were monitored daily. At the end of four weeks, broilers subject to 0 ppm ammonia had body weights of 1460 g. All levels of ammonia exposure reduced body weights. The 25 ppm concentration reduced body weights a maximum of 1.7% at 3 wks, while 50 ppm exposure reduced body weight most significantly at 4 wks by 12.3%. At the 75 ppm level of ammonia, body weights were reduced by 4.8%, 17.8%, 25.4%, and 22.6% for weeks one through four, respectively.

**Key Words:** Ammonia, Broilers, Performance

### 231 Cotton nematode control by broiler litter.

Y Vizzier Thaxton*, G. W. Lawrence, and C. L. Balzli, Mississippi State University.

Poultry litter has been identified as a valuable source of nitrogen, phosphorus, potassium, calcium, magnesium, and micro-nutrients. In addition to the fertilizer benefits, previous research demonstrated that pre-plant application of poultry litter decreases soil-born plant pathogens including plant-parasitic nematodes. Nematodes were responsible for yield losses greater than 762,520 bales of cotton across the cotton-belt in 1999. The reniform nematode was first described as a pathogen of cotton in 1940, and by 2000 it infested over 48 percent of the U.S. cotton acreage. Since there are no commercially available cotton cultivars with resistance to the reniform nematode, application of chemical nematicides are the most common method of control. These chemicals do not provide long term management and must be used annually. Poultry litter may contain constituents that stimulate the development of nematode-suppressive microbial populations. Actinomycetes from poultry litter have been demonstrated to control a variety of plant diseases. Furthermore, Actinomycetes have been identified as controlling parasitic nematodes. Poultry litter, litter compost, and fecal material commonly contain Actinomycetes. This study utilized field mini plots to evaluate specific microbiological changes in the soil as the result of application of broiler litter compared to no litter and commercial fertilizers. There were 6 treatments and 2 controls. Litter was applied at rates ranging from 0.4 to 2.4 tons per hectare. Results indicate that the poultry litter regardless of quantity stimulated growth of Actinomycetes, while time decreased the numbers of Staphylococi, coliforms, molds and yeasts. The total number of organisms remained stable regardless of treatment or sampling time.

**Key Words:** Broiler litter, Actinomycetes, Nematode, Cotton, Microbiology

### 232 Presence of Salmonella in broiler feed.

J. A. de Graff-Hanson*,1, D. Jackson1, and M. Biru1, University of Maryland, Princess Anne.

Feed from hoppers and feeders from 2 broiler houses were aseptically collected every 2 weeks from placement till birds went for processing for a period of 2 years. Samples were collected with sterile scoops from multiple points from 2 hoppers in each house and from multiple feeders into whirl packs. These were transported on ice to the lab and analyzed within 24 hours. After mixing to effect homogeneity, samples were pre-enriched 1:10 in BPW at 35 C overnight, enriched in TTH at 42 C overnight and then in RH at 35 C overnight. Samples were plated unto XLT-4, BGSA and MLLA at 37 C/24-48 hours. Three presumptive positive colonies from each plate were picked for biochemical screening on TSII and further characterization. A total of 282 samples were collected of which 120 were from hoppers and 162 from feeders. The overall rate of isolation of Salmonella was 25.53%, with rates of isolation of 21.7% and 28.4% from hoppers and feeders respectively. The rates of isolation in House A were 25% and 32.5% for hoppers and feeders respectively and for House B these were 15% and 17% respectively. House A had an overall higher rate of isolation from various environmental samples than from House B but chickens in House A also had a greater frequency of jumping into and contaminating feeders. Serogroups isolated were usually groups B and C.

**Key Words:** Salmonella, Broiler, Feed

### Nutrition B

#### Energy & Amino Acids II

#### 234 Lysine and Methionine Needs of Broilers Fed at Commercial Feed Change Intervals.

M.B. Cafe*,1, C.A. Fritts*,1, and P.W. Waldrup1, 1Universidade Federal de Goias, Goiania, Brazil, 2University of Arkansas, Fayetteville, AR.

Current NRC recommendations for Met and Lys are based on feeding intervals that are not congruous with current industry feeding patterns. A study was conducted to evaluate needs for these amino acids in feeding periods consistent with industry. Diets were formulated using corn, soybean meal, and corn gluten meal to meet NRC recommendations for the benchmark diets. There were few interactions between Lys and Met levels. When fed at the intervals in this study Met levels greater than NRC were required for maximum BW, FCR, and BY. Lys levels of 110% improved BW but not FCR or BY at 35 d; because initial Lys levels were greater than expected this needs further investigation to specify exact levels needed. Results of this study indicate that the effects of Met and Lys are independent.

