

**T114 Chick quality assesment: Visual scoring or chick length?** M. Petek\*, A. Orman, F. Alpay, and S. Dikmen, *University of Uludag, Bursa, Turkey.*

Experience and research demonstrated that the quality of the day-old chick has a big influence on the growth and final performance of the broiler. Describing and measuring chick quality is considered to be very difficult. Visual score, Tona or Pascar score, day-old chick weight and chick length are commonly used for measuring chick quality. Visual scoring include color of the chickens, navel quality, feather development, the firmness of legs, the size of beak and eyes etc. Although visual scoring gives a good estimates on the quality of the day old chicks, it is a subjective measuring. Usually chick weight is used as an indicator for chick quality. But measuring yolk free body mass is ratherly laborious and has limited practical for field evaluation. One of the practical way employed to measure chick development is to determine the length of the chicken. By the present study, we planned to compare different methods in order to determine

the optimal one as chick quality indicator. For this reason; 480 day old male chicks were used. Chicks were classified into two groups on the basis of feather color: deep and light yellow. Then, chicks in each group was further divided into three groups as small, middle and large according to their body length. The lenght of the middle group birds was varied between 18.0-18.3 cm, while that of the largest group was greater than 18.3 cm and the small group was less than 18.0 cm. A positive correlation between chick lenght at day 0 and chick weight at subsequent days was observed. On the other hand there was no significant differences when the chicks were evaluated by taking into account their colors, except for first week. The measured body weight of chicks in deep yellow groups was greater compared to light yellow ones during the first week. Consequently; chick length was determined as an important criteria to evaluate chick quality since longer chicks exhibited better growth potential.

**Key Words:** Chick quality, Visual scoring, Chick length, Growth

## Nutrition VI

**T115 An estimation of the energy value of B-Mannanase (Hemicell® Feed Enzyme) in turkey toms under practical conditions using varying energy levels.** M. E. Jackson\*<sup>1</sup>, K. R. Stephens<sup>1</sup>, M. W. Greenwood<sup>2</sup>, and G. F. Mathis<sup>3</sup>, <sup>1</sup>*ChemGen Corp, Gaithersburg, MD*, <sup>2</sup>*Akey Inc, Lewisburg, OH*, <sup>3</sup>*Southern Poultry Research, Athens, GA.*

Five dietary treatments consisting of four energy feeding programs (Low Metabolizable Energy (LE), LE + 45, LE + 135, and LE + 180 Kcal/kg) and the LE program with a target  $\beta$ -mannanase added at 100 MU/ton (LE+M) were provided to 8 replicate pens with 8 Nicholas male turkeys per pen. Diets were corn-soybean meal based containing 3-7.5% animal by-product meal. All diets were assayed for proximate composition and B-Mannanase activity. The feeding programs consisted of 7 diets provided from 0-3, 3-6, 6-9, 9-12, 12-15 15-18 and 18-20 weeks of age. Liquid enzyme or water was applied to all pelleted diets. Body weight was determined at 0, 3, 6, 9, 12, 15, 18, and 20 weeks of age and feed consumption was determined between these ages. The LE treatment varied from 2910 Kcal/kg from 0-3 weeks to 3329 Kcal/kg from 18-20 weeks of age. Improvements in weight gain and feed conversion were observed with each increase in energy level during all periods demonstrating that the birds consistently responded to energy density. B-Mannanase improved feed conversion from 0-20 weeks by 20.7 points, ( $P < 0.05$ ) and improved final weights by 5.8% ( $P < 0.05$ ). Weight-adjusted feed conversion at 20 weeks of age for the LE+M treatment was between the LE+135 and LE+180 Kcal/kg ME treatments suggesting that the energy uplift of the enzyme lies between these values under the practical conditions of this study.

**Key Words:** B-Mannanase, Hemicell, Body Weight, Feed Conversion, Energy Uplift

**T116 Effects of endo- $\beta$ -D-mannanase (Hemicell®) on technical performance and litter condition of broilers fed wheat-based diets.** K. Deschepper\*<sup>1</sup>, B. Swart<sup>2</sup>, and R. Wiltenburg<sup>3</sup>, <sup>1</sup>*Vitamex N.V., Drongen, Belgium*, <sup>2</sup>*Cehave Landbouwbelaang, Veghel, The Netherlands*, <sup>3</sup>*CCL Research, Veghel, The Netherlands.*

