early subclinical immunosuppression when given to embryos without maternal antibody, since they caused significant microscopic lesions in the bursae (mean lesion scores of 4 on a scale 1 to 4). However, all bursae from the vaccinated birds did show significant regeneration at 3 weeks of age (mean scores of 2 to 3).

Key Words: IBDV, In Ovo, Vaccines, Safety

78 Comparison of Mortality, Response to Vaccination, and Incidence of Tibial Dyschondroplasia in Three Strains of Tom Turkeys. R. M. Fulton1,2, A. P. Rahb, M. W. Orth2, and K. D. Roberson2, 1 Dept. of Pathology, Michigan State University, 2 Dept. of Animal Science, Michigan State University.

This study involved monitoring the daily mortality, response to vaccination for New Castle disease and incidence of tibial dyschondroplasia (TD) in BUTA Big 6 (B), Hybrid Large White (H) and Nicholas 700 (N) commercial tom turkeys that were part of a strain evaluation trial at Michigan State University. Cause of mortality was determined by necropsy. Major categories consisted of cardiovascular disease (CVD) (round heart, perirenal hemorrhage and aortic rupture), musculoskeletal abnormalities (angular limb deformities) and trauma (broken bones and/or dislocated joints). Most of the mortality in this study was due to CVD. Round heart accounted for most (30% B, 40% H and 35% N) of the CVD mortality. Vascular disease accounted for 2%, 3% and 8% mortality in B, H and N respectively. Musculoskeletal abnormalities accounted for 12%, 8%, and 16% of mortality, due to culling, in B, H and N respectively. Trauma occurred secondary to handling and was responsible for 10%, 13% and 9% of mortality for B, H and N. To determine if there was a difference between strains in response to vaccination, birds were vaccinated for New Castle disease at 6 and 9 weeks-of-age. Blood was drawn 10 days after each vaccination and titers were determined by ELISA. There was no difference between turkey strains in titers for either observation period. To determine if there was a strain difference in incidence and severity of TD, the right and left tibiotarsus from 30, 10-week-old turkeys were collected and split longitudinally. Tibial dyschondroplasia lesions were assigned a score from 0 to 4. The incidence of TD in all strains was low where no B, 3 H and 4 N turkeys had lesions of TD. There was no difference in incidence or in severity between strains.

Key Words: Turkey, Mortality, Titers, Tibial dyschondroplasia, Vaccination

80 Investigation of E. coli Condemnations in the Ontario turkey industry. B. Sanei*, E. Martin, I. McMillan, and B. Hunter, University of Guelph.

This project was designed to investigate the importance of E. coli related condemnations in the Ontario turkey industry. Condemnation records from over 11,000 shipments of turkeys were examined from the four main Ontario turkey processing facilities for the period 1991-1997. Data were manually entered into a data-base program and analysed with SAS software. The main objective of the study was to determine patterns of carcass condemnation in commercial turkeys considering class of turkey, specific reasons for condemnation, and temporal distribution of condemnations. Patterns of carcass condemnation in commercial turkeys for those conditions related to E. coli infections and identifying farms with problems with E. coli condemnations were also studied. The results showed that condemnations accounted approximately 1.5-1.7 % of all turkeys shipped. Birds raised in the winter months consistently had the highest condemnation rate, ranging from 1.7-4.2 % of the birds shipped. Tom turkeys had the highest rate of condemnations, followed by hens and the smaller broiler turkeys. Condemnations in toms were particular high in 1991-1996, being 5.2 % and 4.2 % respectively. Airsacculitis, cellulitis, cyanosis, hepatitis and septicemia were the most common reasons for condemnation. Airsacculitis was responsible for between 14-37 % of all condemnations.

Key Words: E. coli, Condemnation, Turkey

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81 Ovarian steroidogenesis in single and multiple ovulating turkeys. S. Buchanan* and P. M. Hocking, Roslin Institute, Midlothian, Scotland.

