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S-M1 Glycerol as energetic substrate in hatching period of broiler chicks. G. Gaona*, C. López-Coello, R. Guinzberg-Perrusquia, E. Avila-Gonzalez, and A. Díaz-Cruz, *UNAM, National Autonomous University of Mexico, Mexico City, Mexico.*

This study determined the availability of glycerol as indicator of energy status of broiler chicks during hatch, and the behavior of chicks subjected to three fasting times with reference to production standards. Chicks originating from 31 and 54 week-old Ross breeder flocks were utilized. Samples of liver were taken from chicks during the following time periods: pipping of eggshell, wet hatch, dry hatch, and 2.5, 12 and 24 hours post-hatch. Blood was also collected during each phase with the exception of the pipping. The serum samples were used to measure the concentration of glucose, cholesterol and triacylglycerides by COBAS Mira Roche® Analyzer. Liver samples were used to evaluate the quantity of free glycerol using the technique of O. Wieland. A total of 1260 chicks from each age of breeder flock were utilized for the study. Chicks from each source flock were separated into groups of 140 birds per treatment with 3 replications, and the fasting periods of 2.5, 12 and 24 hours post-hatch were evaluated. The growing period was continued through 49 days of age. Study results revealed that chicks originating from the younger source flock had a lower concentration of glycerol when correlated with the relative weight of the liver and the quantity of yolk. Serum glucose indicated that the energy reserves are at their lowest levels before the first administration of feed. Serum cholesterol levels were elevated due to the yolk absorption, and during hatch there was a high percentage of cholesterol esters. For triacylglycerides and glucose, there was a difference of $p < 0.05$ between the chicks originating from the two source groups of breeder hens. The production results (body weight, consumption, feed conversion ratio) did not present a $p < 0.05$ for any of the fasting time periods. The administration of early feeding caused benefits with respect to yolk absorption, weight of chicks at one-week of age. Nevertheless, when performance was actually measured in this study, improved performance due to early feeding was not detected. While early feeding caused better utilization of yolk and nutrients, pre-placement fasting did not negatively affect performance in this study.

Key Words: glycerol, hatching chicks, glucose

S-M2 Expression of ghrelin receptor during follicular development in the fasted broiler breeder hen. M. Freeman* and A. Davis, *University of Georgia, Athens.*

Ghrelin is a 28 amino acid polypeptide that was originally identified as the endogenous ligand for the growth hormone secretagogue receptor (GHSR). In mammalian species, ghrelin is produced predominantly in the stomach and has strong growth hormone releasing activity but has also been found to play a role in appetite stimulation and energy metabolism. In the chicken, ghrelin mRNA is primarily produced in the proventriculus and two forms of the GHSR have been characterized. These two forms are generated by alternative splicing of the GHSR transcript. In mammalian species, there is increasing evidence that ghrelin plays a role in reproduction therefore, the mRNA expression of GHSR was investigated in the developing preovulatory follicles of six broiler breeder hens that had been fasted for 72 hours. Individual theca and granulosa layers were isolated from the F1 to the F4 follicles, a pool of small yellow follicles, and a pool of large white follicles. The isolated theca and granulosa cells were combined from two birds each to create three replicate samples for each follicle size. Total RNA was extracted from each sample for two step real-time PCR analysis of GHSR. Taqman minor groove binding probes and primers for detecting GHSR and GAPDH (endogenous control) were designed using Primer Express (Version 2.0, Applied Biosystems) based published sequences of these genes. In addition, the assay created for GHSR measured the mRNA expression of both receptor variants. Expression of the ghrelin receptor was detected in all theca and granulosa samples from each follicular size. Overall expression of GHSR was significantly greater in the theca than in the granulosa. The results suggest that circulating ghrelin levels may influence follicular development in the hen.

