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ABSTRACTS

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arranged as a 2×3 factorial of CT (74 and 85°C) and DS (1800, 1350, and 900 rpm), however, 85 CT and 900 rpm DS was infeasible. Thus, data were analyzed using the GLIMMIX procedure of SAS as a one-way ANOVA with linear and quadratic contrasts for increasing DS at CT and the interaction of CT (74 and 85°C) and DS (1800 and 1350 rpm). Treatments were arranged in a completely randomized design and replicated 3 times each. Diets were conditioned for approximately 30 s and pelleted with a 4.8×44 mm die at a rate of 4.5 MT/hr. Samples of the unconditioned mash diet (M) and pellets (P) were collected and analyzed for XYL and PHY concentration with enzyme stability expressed as P:M. Pellet durability index (PDI) was determined using the Holmen NHP100 (TekPro Ltd) at a 30 s run time. For diets pelleted at 74°C, there was no evidence of difference ($P>0.20$) in XYL (95, 90 and 93%) or PHY (87, 88 and 91%) stability when decreasing DS from 1800 to 900 rpm. However, when conditioning diets at 85°C decreasing DS from 1800 to 1350 rpm increased (linear, $P<0.01$) PDI (71, 73 and 78%). There was no interaction ($P=0.28$) between CT and DS for XYL stability or PDI. However, there was a CT

\times DS (1300 and 1800 rpm) interaction ($P<0.01$) for PHY stability. When conditioning diets at 85°C, increasing DS decreased PHY stability (75 and 61%). However, when conditioning at 74°C, increasing DS did not influence PHY stability (91, 88 and 87%). For main effects of CT, increasing CT decreased ($P=0.04$) PHY stability, but improved ($P<0.01$) PDI. There was no evidence of difference ($P=0.54$) between XYL stability when diets were conditioned at 74 vs 85°C. For the main effects of DS (1350 vs 1800), decreasing DS decreased ($P<0.01$) the XYL stability, but there was no evidence of difference ($P=0.21$) for PDI. The results of this trial indicate that DS should be taken into consideration when evaluating enzyme stability of both XYL and PHY as pellet mill models may be operating at different speeds. Additionally, increasing CT will improve PDI, but may result in decreased PHY stability.

Key Words: die speed, conditioning temperature, xylanase stability, pellet quality

Metabolism and Nutrition: Vitamins and Minerals

P60 The effects of supplementary *in ovo* and dietary vitamin C on broiler performance through 2 weeks posthatch Nathaniel Miller^{*1UG}, Ayoub Mousstaaid¹, Barr Oakes¹, Seyed Fatemi¹, Abdulmohsen Alqhtani¹, Katie Elliott¹, William Miller², Patrick Gerard³, E. Peebles¹ ¹Mississippi State University, ²Animal Ophthalmology Clinic, ³Clemson University

The use of supplementary L-ascorbic acid (Vit C) may benefit the broiler industry by improving broiler feed efficiency (FE) and BW gain in addition to alleviating stress factors that include disease, heat, cold, starvation, and tissue damage. Nutritional supplementation of broiler embryos by the *in ovo* administration of Vit C has also shown production benefits in previous research. No known study, however, has evaluated the supplementation of broilers with Vit C both *in ovo* and through the diet after hatch. Therefore, the effects of supplemental *in ovo*-injected and dietary Vit C on the BW, feed intake (FI), and FE of broiler chickens were evaluated in this study during the first 2 wk posthatch to determine any potential production benefits in early broiler chick rearing. Four *in ovo* treatments were administered at 17 d of incubation: non-injected; saline injected; injected with saline containing 12 mg Vit C/egg, or 25 mg Vit C/egg. Two dietary treatments, without (Diet 1) or with (Diet 2) 200 mg/kg of supplemental

Vit C, were provided from d 0 to d 14 post hatch. Nine males and nine females were placed in each of 48 floor pens. Body weight gain was determined between 0 and 7, 7 and 14, and 0 and 14 d posthatch. Birds that were fed diets without supplemental Vit C had a greater BW ($P=0.0002$) on d 7 in comparison to birds fed supplemental Vit C. This same effect was not observed on d 14 posthatch. Supplemental dietary Vit C improved ($P=0.04$) FE between d 7 and d 14. *In ovo* supplementation of Vit C did not produce significant differences in average bird BW at placement, or on d 7 and 14 of grow out ($P=0.07$). It also had no effect on FI ($P=0.18$) or FE ($P=0.10$) from 7 to 14 d posthatch. In conclusion, Vit C administered by *in ovo*-injection did not influence broiler performance. However, supplemental dietary Vit C improved the FE of the broilers during the posthatch period. Further research incorporating other dosages and longer grow out periods are warranted. This will provide further clarity in determining the potential benefits of these forms of Vit C supplementation on broiler performance.

Key Words: Body weight gain, broiler, feed efficiency, *in ovo*, supplementary L-ascorbic acid

Pathology

P61 *In vivo* effect of wild-type lytic bacteriophages on the reduction of Salmonella Heidelberg in chickens Clarissa Vaz^{*}, Daiane Voss-Rech, Francisco da Fonseca, Marcos Morés, Arlei Coldebella *Embrapa Suínos e Aves*

Salmonella Heidelberg has been a common serotype in poultry. The use of lytic bacteriophages might support *Salmonella* control programs while avoiding the use of antimicrobials and the rise of antimicrobial resistance. We have previously isolated and characterized three wild-type lytic bacteriophages which showed *in vitro* efficacy against *S. Heidelberg* field strains. This study aimed to determine the effect of such bacteriophages to reduce *S. Heidelberg* in chickens. A *S. Heidelberg* strain previously isolated from broiler litter was used to challenge 22 White Leghorn SPF chicks by oral gavage at 2 days of age, which were housed in air-filtered wire-mesh floor isolator chambers. At 33 days of age, 6 chickens were randomly selected and euthanized to collect liver, spleen and cecal tonsils for qualitative *Salmonella* analysis, and cecal content for *Salmonella* quantification. Next, a cocktail containing 10^9 PFU/mL of each bacteriophage was daily administered in drinking water from 35 to 39 days of age to the treated group. The control group received drink water without

bacteriophages. All chickens from each group were euthanized at 24 h post treatment, when cecum, liver, spleen and cecal tonsils were collected for *Salmonella* analyses. *Salmonella* log₁₀ CFU/g obtained from chickens in both groups were subjected to an analysis of variance with a model containing the fixed effects of treatment, days after treatment and interaction between them. Fisher exact test was used to compare *Salmonella* detection in liver, spleen and cecal tonsils between each group. The treated and control groups showed *S. Heidelberg* levels of 3.306 ± 0.817 and 5.931 ± 0.356 log₁₀ CFU/g in the cecal content at 24 h post treatment, respectively, with a significant difference between them ($p \leq 0.05$). On the other hand, *Salmonella*-positive liver, spleen and cecal tonsils were found in all sampled chickens. Nevertheless, a significant difference between the number of positive spleen samples in the treated and control groups was found ($p \leq 0.05$). The results revealed the *in vivo* effect of the studied bacteriophages against *S. Heidelberg* and indicated that it is a promising approach to reduce the intestinal colonization of *Salmonella* in chickens.

Key Words: Salmonella, phage therapy, poultry, food safety