**Key Words:** Broilers, Lysine, Methionine, Feeding Programs

#### 233 Nitrogen and energy metabolism in broilers as affected by lysine and methionine dietary levels.


This experiment was conducted to study energy metabolism parameters, and protein and fat retention curves of broilers fed diets varying only in lysine (LYS) and methionine (MET) levels. For this purpose, 61 male Ross broilers were used, from 21 to 42 days of age. Five animals were slaughtered at the beginning of the experiment (21 d) for initial body composition. Eight broilers were fed the basal diet (86% of NRC 1994 levels of LYS and MET) in metabolism cages. The remaining 48 birds were also placed in individual metabolic cages for testing the factorial effects of LYS and MET level (92, 100, 108 and 115% of NRC 1994 level of LYS and/or MET) and relation (NORMAL, with the above levels for LYS and MET; PLUS LYS, with 15% more LYS over the above levels and PLUS MET, with 15% more MET over the above levels) with four replicates for each combination. Experimental data were generated by comparative analysis of variance and regression analysis on LYS and MET intake. Treatments had no effect on carcass and total body energy retention. Broilers fed the PLUS LYS diets retained more (p<0.05) carcass protein and had less (p<0.06) carcass fat than NORMAL diets, with intermediate results for PLUS MET diets. Viscera protein and fat retention were not affected by the factors tested. Carcass protein and water retention were quadratically affected by amino acid levels, showing maximal response to occur around 115% level. Regression analysis on LYS and MET intakes showed that LYS intake explained most of the response on protein and water retention. These results showed that at least the LYS level in broiler diets, compared to NRC 1994 requirement, should be higher for maximal carcass muscle growth.

**Key Words:** Leaness in broilers, Lysine intake, Efficiency
235 Impact of graded levels of methionine and cysteine at two ideal protein levels on performance in broilers. S. L. Vieira*1, D. B. Goldenberg1, A. Lemme2, A. Petri2, and I. Bruggali2, 1Department of Zootechnique, Federal University Rio Grande do Sul, Porto Alegre, RS Brasil, 2Degussa AG, Feed Additives, Hanau/ Germany, Sao Paulo/Brasil.

Dose-response relationships of graded methionine + cystine levels (Met+Cys) at two ideal dietary protein levels (IP) on performance of male Cobb 500 and Ross 308 broilers 14 to 35 days of age were investigated. The experiment consisted of 16 treatments: 2 strains x 2 IP levels x 4 Met+Cys levels. A corn-soybean meal-poultry byproduct meal based diet was formulated to contain 12.8 MJ ME/kg and 26.0% protein balanced according to the ideal protein concept (Mack et al., 1999) with 1.46% true fœcal digestible Lys (1.60% total Lys). The digestible Met+Cys content (ratio 58:42) was deficient (0.73%) corresponding to 65% of the ideal concentration. All remaining nutrients met NRC recommendations (1994). Met+Cys (58:42) were supplemented in graded levels to achieve 80, 90, and 100% of the ideal Met+Cys content. A dilution diet (12.8 MJ ME/kg) consisting mainly of corn starch was used to derive corresponding diets at 20.5% IP containing all amino acids in the same ratio to lysine (true fœcal digestible lysine 1.15%, total lysine 1.26%). Analyses verified a successful feed production. Each treatment was repeated 5 times with 36 birds per replicate (9 birds/sqm). At termination the experiment 6 birds/replicate were slaughtered for carcass evaluation. For all criteria clear dose responses - non-linear in most cases - were observed at each IP level in both strains. The data were compared on relative scales (asymptote = 100%, dig. Met+Cys content in % of ideal concentration). The magnitude and the slope of both Ross bird’s regression curves were similar, whereas the Cobb birds did not show the same consistency. Regarding feed conversion, there was no difference between the strains but the slope observed for the high IP curves tended to be smaller compared to those of the low IP. A similar relationship was observed for breast meat yield. The results indicate, at least for feed conversion and breast meat yield, that impairments due to Met+Cys deficiency when expressed in % of ideal content is more pronounced in low IP diets.