Key Words: ghrelin receptor, broiler breeder hen, theca, granulosa

S-M3 Changes in broiler small intestinal electrophysiology and permeability due to short-term feed withdrawal. K.L. Thompson*, K.L. Saddoris, J.S. Radcliffe, and T.J. Applegate, *Purdue University, West Lafayette, IN.*

In the poultry industry, pre-processing fasting periods up to 24 h are commonly utilized by producers in an effort to reduce the amount of ingesta within the gastrointestinal tract (GIT), a practice which reduces the incidence of ruptured tracts and subsequent carcass contamination at the processing plant. However, little is known regarding how such feed withdrawal (FW) periods affect intestinal electrophysiology and permeability to inert dextrans. Therefore, an experiment was conducted to determine the effects of 0 and 24 h of FW on ileal electrophysiology and permeability of broiler ileums. Male broilers (n=20) were raised in floor pens to 39 d of age with ad libitum access to a standard industry corn-soybean meal diet and water. At 39 d of age, feed was removed from 4 birds 24 h prior to sampling (repeated at 40, 41, and 42 d of age, for a total of 10 birds/FW period), and birds (n=4) on the control treatment were not subjected to FW. Birds remained on litter with access to water for the first 4 h and were then crated. At the conclusion of the FW period, birds were euthanized and the distal ileal segments (2 replicates/bird) were placed in Ussing chambers for measurement of initial short-circuit current, transepithelial electrical resistance (TER), and intestinal translocation of a 40,000 MW FITC-dextran and a 4,400 MW TMR-dextran. Mucosal and serosal reservoirs were sampled for dextran translocation at 20 min intervals for 120 min. The 24 h FW birds demonstrated lower initial current (13.17 and 6.41 MA/cm² for 0 and 24 h FW, respectively; $P < 0.05$) and TER (178.64 and 141.84 ohms•cm² for 0 and 24 h FW, respectively; $P < 0.05$). Intestinal permeability to the 40,000 and 4,400 MW dextrans was greater in 0 h FW birds at all sampling points from 0 to 120 min (40,000 MW dextran), and at 20, 40, and 60 min (4,400 MW dextran) when compared with the FW birds. The results indicate that FW reduces current and TER values, which suggest reductions in intestinal viability and integrity. However, intestinal permeability was reduced by FW, an occurrence which warrants further investigation.

Key Words: broiler, feed withdrawal, intestine, permeability, ussing chamber

S-M4 The effect of in ovo injection of L-carnitine on hatch rate and body weight of White Leghorns. W. Zhai*¹, S.L. Neuman², M.A. Latour¹, and P.Y. Hester¹, ¹*Purdue University, West Lafayette, Indiana*, ²*Guidant Corporation, St. Paul, Minnesota*.

A previous study conducted in our laboratory showed that the in ovo injection of saline (0.85%) or carnitine (0.25, 0.50, 1.00, or 2.00 μ moles) into fertile White Leghorn eggs at 18 d of incubation did not affect hatch rate. The current study also examined the effects of carnitine injection on hatch rates of White Leghorn eggs; however, in this experiment, eggs were injected with a wider dosage range of carnitine. Prior to in ovo injection of carnitine, 13 fertile eggs were injected with a purple dye to verify that the injectable was placed in the amnion. When opened, 12 out of 13 embryos had dye within their amnions. All hatching eggs were candled for fertility prior to injection. Shells of all fertile eggs were sanitized with a bleach solution at the large end of the egg prior to injection. With the exception of controls, fertile eggs (1,680) were injected with 100 μ L of sterilized saline (0.85%) or carnitine (0.05, 0.5, 5, or 10 μ moles dissolved in saline) using a 3.81cm 21-g needle. Data were analyzed using ANOVA. Hatch was unaffected by treatment (76% for

non-injected controls, 74% for saline injected eggs, 77, 77, 68, and 76% for eggs injected with 0.05, 0.5, 5, or 10 μ moles of carnitine, respectively, SEM = 3). Chick body weight was also unaffected by treatment (39.5 g for non-injected controls, 39.6 g for saline injected eggs, 39.7, 39.8, 39.9, and 39.4 g for eggs injected with 0.05, 0.5, 5, or 10 μ moles of carnitine, respectively, SEM = 0.2). It is concluded that the in ovo injection of carnitine into fertile chicken eggs at 17 d of incubation did not affect hatch rate and body weight. This study was supported by the U. S. Poultry & Egg Association & Lonza, Inc.