Breeding male-line (ML) turkeys that have been selected for high meat yield have multiple ovulating ovaries. The ovary of the ML strain has 3 times as many yellow follicles and a residual ovary weight 5 times that of unselected traditional lines (TL). Mature follicles produce progesterone while smaller follicles and the residual ovary produce oestradiol. However the ML strain has a lower plasma oestradiol concentration than the TL and there is no significant difference in plasma progesterone. The aim of this experiment was to compare the ovarian output of oestradiol and progesterone of the TL and ML strains. Female turkeys (n = 24) were killed five weeks after photostimulation. All ovarian follicles greater than 8 mm were removed and individually incubated for 3 hours at 39°C in Medium 199. Follicles smaller than 8 mm were classified according to size (1-3, 3-5 or 5-8mm) and incubated in groups of 4. Students t-tests and ANOVA were used to test significance of results. There was no significant difference in total progesterone output from the mature follicles between the ML (14.3±3.06ng) and the TL (8.9±2.88ng). The total output of oestradiol was significantly greater in the ML (11.5±1.06ng) compared to the TL (6.1±0.57ng), P<0.001. When considered relative to body weight, to account for differences in blood volume, the oestradiol output was greater in the TL (1.02±0.10ng/kg) than the ML (0.59±0.08ng/kg), P<0.001. There was no significant difference in progesterone output relative to body weight between the TL (1.51±0.487ng/kg) and the ML (0.75±0.163ng/kg). Oestradiol output in small follicles increased significantly as follicle size increased, (P<0.001) and was significantly greater in the TL than in the ML (TL 28.4, 73.6, 119.6pg; ML, 11.9, 24.3, 64.1pg, per follicle, SED=12.38, P<0.001). There was no significant difference in progesterone output between the different small follicle sizes or between the TL and ML, (TL, 13.2, 6.6, 46.5pg; ML, 11.7, 23.8, 31.2pg, per follicle, SED=21.75). The results suggest that steroidogenesis of the ML ovary may be impaired.

Key Words: Turkeys, Oestradiol, Progesterone


The effect of Sulfaquinoxaline (SQO), when used over a prolonged period for anticoccidial prophylaxis or as a growth promotant, on the hepatorenal performance were investigated. To determine the effect on the withdrawal period various tissue levels of SQO were also measured. A total of 180 one day old chicks were administered a prophylactic dose of SQO for 35 days. Hematological studies revealed anemia. Impairment of hepatorenal performance were manifested by a significant decrease in the concentrations of total serum protein and albumin, as well as an increase in AST, ALT, creatine, and uric acid. Chronic hepatopathy and nephropathy were observed in most chickens. Hypoglobulinemia and depletion of lymphoid cell populations in the lymphoid organs indicated immunosuppression. Higher concentrations of SQO residues were found in the kidney, followed by the liver and muscles. The SQO withdrawal period was extended from 15 to 18 days. It was concluded that the prolonged administration SQO has a deleterious effect on the hepatorenal functions, causes immunosuppression and lengthens the withdrawal period of the drug.

Key Words: Sulfaquinoxaline, Prophylaxis, Broiler Chickens
82 Embryonic mortality differs between hen ages. B. D. Fairchild, V. L. Christensen, J. L. Grimes, M. J. Wineland, and L. G. Bagley. North Carolina State University, Raleigh, NC USA; 2 Tarheel Turkey Hatchery, Raeford, NC USA.

Fertility changes due to hen age have been well documented, but incidence of early embryonic mortality has not been examined thoroughly. This study tested the hypothesis that embryonic mortality from young hens in the first two weeks of production was higher than embryonic mortality from older hens in their 12th week of production. Three residue breakouts were performed at two commercial turkey hatcheries in North Carolina for a total of six hatch. Large White turkey eggs from each age group were set in the same incubator and were subjected to normal management in each hatchery. Hatchability, percent internal pips and live pips did not differ significantly between the two ages. Week 4 mortality and the percent dead pips were significantly greater in the older flocks. The fertility and early embryonic mortality occurring after blood formation were negatively correlated, whereas mortality occurring before blood formation did not correlate significantly in young flocks. Therefore, eggs from young hens tend to experience embryonic mortality earlier in incubation than eggs from older hens, and hen age could be a useful model for examining embryonic mortality in future studies.