Key Words: ideal protein, methionine and cystine, dose-response

236 Performance Response of Market Turkeys to Methionine and Betaine. S. L. Noll*1, V. Stangeland2, and J. Brannon1, 1University of Minnesota, 2Stangeland Feed Consulting, Inc.

A study was conducted to determine the response of turkeys to methionine (met) and betaine in diets varying in protein. At 5wk-2d of age, 960 male turkeys (Large White, Nicholas strain) were randomized into 96 pens such that starting weight was similar. The factorial design included added met (3 levels), betaine addition (none and Betafin S1 (1g/kg diet)) and protein (2 levels). Diets were composed primarily of corn, soybean meal, canola meal and meat and bone meal. Diet protein level was set by formulating to 96 or 104% NRC threonine (thr) and contained lysine at 110% NRC. Methionine plus cystine (TSA) level in the basal diets was set at 90% NRC. DL-methionine was added to each basal protein diet at levels of 10% and 20% TSA NRC. Each diet was fed to 8 replicates of turkeys to 20wk-2d of age. The trial was conducted during the summer season with daily room temperatures averaging 24 C. BW and feed intake were measured at 3-wk intervals corresponding to diet changes. Breast meat yield (BMI) was determined at 20wk-4d of age. Met improved BW to 17 wk of age (P<.001). Met interacted with protein such that BW (20 wk), feed conversion (FC), and breast meat yield were improved when met (10% TSAA NRC) was added to the 96% NRC thr diet only. Betaine affected breast meat yield (P<.001) regardless of met level or protein regimen with betaine addition improving yield by 2.7% on a percent of carcass weight basis and 3.9% on a weight basis. The study indicated that BW, FC, and BMI were responsive to methionine addition giving a diet concentration of TSAA approximating 100% NRC. The improvement in breast meat yield with betaine addition was not dependent on dietary protein or met content.

Key Words: turkey, methionine, betaine, protein, breast meat

237 The influence of dietary sodium chloride and methionine activity source on apparent ileal digestibility of arginine and lysine at two different dietary arginine:lysine ratios. J. Chen1, X. Li1, D. Balnave1, and J. Brake2, 1University of Sydney, Camden, NSW Australia, 2North Carolina State University, Raleigh, NC USA.

A study was conducted to determine if dietary salt (NaCl) could affect the ileal digestibility of arginine and lysine at 32 C. Cobb 500 male broilers were maintained at 22 C from 21 to 33 d of age and then at 32 C from 33 to 38 d of age. From 28 to 38 d of age birds were fed a basal diet with an Arg:Lys ratio of 1.05 and 3 g NaCl/kg diet with or without a supplement of L-arginine free base that increased the Arg:Lys to 1.35 and with or without 1.5 g/kg supplemental NaCl. The source of methionine activity was either equal amounts of DL-methionine (DLM) or 2-hydroxy-4-(methylthio) butanoic acid (HMB) to create a 2 X 2 X 2 design. Digesta from the terminal ileum were taken from five birds per replicate and pooled before lyophilization. There were 5 replicate samples for each of the eight dietary treatments. Amino acid analyses were conducted on both feed and digesta samples and compared to acid insoluble ash (dietary cellulite) to calculate the apparent ileal digestibilities of lysine and arginine. A two-way interaction showed that increasing the dietary NaCl from 3 g/kg diet to 6 g/kg diet significantly decreased the apparent ileal digestibility of lysine and arginine at an Arg:Lys ratio of 1.05. However, at an Arg:Lys ratio of 1.35 the ileal digestibility of Arg was increased significantly by the increase in NaCl while Lys was unaffected. The three-way interaction showed that the 1.35 Arg:Lys ratio at 3g/kg NaCl significantly reduced Lys digestibility with HMB but not DLM without effect on Arg. However, in the presence of 6g/kg NaCl increasing the Arg:Lys ratio significantly improved Lys digestibility in the presence of both HMB and DLM without affecting Arg. It was concluded that dietary NaCl could affect the ileal digestibility of arginine and lysine at certain Arg:Lys ratios and the response was somewhat dependent upon the source of methionine activity.

Key Words: Arginine, Lysine, Salt, Ileal Digestibility, Amino Acids

238 Arginine needs of broiler chicks. M. T. Kidd*, J. P. Thaxton, and S. J. Barber, Mississippi State University, Mississippi State, MS.

