. Light intensity was measured at floor level at the beginning of the study, 6 and 12 months into the study. Bulbs were cleaned prior to taking the light intensity measurements. The average light intensity was measured in a grid at 1, 10 and 20 ft off of the side wall and every 5 ft down the length of the house for a total of 20 ft. Dimming curves for the bulbs were obtained and bulb losses in each house were recorded at the end of each flock. Data loggers were installed to monitor the house total power and the power utilized by the lighting system.

Dimming the light intensity below 5 lux resulted in higher CFL bulb losses. When the house dimmer was marked to show the grower how to limit dimming, bulb losses were reduced from 50% to less than 4%. The dimming curve of incandescent bulbs was the most linear, followed by cold cathode, LED and CFL. All bulbs exhibited a loss of light intensity that ranged from 25% to 50% depending on the type of bulb. The average light intensity at floor level was 6.8, 10.9, 10.4 and 20.3 for LED, CCFL, LED and CFL respectively. On a second farm Light intensity measurements were affected by bulb spacing and height from the floor and reflection of the ceiling bed and material and walls. These data suggest that not all bulbs can be used at the current spacing of incandescent bulbs. Poultry producers should evaluate the intensity of the bulb at floor level prior to investing in bulbs for all houses on the farm.

Key Words: Lighting, Energy conservation, light bulb, Light intensity

T106 Effect of repeated application of litter amendment Joseph Purswell1, Jeremiah Davis2, Aaron Kiess3, Craig Coufal4 1USDA-ARS South Central Poultry Laboratory, Mississippi State, MS 2Department of Agricultural and Biological Engineering, Mississippi State University, Mississippi State, MS 3Department of Poultry Science, Mississippi State University, Mississippi State, MS 4Department of Poultry Science, Texas A&M University, College Station, TX

Ammonia (NH3) production by poultry litter is a recurring management concern for producers. Excessive NH3 exposure has negative impacts on eye and respiratory health, as well as production efficiency. Application of litter amendments is a common management practice to reduce NH3 concentration inside poultry houses during brooding. However, singular applications prior to chick placement typically provide