Key Words: carnitine, hatch rate, in ovo injection

S-M5 S-Tress and blood gases. L. Hale-McWilliams*, G.T. Pharr, S. Anderson, J.P. Thaxton, and S. Wongpichet, *Mississippi State University, Mississippi State.*

Experiments were conducted to evaluate the effects of adrenocorticotropin (ACTH) on 43 to 46 d old male broilers with high and low hematocrit levels. An initial evaluation separated the 40 broilers into two groups based on hematocrit level. These groups were low hematocrit (19 to 22%) and high hematocrit (25 to 28%). Treatment was delivered via mini-osmotic pumps that infused ACTH at 8 IU/kg BW/d for 7 days at a rate of 1uL/h. Controls did not receive ACTH. A 2 x 2 factorial arrangement in a completely randomized design with ten replications per treatment was performed; measured effects were ACTH treatment and hematocrit level. Blood was evaluated for pH, pCO₂, pO₂, hematocrit, hemoglobin, electrolytes (Na⁺, K⁺, Ca⁺, Cl⁻ and HCO₃⁻), and corticosterone (CS) levels. On d 43, i.e. immediately prior to the start of ACTH treatment, birds differed significantly ($P < 0.05$) in hematocrit, hemoglobin, pO₂, and HCO₃⁻ levels. Carbon dioxide levels were also approaching significance ($P = 0.06$). On d 46, i.e. after 4 d of continuous infusion of ACTH, blood was taken and evaluated for the same characteristics as d 43. Adrenocorticotropin hormone treated birds had significantly increased ($P < 0.05$) hematocrit, hemoglobin, pCO₂, HCO₃⁻, and corticosterone levels and decreased Cl⁻ and Na⁺ levels compared to control birds. High hematocrit grouped broilers had significantly higher hematocrit, hemoglobin, pCO₂, and HCO₃⁻ levels compared to the low hematocrit group. Corticosterone levels were not significantly different between low and high hematocrit birds. No ACTH x hematocrit response interactions occurred. The relationship of metabolic need for O₂ in stressed birds is apparent.

Key Words: broiler, ACTH, stress, hematocrit, corticosterone

S-M6 Yeast extract (Alphamune™) supplementation enhances early gut development in turkey poults. F. Solis de los Santos*¹, M.B. Farnell², A.M. Donoghue³, G.R. Huff³, W.E. Huff³, N.C. Rath³, and D.J. Donoghue¹, ¹*University of Arkansas, Fayetteville*, ²*Texas A & M University, College Station*, ³*USDA, ARS, Poultry Production and Product Safety Research Unit, Fayetteville, Arkansas*.

Alphamune™ is a yeast extract antibiotic alternative that has been shown to stimulate the immune system and increase BW in pigs. The influence of Alphamune™ on gastrointestinal tract (GIT) development of turkey poults has not been reported. Two trials were conducted to evaluate the effects of Alphamune™ on gut maturation of 1-wk-old turkey poults. Twenty seven birds were collected per trial at seven days of age. Birds were fed an untreated control diet, or the same diet supple-

mented with 1 lb/ton or 2 lb/ton of Alphamune™ throughout the study (n = 9 poult/group). A 2-cm section was collected from the mid-point of the duodenum, upper ileum and lower ileum of each bird. Tissue sections were fixed in 10% buffered formalin for 72 h and then stained with hematoxylin and eosin. Twenty measurements of villus height, villus base width, lamina propria thickness and crypt depth were taken per section per poult. Villus surface area was calculated by multiplying the length of the villus by the width of the villus base. Goblet cells/villus was determined as the average number of goblet cells within the 10 best-oriented villi from each section. Duodenum villus height and surface area were higher ($P < 0.05$) in the 2 lb/ton Alphamune treatment when compared to poult fed a control diet in both trials. Duodenum lamina propria thickness was greater ($P < 0.05$) in the Alphamune™ supplemented diets compared to controls. The crypts were significantly deeper in both Alphamune™ treatments when compared to controls in Trial 2. The number of goblet cells/villus was also higher ($P < 0.05$) in the Alphamune™ treatments when compared to controls in both trials. These data suggest that the addition of Alphamune™ may enhance the development of the GIT and mucin production of young turkey poult.

Key Words: Alphamune™, gastrointestinal tract, turkeys, poult, yeast extract

S-M7 Egg weight, eggshell conductance and incubation temperature effects on the intestinal maturation in commercial turkey poult. S. Funderburk*¹, V. Christensen¹, G. Campbell², M. Wineland¹, J. Grimes¹, M. Mann¹, R. Neely¹, D. Ort¹, and D. Rives², ¹North Carolina State University, Raleigh, ²Prestage Farms, Clinton, North Carolina.