Dietary dose responses for arginine were generated for growth performance in broiler chickens (Days 1 to 17) reared in differing environmental conditions. Male broilers (Ross x Ross 308) were placed in floor pens (30 birds/pen) that had clean or dirty pine shavings. The dirty pine shavings represented litter used in previous experiments whereby birds were challenged with coccidiosis. Dietary arginine treatments consisted of graduations of arginine (0.95, 1.10, 1.25, 1.40, and 1.55% of diet) as achieved by adding L-arginine at the expense of the filler in the arginine deficient diet (20.6% CP). The experimental design represented a factorial arrangement of litter by arginine (2 x 5) resulting in five replications per treatment. Body weight gain, feed intake, and feed conversion responses were measured for the 1 to 17 d period. Immune organ and liver weights were obtained at Day 17 on one bird per pen. No significant interactions occurred for any of the measured. Birds reared on dirty litter had significantly worse body weight gain, feed intake, and feed conversion responses. Litter condition did not affect livability or immune organ weights. Significant negative performance responses were noted when birds were fed diets containing 1.55% arginine. Quadratic responses for dietary arginine occurred for body weight gain and uncorrected feed conversion generating requirements (95% of asymptote) of 1.14 and 1.19% of diet, respectively. Lack of significant interactions indicated that the shape of the arginine curves for performance responses were the same, but arginine requirement estimates in the two different environments were not. For example, arginine responses (95% of asymptote) needed to improve body weight gain in the clean and dirty environments were 1.13 and 1.18% of diet, respectively. Results indicate that the NRC (1994) arginine estimate (1.25% of diet) for chicks is safe based on our titration responses in the low CP test diet. However, research studies evaluating arginine needs in clean or unchallenged environments may underestimate responses required to support bird growth in field conditions.

Key Words: Arginine, Broiler, Environment
239 CRUDE PROTEIN AND ESSENTIAL AMINO ACID REQUIREMENTS IN CHICKS DURING THE FIRST WEEK POSTHATCH. Yael Noy1 and David Sklan2.
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Lysine and sulfur amino acid requirements were determined in the first week posthatch in broilers and the relationship between dietary essential amino acids and CP level on performance was examined during this period. The requirement during the 7 d posthatch using a 23% CP diet for sulfur amino acids was 0.91% and for lysine was 1.03-1.08% with maximal BW or feed efficiency as the criteria. Feeding diets with CP ranging from 20 to 26% with either constant amounts of essential amino acids at different CP levels or constant ratios of essential amino acids to CP resulted in enhanced performance at 7 but not at 4 d with high CP intake and proportionally increased essential amino acids. Performance using diets with CP ranging between 16 to 28% with constant ratios of essential amino acid to CP was much enhanced with the high CP diets at 7 d. All chicks were transferred to standard diets after 7 d and the BW advantage due to the balanced amino acid-high CP diet remained through marketing. Thus increasing essential amino acids in a constant ratio to CP enhanced performance during the 7 d posthatch.

Key Words: Amino acid, Protein, Chick


This study was set to measure energy metabolism parameters, and protein and fat broiler retention curves when only metabolizable energy (ME) intake, as corn starch (ST) or corn starch and soybean oil (STO), and dietary carnitine, were changing. For this purpose, 80 male Ross broilers were used, from 21 to 42 days of age. Five animals were slaughtered at the beginning of the experiment (21 d) for initial body composition. Three broilers were fed the basal diet (57 % of daily ME intake) in metabolism cages. The remaining 72 birds were also placed in individual metabolic cages for testing the factorial effects of energy level (65.6, 74.2, 82.8, 91.4, 100.0 or 108.6 % of daily strain standard ME intake), source (ST or STO) and L-carnitine (0 or 430 mg/kg), with three replicates for each combination. Experimental data were generated by comparative slaughter technique and total fecal collection. Data were submitted to factorial design analysis of variance and regression analysis on ME intake. L-carnitine supplementation had no effect in the responses studied. Broilers fed STO diets retained more (p<0.01) carcass fat, total body fat and energy than ST diets, when compared at the same levels of ME intake. Most of these effects were found on the higher ME intake levels, showed by regression analysis. Nitrogen retention was not affected by energy source, but slightly affected by ME intake level. This was a clear contrast when compared to the slopes of body fat and energy retention, as affected by ME intake. These results showed that when only energy intake is changing in broilers, irrespectively to energy source, broilers can maintain acceptable lean growth, at expenses of body fat reserves.