Key Words: Hen age, Embryonic mortality, Turkeys


Previous studies in our lab have demonstrated that in ovo administration of PYY at d18 of incubation enhanced chick feed conversion ratio (FCR) and body weight (BW) gains during the first week post-hatch. Preliminary studies have also shown that PYY administration increases jejunal glucose absorption in 1d turkey poults. The objective of this study was to further elucidate the possible benefits of in ovo PYY administration in two distinct turkey lines, a commercial growth line, BUT, and the Egg Line (Dr. K. Nestor at Ohio State University). Eggs from both turkey lines were randomly placed in the same incubator. On d25 of incubation, 380 BUT and 440 Egg Line eggs were injected with 100ul of 1.025% saline (control) or 600ug PYY/kg egg weight. Plasma levels of Vitamin C were measured at hatch and at d3. Two groups from each treatment were sacrificed at hatch and the remaining birds were used to examine the growth of the birds. At hatch, 168 poults from each treatment were placed in a standard turkey starter crumble and water were available ad libitum. Feed and birds were weighed on days 3, 10 and 17 to determine BW gains and FCR. No differences were seen on a cage basis for either BW gains or FCR in either line. However, on an individual poult basis, BUT PYY treated birds were heavier than their controls (58.8 vs. 57.7; p=0.02) at hatch. PYY treated turkeys from both lines were heavier (p<0.02) than their control groups at 3d. This effect was not apparent at 10d and 17d. A subset of birds from each treatment group was randomly chosen at the end of the experiment and sexed. At hatch and at 3d there were no BW differences (p=0.87 and p=0.20, BUT and Egg Line, respectively) noted between sexes. BW were different at 10d and 17d between sexes (p=0.0001). These results suggest that PYY enhances poult weight and attenuates differences in BW due to sex during early post-hatch life. Differences observed between the two lines with PYY treatment suggest a PYY-genotype interaction.

Key Words: Peptide YY, In ovo, Poult, BW, Feed conversion ratio

84 The Effect of Vitamin C on the Reproductive Performance of Male Turkey Breeders. S. L. Neuman, J. L. Orban, T. L. Lin, M. A. Latour, and P. Y. Hester. Purdue University, West Lafayette, IN.

A 33 wk field study was conducted to evaluate the effects of dietary Vitamin C on the reproductive performance of male turkey breeders. The Vitamin C fed was a more stable form called Rovinix Stay-C 35 which contains a mixture of tri-, di-, and monophosphate esters of L-ascorbic acid. It is the esterification at position two that protects it from oxidation. At 32 wk of age, 144 BUTA turkey breeders were housed in an industry breeder facility where they were maintained for the entire study. All tom breeders were control fed a 14% crude protein diet. Three dietary treatments with four pens per treatment and 12 birds per pen were fed 0, 75, 150 ppm Vitamin C during the first four months of the reproductive cycle. Levels of Vitamin C were doubled to 150 and 300 ppm, respectively, during months 5-8. Sperm viability, semen volume per bird, sperm concentration, and concentrations of Vitamin C in plasma and feed were determined monthly. The addition of Vitamin C to the diet did not affect any of the measured semen traits, nor were there any significant dietary treatment x age interactions. Age of breeder toms significantly affected semen traits with an age-related decline in semen volume (p<0.01) and sperm concentration (p<0.01). A decrease in seminal vesicle weight from breeding line 2 did not differ among dietary treatments. Analysis of feed showed no Vitamin C in the unsupplemented diets and an average of 88% and 96% of claim in the lower and higher levels of Vitamin C supplemented diets, respectively. It was concluded that Vitamin C, at the levels added to the diet of tom breeders, did not influence semen volume, sperm viability, and concentration.

Key Words: Vitamin C, L-ascorbic acid, Sperm viability, Semen, Turkey breeder toms

85 The Effects of Methylxanthines on Motility of Stored Turkey Semen. A. M. Parkhurst, R. J. Thurstom, and N. Korn. Clemson University, Clemson, SC.