Egg shell conductance (G) and egg weight (W) affect poult livability. These factors may be related to intestinal maturation of the poult. The objectives of this study were to determine the effects of G, W and incubator temperature on jejunum maltase (M) and alkaline phosphatase (ALP) activities of commercial turkey poult. Using two trials, an equal number of eggs from an induced molted flock (recycled eggs) and a first cycle flock (new eggs) were weighed, numbered, set and incubated under standard operating procedures in a commercial turkey hatchery. For both trials an equal number of eggs were incubated under a high temperature profile (HT) and under a low temperature profile (LT). All eggs were reweighed at 25d and G was calculated. The eggs were then sorted into three groups: high, average, and low G. At hatch poult were processed and marked according to G group and incubation profile. At days 1 and 3 (D1 and D3) posthatching intestinal samples of poult from each G group and incubation profile were taken. An equal number of poult from each experimental group was placed in battery brooders and grown for 7d and BW and feed consumption were measured at D1, D3, and D7. Data were analyzed using the GLM procedure of SAS. At D1 there was a sex by G by temperature interaction among poult from recycled eggs for total M. Poult from recycled eggs incubated under HT demonstrated more M and ALP activity. Males showed more M activity than the females at D1 and D3. Low G poult had less ALP than the high and average G poult. At D1 and D3 among poult from new eggs incubated at LT more M activity was seen. High G poult had more M activity at D1. Incubation profile interacted with G to affect poult M and ALP activity, and the effects differed between recycled and new eggs. Thus, G and W may be tools that can be managed with incubator temperatures to improve poult quality.

Key Words: incubation, poult, conductance, maltase

S-M8 Turkey breeder hen age affects growth and systemic and intestinal inflammatory responses in female poult raised to market weight. C.M. Schaefer*¹, C.M. Corsiglia², A. Mireles, Jr.², and E.A. Koutsos¹, ¹California Polytechnic State University, San Luis Obispo, ²Foster Poultry Farms, Modesto, California.

This trial examined the effect of two turkey breeder hen ages (23 or 55 wk of age) on performance, intestinal histology and inflammatory immune response of female turkey poult. Using a completely randomized design, female poult were separated by breeder flock age (n=8 floor pens/breeder flock age; n=26 poult/pen; 2.1 ft²/bird), fed identical commercial diets (9 phases), and grown to market weight (~11.4 kg/bird). At young ages, poult from the older breeder flock tended to have higher body weights ($P < 0.01$ for d 7, $P < 0.09$ for d 63). After approximately 63 d post-hatch, no difference in body weights were observed, suggesting that poult from the younger breeder flock were eventually able to compensate for initial reductions in performance. In addition to growth measurements, on d 10, 24, and 65 post-hatch, poult were vaccinated with lipopolysaccharide (LPS; 0.5 mg/kg BW i.a.) or not vaccinated (Control) and intestinal histology and plasma haptoglobin were assessed at 24 hours post-vaccination. In Control birds, intestinal villus length was greater for poult from the older breeder flock ($P < 0.05$), as was crypt depth ($P < 0.05$ for d 11 and 25). Plasma haptoglobin levels did not change in 11-d old poult after LPS vaccination, but increased with LPS at d 25 and 66 post-hatch ($P < 0.05$ for each). At d 66 post-hatch, poult from the younger flock had increased haptoglobin levels post-LPS compared to those from the older breeder flock ($P < 0.05$). In general, LPS vaccination increased villus width in the jejunum and ileum ($P < 0.05$ for each), increased lamina propria width in the duodenum and ileum ($P < 0.05$ for each), and decreased ileum crypt depth ($P < 0.05$). Overall, poult from the older breeder flock had higher body weights in the early stages of growth, had increased intestinal surface area, and reduced inflammatory response to LPS (d 66 post-hatch). In general, poult from the younger breeder flock compensated in terms of performance, but differences in intestinal histology and inflammatory immune responses persisted.

Key Words: turkey, breeder age, intestine, haptoglobin, inflammation

S-M9 Pragmatic optimization of liver glycogen analysis methodology for embryonic and early hatched chicks. L. Bennett, R. Keirs*, E. Peebles, and P. Gerard, Mississippi State University, Mississippi.