Key Words: Leanness in Broilers, Energy Intake, Efficiency

241 The effects of different feathering types in male broilers kept under normal and high environmental temperatures on performance and metabolism characteristics. Jiaoxia Wang1. 1 Free University of Berlin, Germany.

The objective of this study was to investigate the influence of major genes for feather reduction in naked neck (Na-gene) and frizzle feather (F- gene) broilers under constant high (34 C) or normal (20 C) environmental temperature on performance and energy metabolism by use of carbon, nitrogen and energy balance trials, indirect calorimetry and comparative slaughter technique. Three experiments used 328 seven-day-old male broilers of four genetically different feathering types randomly divided into two different environmental temperature groups within each of the four feathered by type. Relative humidity was kept at 60-70% and a feed rate of 100 kg/h. Differences among corn particle size were of concern. Consequently, pelleted and extruded corn were ground through a hammer mill, utilizing a 1.59 mm (4/16 in) screen, prior to diet incorporation. Pelleted and extruded corn had analyzed starch gelatination percentages of 28.6 and 91.5 respectively. Each of the six diets containing processed corn as well as a control diet that contained only ground unprocessed corn was fed to eight replicate pens of 10 male broilers. All diets were fed in the mash form. Birds were given feed and water for ad libitum consumption. Broilers fed diets containing pelleted corn had lower feed intake (P = 0.0439) and higher feed efficiency (P = 0.0028) than broilers fed diets containing extruded corn. Feed efficiency was not affected when pelleted or extruded corn was increased in diets. Broilers fed control diets had higher feed efficiency compared to broilers fed diets containing extruded corn (P = 0.0179) and similar feed efficiency compared to broilers fed diets containing pelleted corn (P = 0.8444). Increasing dietary levels of gelatinized starch using either pelleted or extruded corn did not improve broiler performance. In general, diets containing extruded corn had a negative effect on broiler performance.

Key Words: Starch gelatination, Broiler performance, Feed manufacturing

242 Effect of starch gelatinization on 0-to-3-week broiler performance. J. S. Moritz*, K. R. Cramer, and R. S. Beyer, Kansas State University, Manhattan, KS.

Feed manufacturing may produce physical and chemical changes in ingredients, such as the gelatinization of starch. The effect of gelatinized starch on animal performance has been controversial in past literature. In the current study, corn was manufactured through different processes (pelleting and extrusion) and substituted for unprocessed corn at varying levels (1/3, 2/3 and 3/3) in complete diets. The objective of the study was to evaluate different levels of starch gelatinization produced by different processes on 0-to-3-week broiler performance. Pellets were formed using a pelleting mill with a 4.76 mm (3/16 in) die. Extruded corn was produced using a twin screw extruder with a shaft speed of 240 rpm and a feed rate of 100 kg/h. Differences among corn particle size were of concern. Consequently, pelleted and extruded corn were ground through a hammer mill, utilizing a 1.59 mm (4/16 in) screen, prior to diet incorporation. Pelleted and extruded corn had analyzed starch gelatination percentages of 28.6 and 91.5 respectively. Each of the six diets containing processed corn as well as a control diet that contained only ground unprocessed corn was fed to eight replicate pens of 10 male broilers. All diets were fed in the mash form. Birds were given feed and water for ad libitum consumption. Broilers fed diets containing pelleted corn had lower feed intake (P = 0.0439) and higher feed efficiency (P = 0.0028) than broilers fed diets containing extruded corn. Feed efficiency was not affected when pelleted or extruded corn was increased in diets. Broilers fed control diets had higher feed efficiency compared to broilers fed diets containing extruded corn (P = 0.0179) and similar feed efficiency compared to broilers fed diets containing pelleted corn (P = 0.8444). Increasing dietary levels of gelatinized starch using either pelleted or extruded corn did not improve broiler performance. In general, diets containing extruded corn had a negative effect on broiler performance.

Key Words: Starch gelatination, Broiler performance, Feed manufacturing

243 The increase in starch digestibility when ground wheat is replaced with whole wheat in broiler. diets is associated with an increase in jejunal bile acid concentration and amylase activity. B. Svihus1, E. Juvik1, and A. Krogdahl2. 1 Department of Animal Science, Agricultural University of Norway, 2 Department of Nutritional Physiology, Norwegian College of Veterinary Science.