European broiler diets based on wheat and soya normally contain only xylanase and  $\beta$ -glucanase enzymes. A very large broiler pen trial was conducted to evaluate the effect of a commercial endo- $\beta$ -D-mannanase (Hemicell®) on the technical performance of broilers from 0 to 37 days of age. A one-factorial, block-designed experiment was set up with 13,680 hatched Ross 308 chicks. The trial was executed at the practical trial facilities of the Schothorst Feed Research. Starter (0-10 days), grower (11-27 days) and finisher (28-37 days) diets were formulated with wheat as the main cereal. Narasin/nicarbasin (50/50 ppm) and salinomycin (65 ppm) were used in the starter and grower diets in order to control coccidiosis. Aromabiotic was added as an alternative growth promoter in the starter and grower diets, and a commercial xylanase was included in all diets. The treatments were: (1) control diet and (2) control diet with 0.05 % endo- $\beta$ -D-mannanase added in the grower and finisher diets. Eight replicate pens per treatment were used, with 855 broilers in each pen. Mash feed and water were available for *ad libitum*

consumption. Endo- $\beta$ -D-mannanase supplementation resulted in a significantly higher body weight compared to the control diet (2173 g vs. 2138 g) ( $P < 0.05$ ) and a significant improvement in feed conversion (1.615 vs. 1.636) ( $P < 0.05$ ). The litter score, determined on day 23, was significantly better ( $P < 0.05$ ) for the endo- $\beta$ -D-mannanase supplemented diet. These results indicate that endo- $\beta$ -D-mannanase (Hemicell®) supplementation improves the technical performance and litter conditions of broilers fed wheat/soya-based diets.

**Key Words:** Enzyme supplementation, B-mannanase, Broiler, Wheat, Soya

**T117 The effect of  $\beta$ -mannanase (Hemicell®) on broiler weight gain, feed conversion, mortality, and litter traits in a reduced energy, wheat-soybean meal-based feeding program.** E. B. Helmes<sup>1</sup>, H.-Y. Hsiao<sup>1</sup>, M. E. Jackson\*<sup>1</sup>, and A. Knox<sup>2</sup>, <sup>1</sup>*ChemGen Corp., Gaithersburg, MD*, <sup>2</sup>*Roslin Nutrition Ltd., Midlothian, Scotland.*

The goal of this pen trial was to study the effects of the enzyme  $\beta$ -mannanase in broiler rations typical of central and northern Europe where wheat (average 64%) and soybean meal (average 27%) are the primary ingredients. Energy was reduced by 3-4% to test the hypothesis that  $\beta$ -mannanase compensates for lower dietary energy. To date, most studies using  $\beta$ -mannanase were conducted in corn-based rations. Three treatments, normal energy (NE), low energy (LE), and LE+ $\beta$ -mannanase (LE+M) were tested with four diets and each treatment was comprised of 16 randomly blocked pens (40 birds/pen) of Ross 308 males; measurements were taken at 3 and 6 weeks. A commercial xylanase was used in all treatment diets. Litter quality was scored at 6 weeks by visual inspection and moisture analysis of random samples. The observed results included lower weight-adjusted feed conversion (WAFC) for the LE+M group (1.685) versus the LE group (1.752) ( $P < 0.05$ ), and a trend to lower WAFC for LE+M group compared to the NE group (1.698). Average weight gain was similar for the LE+M group (2730 g) and NE group (2724 g); both of these groups showed significantly higher weights than the LE group (2640 g) ( $P < 0.05$ ). Mortality and litter quality results did not differ among the treatment groups. One may conclude that  $\beta$ -mannanase significantly improves broiler growth and feed conversion in reduced-energy wheat/soybean meal-based diets containing xylanase, but has no effect on mortality or litter quality.

**Key Words:** Enzyme, Wheat, B-mannanase, Soybean meal, Broiler

**T118 Effects of ultraviolet light irradiation on hatchability of floor eggs from White Leghorns.** C. Coufal\*, J. Wells, H. Parker, and C. McDaniel, *Mississippi State University, Mississippi State, MS.*