Predetermined measured amounts of minced liver samples, collected in 6 mm diameter plastic straws from individual day-old chicks, were deposited into 10 % chilled perchloric acid in less than one minute post euthanasia. Liver glycogen content was stabilized immediately and remained so for at least one week. The colorized standards for glycogen determination utilized the phenol-sulfuric acid method which results in the glycogen being hydrolyzed to glucose. The resultant standard curves for glycogen ($y = 0.0032x + 0.0515$; $R^2 = 0.9865$) and glucose ($y = 0.0033x + 0.0178$; $R^2 = 0.9779$) were nearly identical. Color stability of the same phenol-sulfuric acid standard at 0 and 24 h were nearly identical with closely similar slopes and intercepts. The lower detection limits for the standards were at 5 ppm. Of the total glycogen recovered from two tissue ultra-grinds, 95.24 ± 4.98 % was obtained on the first grind. Mincing a frozen liver sample prior to ultra-grinding caused the detection of slightly higher glycogen levels. Furthermore, glycogen levels in samples from the same frozen liver that were minced, placed in 10

% chilled perchloric acid, and refrigerated for one wk were slightly higher than that of liver samples that remained un-minced and were refrozen for the same period. This pragmatic approach for collecting chick liver samples requires no specialized instruments, can be implemented at the hatchery or farm level, and in adequate numbers for statistical evaluation on an individual chick basis. Simple aliquot selection from each sample can be utilized for other tests, e.g. protein and fat determination.

Key Words: broiler, chick, glycogen methodology, liver, minced

S-M10 Comparison of radioimmunoassay and Enzyme-Linked Immunoassay methods for determination of corticosterone concentration in poultry plasma. S. Wongpichet¹, J. Thaxton¹, and S. Collier^{*2}, ¹Mississippi State University, Mississippi State, ²USDA, ARS, Poultry Research Unit, Mississippi State, Mississippi.

Corticosterone (CS) concentration in biological fluids was first reported in the 1950's and this method involved sulfuric acid-induced fluorescence. Quantification was accomplished using the phenylhydrazine reaction. Several fluorometric methods were developed to measure steroids and these methods were used exclusively until the advent of competitive protein-binding radioimmunoassay (RIA) methodology in the 1970's. The first report of RIA measurement of CS in avian plasma was in 1976. This RIA was validated for chicken plasma in 1980. All reports of CS concentrations in avian plasma up until the present have involved RIA. However, because of concerns of expense, meeting regulatory mandates, and disposal of radioactive materials a non-radioactive method for determination of biological entities has been developed. This technique is termed enzyme-linked immunoassay (EIA). In the present study, CS concentration was determined from plasma samples taken from broiler chickens using both RIA and EIA methods. Both methods are sensitive indicators of CS concentration and showed similar linearity patterns. Specifically, average CS concentration using RIA was 16.4 ± 4.5 ng/mL and the average concentration in the samples using the EIA procedure was 12.5 ± 5.5 ng/mL. The results of this study suggest that RIA and EIA methods have equal accuracy and precision for determination of CS in chicken plasma.

Key Words: EIA, RIA, corticosterone, broiler

S-M11 Effects of time specific F-strain *Mycoplasma gallisepticum* inoculation overlays on pre-lay ts-11-strain *Mycoplasma gallisepticum* inoculation on performance characteristics of commercial laying hens. A. Vance^{*2}, E. Peebles¹, S. Branton², S. Whitmarsh¹, and P. Gerard¹, ¹Mississippi State University, Mississippi State, ²USDA, ARS, Poultry Research Unit, Mississippi State, Mississippi.

Previous studies have shown that 12 wk F-strain *Mycoplasma gallisepticum* (FMG) inoculations have reduced egg production compared to controls and 22 wk FMG inoculation treatments, and have also delayed egg production compared to controls in commercial layers. Two trials were conducted in this study to compare the effects of the following inoculation treatments: sham inoculation at 10 wk, ts-11-strain of *Mycoplasma gallisepticum* (ts11MG) at 10 wk of age, ts11MG at 10 wk overlaid by a subsequent FMG inoculation at 22 wk, and ts11MG at 10 wk overlaid by a subsequent FMG inoculation at 45 wk. Parameters assessed in each trial between 23 and 57 wk of age were hen