A class of compounds known as methylxanthines, which includes caffeine and pentoxifylline, have been shown to increase sperm motility for several mammalian species. Good sperm motility has been correlated with improved fertility in the domestic turkey. The objective of the present study was to assess the effects of caffeine and pentoxifylline on turkey sperm which had been stored for 6 hours. Motility was assessed by Accudex "swim-down" test in unstored semen (time 0) and semen stored for 6 hr at 5C. The tested compounds were added after semen storage, or were present in the semen during the 6 hr storage period. Concentrations tested were 0.1M and 0.5-4mM for each methylxanthine and treatments for each level were repeated 3 times with different semen samples. A significant decrease in motility was seen for all sperm stored 6 hr compared to that for the time 0 control, regardless of whether the methylxanthine was present or not. The addition of caffeine or pentoxifylline, either before or after storage, did not improve motility compared to semen stored without a methylxanthine. The results of this study demonstrated that, unlike mammalian sperm, methylxanthines are not useful for boosting the motility of stored turkey semen.

Key Words: turkey, sperm, motility, caffeine, pentoxifylline

86 Effects of length of the incubation period of turkey embryos on embryonic metabolism and growth. V. Christensen, J. L. Grimes, M. J. Wineland, and L. G. Bagley. NC State University, Raleigh, NC; 2 Moroni Turkey Hatchery, Moroni, UT.

Growth of turkey embryos may be a function of many variables. It was suggested many years ago that maximal embryonic growth would result in optimal survival. The effect of the length of the incubation period on embryonic growth has received little attention. The hypothesis that different incubation periods would result in different rates of growth in turkey embryos was tested. Different growth rates may be important in determining survival rates of embryos prior to hatching and that of neonates post-hatching. High altitude reduces the eggshell conductance of turkey eggs and prolongs the incubation period. Fertile eggs were obtained from sibling breeder hens that were laying eggs at high altitude or sea level. The eggs were randomized and placed into two different treatments. One group was incubated at 37.5 C and the second was incubated at 37.8 C for 14 d. Following the 14th d, all eggs were randomized within the incubation cabinet at 37.5 C and incubated similarly until hatching. Embryos were selected randomly at 7 to 28 d and were sampled for both growth and metabolic function. Embryos older than 14 d were dissected and weights and metabolism were measured additionally on heart, liver and muscle tissues. Growth was measured by wet weight and total protein. Function was measured by the metabolites, glycojen and lactate. The high temperature treatment accelerated hatching time by approximately 12 h. No significant differences were observed between survival rates of the two treatments. The high temperature treatment...
also accelerated the rate of muscle growth but did so at the expense of heart tissue. The abilities to synthesize and accrue glycogen or to recycle lactate were affected by an interaction of eggshell conductance and length of the incubation period. Tissues that had high levels of lactate generally also had reduced growth rates. Metabolic energy may influence the growth of the demand tissues with little or no effect on the supply tissue. It was concluded that the length of the incubation period which is determined by eggshell conductance, influences the growth of embryos differently depending upon the ability of critical tissues to recycle lactate. Turkey eggs with different conductance constants may require different incubation periods to optimize embryonic growth and survival.

Key Words: Embryo, Growth, Metabolism, Survival, Conductance


This study was conducted to determine if veterinary drugs would transfer into egg albumen during the latter two phases of albumen formation (preplumping or plumping). Oxytetracycline (OTC) was picked as the model drug since it is known that it transfers into albumen. In two replicate experiments (24 hens per experiment), hens were injected (i.M) with either 400 mg/kg OTC (n=20) or physiological saline (n=4). Equal groups of hens were dosed at 2 h (preplumping phase) or 5 h (plumping phase) after oviposition. Five hours following injections, hens were euthanized by cervical dislocation and albumen collected from the reproductive tract.

Results indicate that OTC did transfer into albumen during both of the latter phases of albumen formation. The concentrations (ppm) were greater (P<0.05) in the preplump vs. plump phase (3.2+0.3 vs. 1.8+0.2 for preplump vs. plump, Exp. 1; or 2.8+0.3 vs. 1.6+0.2 for preplump vs. plump, Exp. 2, respectively). However, when the differences in albumen weights were accounted for, total µg transfer did not differ between the two phases of albumen formation. The results indicate that veterinary drugs which are chemically and pharmacokinetically similar to OTC may transfer into egg whites during the latter phases of formation prior to oviposition. It is unknown if other classes of antibiotics behave in a similar manner. Therefore, it is incumbent upon the poultry producer or veterinary practitioner dosing laying hens to consider the possibility that egg whites contained in the first egg laid after dosing may contain drug residues.