Eggs laid on the floor that appear nest-clean are often collected and sent to the hatchery along with eggs laid in the nests. However, the microbial load of eggs laid on the floor can be much greater than that of eggs laid in the nest. It is generally assumed that, because floor eggs are heavily contaminated with bacteria,

hatchability and chick quality are reduced. Past research using ultraviolet light (UV) irradiation to disinfect hatching eggs has resulted in little improvement in hatchability. However, all previous research used nest-laid eggs that usually have a more acceptable rate of hatch without eggshell disinfection. Therefore, the objective of this study was to determine if eggshell disinfection of floor eggs by UV would improve hatchability. White Leghorn eggs were collected twice daily from the floor of 9 pens. Any adhering material was removed from eggs by wiping with a clean paper towel to make eggs visibly clean. Eggs that could not be made visibly clean were discarded. Visibly clean eggs from each pen were evenly allocated into 2 treatment groups (control and UV) during each collection time. Eggs in the UV group were subjected to irradiation immediately after collection for 7 min using a prototype irradiation cabinet. Eggs were collected and stored for 7 consecutive days, and all eggs were placed in the incubator on Day 8. A total of 340 and 342 eggs were incubated for control and UV, respectively. Twelve eggs (6 per treatment) collected prior to the start of the experiment were cultured on plate count agar to assess microbial reduction by UV treatment. Bacterial colony enumeration indicated a significant reduction of aerobic microorganisms from the control level of 6.35 log CFU/egg to 4.5 log CFU/egg by UV treatment. Hatch of eggs set for UV eggs was 7.5% greater than controls. Hatch of fertile eggs was 85.0% for UV and 80.6% for control eggs, but was not significantly different. This experiment indicates that UV irradiation can improve the hatchability of floor eggs.

**Key Words:** Eggshell sanitation, Ultraviolet light, Hatchability, Bacterial contamination

**T119 Effect of feeding programs during mixed-sex rearing of broiler breeders on reproductive performance and livability.** J. T. Brake\* and N. Lekrisompong, *North Carolina State University, Raleigh.*

An experiment was conducted to evaluate two feeding programs during rearing on subsequent broiler breeder reproductive performance and livability. Heritage 78 males and Heritage 32 females were reared separately to 5 wk of age on a 17% CP starter diet. From 5 to 21 wk of age males were intermixed with females and fed a 15% CP grower diet on either a Low or High feeding program. Rearing was carried out in a blackout facility with incandescent lamps (8 h) and birds were photostimulated (14 h) at 21 wk of age with a mixture of natural and artificial light (incandescent and high pressure sodium lamps) when they were moved to a curtain-sided production facility where all birds were thereafter subject to the same feeding program and management. Males and females were fed separately after 21 wk of age. There were 6 replicate pens of 225 females and 25 males per treatment. BW was determined on a regular basis. Egg production and mortality were determined on a daily basis while percentage fertility and hatchability were evaluated on a biweekly basis from sets of 180 eggs per replicate pen. The High rearing program slightly elevated female and male BW during rearing but did not significantly affect egg production or livability. However, there was improved fertility after 58 wk of age exhibited by breeders subject to the High rearing treatment. This was attributed to the increased cumulative rearing nutrition of the High treatment.

**Key Words:** Broiler breeder, Feed program, Cumulative nutrition, Fertility

**T120 Requirement of Zn provided as organic Zn for broiler chicks.** T. Ao\*, J. L. Pierce, A. J. Pescatore, M. J. Ford, A. H. Cantor, K. A. Dawson, and M. Paul, *Alltech-University of Kentucky Nutrition Research Alliance, Lexington, KY.*

Studies in our lab demonstrated that optimal growth performance of chicks in starter phase can be reached by supplementing 12 ppm Zn as Bioplex Zn® (a chelated Zn proteinate) in corn-soy basal diet. This study was to investigate the dietary supplemental level of 12 ppm Zn as Bioplex Zn® on the performance of broiler chicks in entire period (starter and grower). One-day-old broiler chicks were housed in floor pens with new litter in an environmentally controlled room for 42d. Birds were given *ad libitum* access to feed and water. Dietary treatments included: 1) corn-soy diet (control) without addition of Zn in entire period; 2) control + 40 ppm Zn (NRC level) as zinc sulfate in entire period; 3) control +