mortality, BW, egg weight, egg production, eggshell breaking strength, egg Haugh unit score, and incidences of blood, meat spots, and pimpling. Significant age main effects were noted for egg production between 45 and 58 wk and for hen BW between 24 and 43 wk of age. Age by treatment interactions were noted for blood spot and pimpling incidences, egg weight, and Haugh unit scores. Blood spot and pimpling incidences were increased in eggs belonging to the ts11MG at 10 wk and FMG at 45 wk group between 53 and 56 wk. The effects of inoculation treatment on egg weight at 27, 37, and 38 wk were variable; however, Haugh unit score was significantly reduced by the ts11MG at 10 wk inoculation. Despite increases in blood spot and pimpling incidences very late in production due to the overlay of the 45 wk FMG on the ts11MG at 10 wk treatment, performance in layers was not adversely affected by a pre-lay ts11MG inoculation or when in conjunction with subsequent overlay inoculations of FMG during lay. It is, therefore, suggested that the pre-lay inoculation of commercial layers with ts11MG may reduce the negative impacts of a pre-lay FMG inoculation on performance while providing protection against subsequent FMG inoculations.

Key Words: egg quality, inoculation, *Mycoplasma gallisepticum*, performance, vaccine

S-M12 Digestive and reproductive organ characteristics of commercial egg laying hens inoculated with S6-Strain *Mycoplasma gallisepticum* at either 10, 22, or 45 weeks of age. E. Basenko¹, E. Peebles^{*1}, S. Branton², S. Whitmarsh¹, and P. Gerard¹, ¹Mississippi State University, Mississippi State, ²USDA, ARS, Poultry Research Unit, Mississippi State, Mississippi.

Experimental inoculation of commercial laying hens with the S6-strain of *Mycoplasma gallisepticum* (S6MG) at 20 wk of age, while being maintained under controlled conditions in environmental isolation units, has previously been shown to affect the lengths and weights of various portions of the reproductive tract. Two trials were conducted in the current study to compare the effects of S6MG inoculation prior to lay at 10 wk of age, during onset of lay at 22 wk of age, and during lay at 45 wk of age on the digestive and reproductive organs of commercial layers similarly housed and maintained under controlled conditions. In each trial, liver weight, liver moisture and lipid concentration, incidence of fatty liver hemorrhagic syndrome, ovary weight, ovarian mature follicle numbers, weights and lengths of the oviduct and oviductal regions, and weights and lengths of the small intestine and small intestinal regions were examined at 60 wk of hen age. At 60 wk, liver lipid concentration was depressed and isthmus weight, as a percentage of total oviduct weight, was increased in birds that had been inoculated with S6MG at 45 wk. Alterations in liver lipid content and weight of the isthmal portion of the oviduct may occur in response to S6MG inoculation during the later stages of production in layers housed under controlled conditions.

S-M13 Effects of pre-lay 6/85-strain *Mycoplasma gallisepticum* inoculation on performance characteristics of commercial laying hens when given alone or in conjunction with F-strain *Mycoplasma gallisepticum* inoculations during lay. K. Viscione^{*1}, E. Peebles¹, S. Branton², A. Vance², S. Whitmarsh¹, and P. Gerard¹, ¹Mississippi State University, Mississippi State, ²USDA, ARS, Poultry Research Unit, Mississippi State, Mississippi.

When inoculated at 12 wk of age, the F-strain of *Mycoplasma gallisepticum* (FMG) delays onset of lay and reduces total egg production of commercial layers housed in isolation units under controlled conditions. Also, compared to 22 wk FMG inoculations, 12 wk inoculations reduce pre-peak and post-peak egg production and cause shifts in egg size distribution in layers housed in a caged layer facility. Two trials were conducted in this study, using layers housed in isolation units under controlled conditions, to compare the effects of the following inoculation treatments: sham inoculation at 10 wk of age, 6/85-strain of *Mycoplasma gallisepticum* (6/85MG) at 10 wk of age, 6/85MG at 10 wk overlaid by a subsequent FMG inoculation at 22 wk, and 6/85MG at 10 wk overlaid by a subsequent FMG inoculation at 45 wk. Parameters assessed in each trial between 20 and 54 wk were hen mortality, BW, egg weight, egg production, and percentage yolk, albumen, and shell weight. Significant age main effects were noted for egg weight and production between 22 and 54 wk, and for percentage yolk weight between 24 and 43 wk. Percentage yolk weight at 24 wk was lower than that at 32 and 43 wk. However, no significant treatment main effects or treatment by age interactions were found for any of the determined parameters. Performance in layers was not adversely affected by a pre-lay 6/85MG inoculation or when in conjunction with subsequent overlay inoculations of FMG during lay. It is, therefore, suggested that a pre-lay inoculation of commercial layers with 6/85MG may provide a useful alternative to an FMG inoculation.