Key Words: Food Safety, Drug Residues, Eggs, Albumen


Domestic avian species are exposed to relative high levels of the phytoestrogen genistein in soy based diets. Genistein and other phytoestrogens are known to impair reproductive development, function, and behavior in susceptible mammals, however, poultry species have not been examined for potential reproductive sensitivity to phytoestrogens. To begin to address this question, the objective of the present study was to determine whether the soy phytoestrogen genistein is estrogenic in chickens.

Day old female chicks were assigned to 5 treatments as follows: chicks fed a typical soy based chick diet with daily subcutaneous injection of sesame oil vehicle (SV); soy free diet and vehicle injection (V); daily injection of 0.5 mg diethylstilbestrol as a positive control (DES); 1.0 mg genistein injection (G1); and 10.0 mg genistein (G10). At 12 days of age, the chicks were weighed and oviducts, ovaries, and livers were excised and weighed. DES treatment massively increased oviduct and liver weight, 76x and 2x respectively, as compared to vehicle injected control. Relative oviduct weights (mg/kg body weight) of the other treatments were: (SV) 112.10 ± 8.0; (V) 104.79 ± 10.57, (G1) 135.55 ± 21.84, and (G10) 178.87 ± 22.04. Oviduct weights of G10 chicks were significantly increased as compared to SV (P<0.05) and V (P<0.01). Liver and ovary weights were not significantly affected by the treatments other than DES. Significant growth of the chick oviduct in response to genistein demonstrates that genistein has estrogenic activity in chickens and may influence reproduction in poultry species. (Supported by the Alabama Agricultural experiment Station and USDA AD-421 project S-233).

Key Words: Phytoestrogen, Genistein, Oviduct


Genetically selected broiler line (42L) developed at Pennsylvania State University was used as primordial germ cell (PGC) donor in the present experiment. Embryonic blood was collected from 42L embryos at stage 14-15 (Hamburger and Hamilton, 1951). Collected blood was pooled into 1 microliter of Minimum Essential Medium (MEM) supplemented with 10 % fetal bovine serum (FBS). Pooled whole blood was placed into freezing container (Cryoware, Nalg e) and 100 microliter of MEM supplemented with 10 % FBS and 20 % DMSO was added followed by placing freezing container into Bicell(Nihon Freezer Co. Ltd.). Bicell was then placed into deep freezer at -80 °C for approximately 3 hours followed by pluming freezing container into liquid nitrogen. Sample was stored in liquid nitrogen for about one month. After thawing sample in ice water, circulating PGCs were isolated from blood cells. Thirty to seventy frozen/thawed cPGCs were injected into Brown Leghorn embryos at stage 14-15 using a fine glass needle, which 3-5 microliter of embryonic blood was removed prior to cPGC transfer. One male and 2 females were kept for male and a progeny testing was performed upon reaching sexual maturity by mating with Brown Leghorn of opposite sex. Out of 2 females, one female died before reaching puberty. Both male and female recipients produced 48% - 100 % (as of Mar,1999) of offspring derived from transferred cPGCs. These results show that it is possible conserve parent stocks in domestic chicken by freezing circulating primordial germ cells.

Key Words: Chicken, PGCs, Genetic resources, Conservation

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Cecce:7.8, colon:3.1. Bacterial results are reported as mean log10 colony forming units per gram of sample. Campylobacter population found were: feathers:5.4, skin:3.8, crop:4.7, ceca:7.3, colon:7.2. Colliform / E. coli populations observed were: feathers:6.4 / 6.0, skin:5.3 / 4.9, crop:4.3 / 3.7, ceca:6.6 / 6.2, colon:5.8 / 5.3. Total aerobic bacterial populations found were: feathers:7.9, skin:7.1, crop:5.8, ceca:6.8, colon:6.4. Prior to carcass scaling, aerobic bacteria were recovered in greatest numbers from feathers and skin, while Campylobacter was recovered at the lowest level from skin.

Key Words: Campylobacter, ceca, crop, colon, skin