12 ppm Zn as zinc sulfate in entire period; 4) control + 12 ppm Zn as Bioplex Zn® in starter phase + no Zn in grower phase; 5) control + 12 ppm Zn as Bioplex Zn® in entire period; 6) control + 12 ppm Zn as Bioplex Zn® in starter phase + 24 ppm Zn as Bioplex Zn® in grower phase. A total of 660 chicks was randomly assigned to each of six dietary treatments with five replicate pens of 22 chicks. Chicks fed dietary treatments 1), 3) and 4) showed Zn deficiency symptom with lower ( $P < 0.01$ ) feed intake, weight gain and tibia Zn content comparing with other treatment groups. Dietary supplementation of 40 ppm Zn as zinc sulfate had the same effects on feed intake, weight gain and tibia Zn content of chicks as dietary supplementation of 12 ppm Zn as Bioplex Zn® in entire period. Chicks fed diet supplemented with 12 ppm Zn as Bioplex Zn® in starter phase and 24 ppm Zn as Bioplex Zn® in grower phase had the same feed intake and weight gain, but higher ( $P < 0.01$ ) tibia Zn content comparing with chicks fed diet supplemented with 12 ppm Zn as Bioplex Zn® in entire phase. These results indicate that the supplemental level of 12 ppm Zn as Bioplex Zn® in corn-soy diet has the same effects on performance and tibia Zn content of broiler chicks as supplemental level of 40 ppm Zn as zinc sulfate.

**Key Words:** Broiler chick, Zinc, Organic zinc, Zinc sulfate, Requirement

**T121 Organic trace minerals (Mintrex® P) in broiler breeder diets and pre-incubation conditions on bone development and leg health of broilers.** E. O. Oviedo-Rondón\*, L. Meija-Sanchez<sup>1</sup>, J. Small<sup>1</sup>, K. E. Brannan<sup>1</sup>, N. Lekrisompong<sup>1</sup>, A. Mitchell<sup>2</sup>, T. A. York<sup>3</sup>, and J. Brake<sup>3</sup>, <sup>1</sup>*North Carolina State University, Raleigh*, <sup>2</sup>*USDA - ARS, ANRI, Beltsville, MD*, <sup>3</sup>*Novus International, Inc., Chesterfield, MO.*

Leg health issues and bone disorders are developmental problems that may be increased by environmental stress, inadequate nutrition, and improper incubation conditions. Organic trace minerals (OTM) as Mintrex® P were added on top (1 kg/MT) of Ross 708 broiler breeder diets from start of lay. Eggs from the flock at 35 wk of age were then pre-incubated in either NON-UNIFORM conditions at 23.9C without forced air movement for 9 h or in UNIFORM conditions at 26.7C with forced air movement for 11 h. All eggs were thereafter incubated in a similar manner and exposed to elevated temperatures in the hatcheries. Bone development was evaluated in 20 chicks per treatment at hatch. Chicks were grown to 49 d of age in 48 floor pens. Gait scores and leg disorders were observed at 40 d of age and incidence per pen was determined. Broilers were processed at 49 d and both tibias collected. Tibia mineral density (BMD) and bone mineral content (BMC) were determined with DEXA. Data was analyzed as 2x2 completely randomized factorial design with breeder diet (Control vs OTM) and egg pre-heating (NON-UNIFORM vs UNIFORM) as main effects. Results indicated that treatments did not affect chick BW or yolk utilization at hatch. However, UNIFORM pre-incubation caused lower relative weights of femur and tibias, shorter femur and tibias, and higher relative asymmetry of tibias and shanks. Chicks from breeders fed added OTM had thicker shanks and lower shank length relative asymmetry. The incidence of twisted legs at 40 d was affected by both breeder diet and egg pre-heating treatments. UNIFORM pre-incubation reduced incidence of twisted legs. Breeder diets with added OTM produced broilers with a lower incidence of gait score 2 ( $P \leq 0.01$ ) or any gait score  $> 1$ . BMD and BMC were not affected by treatments, but the relative asymmetry in BMD was reduced ( $P = 0.08$ ) by added OTM in breeder diets. It was concluded that added OTM in breeder diets can improve bone development and gait scores in the progeny, and pre-incubation conditions may affect bone development and reduce bone disorders in broilers.

**Key Words:** Leg health, Organic trace minerals, Broiler breeders, Incubation, Broilers

**T122 Effects of spray characteristics on application of avian vaccines.** J. L. Purswell\*, B. K. Fritz<sup>2</sup>, S. L. Branton<sup>1</sup>, and S. A. Leigh<sup>1</sup>, <sup>1</sup>*USDA, ARS, Poultry Research Unit, Mississippi State, MS*, <sup>2</sup>*USDA, ARS, Area-Wide Pest Management Research Unit, College Station, TX.*

Optimization of vaccine delivery via spray application of live Mycoplasma gallisepticum (MG) vaccine to commercial caged layer chickens is impacted by

many factors. One of these factors is the pressure utilized to dispense the vaccine, which affects both delivery rate and droplet size. MG vaccine was applied using a self-propelled, constant speed vaccinator operated at two different pressures and using three different nozzle types, designated coarse, medium, and fine by the supplier. Droplet size and as-applied coverage and deposition were measured to determine the effects of system pressure and nozzle type on spray characteristics. Vaccine viability was also assessed to determine how viability is affected by the spray application process.