Key Words: egg, egg production, inoculation, *Mycoplasma gallisepticum*, performance

S-M14 Effects of *Eimeria acervulina* on concurrent *E. maxima* infections: relationship to field problems with *Eimeria maxima*. G. Mathis*, *Southern Poultry Research, Inc., Athens, Georgia.*

The three most commonly occurring species of *Eimeria* infecting chickens are *Eimeria acervulina*, *E. tenella*, and *E. maxima*. Even though *E. maxima* is very immunogenic, lesions are often observed in the field late in a growout. A survey of 50 coccidial field isolates showed that 36 were predominately *E. acervulina*, 4 *E. maxima*, and 10 *E. tenella*. All of the *E. maxima* isolates came from farms where the broilers were over 28 days old. Most of the *E. acervulina* isolates were from broilers that were 18 to 28 days old. The daily oocyst shedding pattern for a commercial coccidial vaccine was examined in floorpen birds. Birds vaccinated for coccidiosis at the hatchery were placed into pens on new pine shaving. The shedding of *E. acervulina* type oocysts peaked around 18 days. A small peak of *E. maxima* was observed around 28 days. A battery cage study was conducted to examine whether *E. acervulina* could be interfering with *E. maxima* development. Birds were challenged at 14 days of age with *E. acervulina* and/or *E. maxima*. The oocyst per bird challenge levels were none (Trt. 1), *E. acervulina* 100,000 (Trt. 2), *E. acervulina* 100,000 plus *E. maxima* 5,000 (Trt. 3), *E. acervulina* 50,000 plus *E. maxima* 5,000 (Trt. 4), *E. acervulina* 25,000 plus *E. maxima* 5,000 (Trt.

5), and *E. maxima* 5,000 (Trt. 6). Each treatment consisted of 3 replications in a complete randomized block design. *E. maxima* alone caused 21 % weight reduction and 2.75 lesion score. The 100,000 and 50,000 *E. acervulina* oocyst level reduced *E. maxima* lesions to 1.33. The 25,000 *E. acervulina* oocyst level only slightly reduced *E. maxima* lesions to 2.25. The *E. maxima* did not interfere with any of the *E. acervulina* infections. This study suggests that *E. acervulina* interferes with colonization or development of *E. maxima*. development. As birds become more immune to *E. acervulina* then *E. maxima* has more of an opportunity to develop.

Key Words: coccidiosis, *E. maxima*, *E. acervulina*, *eimeria*, chicken

S-M15 A field trial using the Sperm Quality Analyzer (SQA Vt) to prepare artificial insemination doses for turkeys based on motile sperm cell number. U. Shalit¹, L. Rabinovitch¹, and K. Krueger*², ¹MES, Ltd., Caesarea, Illinois, ²Diamond K Research, Marshville, North Carolina.

Most commercial turkey operations collect semen and dilute on a volume basis for artificial insemination (AI). The number of motile sperm cells/AI are highly variable and often range from <100 to >600 million. AI doses >200 million motile sperm are probably not biologically effective. The SQA Vt provides an accurate and rapid method of determining total (TSC) and motile sperm concentration (MSC) for dosimetry purposes. A field trial (2200 parent stock turkey hens and 154 toms) was conducted to compare conventional volume (V) based AI with AI based on a target number of motile (M) sperm. The test population was randomly divided into two groups of approximately 1100 hens and assigned to either V or M protocols. From one through four weeks of egg production (acclimation), both groups were inseminated using the V based protocol. All pools of semen were diluted 1:1 with a commercial semen extender and analyzed for TSC and MSC using the SQA Vt. A 0.055 ml dose and weekly AI were used throughout the trial. All eggs were incubated in a commercial hatchery and candled fertility (CF) determined after seven days of incubation. During the acclimation period, no difference in CF was observed between groups. From five through 24 weeks of egg production, motile sperm cell number/AI was accomplished in the M group by the addition of extender to achieve a target MSC per AI. From five through 24 weeks of egg production, the average number of motile sperm/AI was 217 and 140 million for the V and M groups, respectively. No difference in CF or hatchability was observed between the V and M AI protocols. Using the SQA Vt to prepare AI doses based on motile sperm cell number was found to be practical and improved male utilization by more than 20%. AI based on motile cell numbers will reduce breeding costs and enhance the use of superior sires and improve the genetic quality of the progeny produced.

Key Words: fertility, insemination, motility, sperm, turkey