Volume median diameter (VMD) varied with nozzle type and pressure, with the fine nozzle at 310.2 kPa yielding the largest mean VMD of 192.9  $\mu\text{m}$ . However, the lowest mean VMD observed was 154.2  $\mu\text{m}$  for the coarse nozzle at 448.1 kPa; while statistically different, this represents a narrow range in VMD of 38.7  $\mu\text{m}$ . Negligible amounts of respirable droplets (< 10  $\mu\text{m}$ ) were observed for any treatment. Coverage and deposition were greatest for the coarse nozzle, followed by the medium and fine nozzles. Vaccine viability appears to be unaffected by any of the treatments tested. The relative similarity of droplet sizes coupled with the disparity of coverage and deposition between nozzle types indicated that delivery rate is of greater concern than droplet size, especially given the negligible amount of respirable droplets observed.

**Key Words:** Vaccination, Layer, Chickens, Spray, Application

**T123 A chronicle of serological response to F strain *Mycoplasma gallisepticum* vaccine.** S. L. Branton\*, S. D. Collier, J. D. Evans, S. A. Leigh, J. L. Purswell, W. A. Dozier, W. B. Roush, and H. A. Olanrewaju, *USDA, ARS, Poultry Research Unit, Mississippi State, MS.*

The serological response (SPA test) to F strain *Mycoplasma gallisepticum* (FMG) vaccine in a single strain of commercial layer chickens on a single farm was chronicled over a five year period. During the five year period, various factors were identified impacting seroconversion including spray nozzles (fine, medium and coarse), water temperature used to reconstitute and administer the vaccine, water pH, water osmolarity and pressure used to apply the vaccine. The foregoing factors were integrated into the FMG vaccine administration protocol and

progressive improvement in seroconversion was evidenced ranging from an initial 55% to a present seroconversion rate of 100%.

**Key Words:** Layer, Poultry, Chicken, Vaccination, Egg

**T124 The effect of egg storage period and turning frequency during incubation on fertile hatchability, hatchling organ weights, and broiler performance.** N. Okur<sup>1</sup>, S. U. Saryiuz<sup>1</sup>, M. Turkoglu<sup>1</sup>, O. Elibol<sup>1</sup>, and J. T. Brake\*<sup>2</sup>, <sup>1</sup>Ankara University, Ankara, Turkey, <sup>2</sup>North Carolina State University, Raleigh.

This study investigated the effects of egg storage period and turning frequency during incubation on hatchability, hatchling organ weights, and broiler performance. Hatching eggs were obtained from Ross 344 male x Ross 308 female broiler breeders at 56 wk of age. Eggs were stored for 2 or 10 d at 18 C and 75% RH prior to setting in Petersime setters in a commercial hatchery. Single-stage setters were operated at 32 C WB until E 10 of incubation with air inlets closed and from E 11 to E 19 of incubation at 29-22 C WB with air inlets open. An incubation tray of 150 eggs constituted a replicate and each treatment group had twenty replicate trays. Eggs were turned either hourly (24X) or four times hourly (96X) to E 19. Chicks were necropsied at 504 h of incubation to determine BW and weights of the heart, liver, gizzard, and yolk sac. There were 480 d-old male chicks assigned to floor pens in a 2 X 2 factorial design with 6 replicate pens of 20 birds each. The same feeding, management, and immunization program was used for all square meter pens. BW, feed consumption, and livability were determined at 14 and 35 d. The 10 d storage period decreased fertile hatchability and 96X turning improved fertile hatchability. Percentage yolk sac was increased but percentage liver, heart, and gizzard were decreased by the 10 d storage period. Percentage heart was significantly greater due to 96X turning. Hatchling BW was increased but broiler BW was decreased at 14 and 35 d by 10 d storage. The 96X turning frequency increased BW only at 21 d. These data showed that increased frequency of egg turning during incubation improved fertile hatchability but that 10 d of egg storage decreased fertile hatchability, changed the development of broiler chick organs, and decreased broiler growth.

**Key Words:** Broilers, Incubation, Egg storage, Turning