A pelleted diet containing 76.2 % wheat ground through a 3 mm sieve was compared with a diet with the same composition but where 37.5 % of the diet consisted of whole wheat mixed with pelleted other ingredients. Broiler chickens were kept on wood shavings till 11 days of age, and were then placed in individual cages with wire floor covered with soft rubber tubes. Twenty-four birds were given each diet and water ad libitum until 25 days of age. Excreta produced between the 12th and 14th day posthatch were collected from each bird. To synchronize the feeding pattern of the birds before dissection at the 25th day of age, light was switched off for 4 hours, followed by at least 3 hours light before the chickens were sacrificed. The birds were killed by CO2-asphyxiation, weighed, and the gut was then exposed. Contents from jejunum and ileum were collected from each bird. The ileal section from Meckel’s diverticulum to the ileocecal-colonic junction was divided into three sections of equal length, and (34 C), the energy requirement for maintenance for the broilers with reduced feathering was significantly decreased 23% on average over the full feathering broilers during both balance trials. This resulted mainly from a significantly 22% reduction in the metabolic rate of the reduction by broiler with major gene. Thus the reduced feathering broilers were able to maintain a significantly higher 18.5% daily protein retention than normal feathering broiler under heat-stressed ambient temperature. The Na+, F and the combination gene also significantly improved the partial efficiency for energetic protein deposition in body on an average 13.3% higher than normal feathering-broilers. The reduced feathering broilers enhance direct heat dissipation by a reduction of insulation plumage and improved thermoregulation physiological responses under high ambient temperature.

Key Words: Major genes for naked neck and frizzle, Energy metabolism, Carbon, nitrogen and energy balance.
ileal contents were collected from each section. Jejunial samples were immediately frozen in liquid nitrogen, while the other samples were frozen at -18°C. Weight of the gizzard was significantly higher when whole wheat was fed. Replacement of ground wheat with whole wheat increased faecal starch digestibility from 96 to 99% and ileal starch digestibility from 93 to 99%. These significant increases in starch digestibility corresponds with earlier results from our lab. The higher starch digestibility was associated with a significant increase in amylase activity and bile acid concentration per g feed in the jejunum. Thus, one possible explanation for the increased starch digestibility in wheat diets by the use unground cereals could be an increased digestive activity. The mechanism behind this needs to be revealed, but may be associated with an increased gizzard activity which is considered to stimulate digestive secretions.

Key Words: Starch digestibility, Wheat, Broilers

244 Lysine Requirements of Pre-Lay Broiler Breeders as Determined by the Indicator Amino Acid Oxidation Method, R. A. Coleman, D. R. Korver, R. F. Bertolo, and R. O. Ball, University of Alberta, Edmonton, AB Canada.

The amino acid (AA) requirements of broiler breeders are not well known. AA requirements of pullets will be expected to change dramatically as the birds begin to lay, reach peak, and then decrease in production. The determination of AA requirements over relatively short phases of production will allow more accurate formulation of breeder diets. The indicator amino acid oxidation (IAAO) method allows rapid determination of an AA requirement. Briefly, a radio labelled indicator AA (14C-Phe) is infused into the jugular vein of birds fed a diet containing a specific level of a test AA. Below the requirement for the test AA, indicator oxidation will be inversely proportional to protein synthesis. At and above the requirement, indicator oxidation will remain constant. Cobalt 500 breeder pullets (n=4) of similar body weights were selected at 20 weeks of age and were fed a pelleted, purified control diet that met NRC requirements for all nutrients. Each bird was fed the diet for three days prior to surgery to implant a jugular catheter. Following recovery (4 d), each bird was fed a pelleted, purified test diet containing one of nine levels of lysine (5, 10, 20, 30, 40, 50, 80, 100 or 150% of NRC recommendation). Each of the test diets was fed for two days and oxidation rate was determined using IAAO. Birds were housed individually in oxidation chambers. Air was drawn through the chamber at 20 L/min for 20 minutes before breath collection began to allow the CO2 to equilibrate in the ventilating system. A priming dose (3.5ml) of 14C Phe was given as a bolus. An infusion pump was used to deliver 0.5 µCi/ml at 1.5 ml/hr into the jugular vein through the catheter, beginning 5 min after the bolus infusion. Collection of breath was initiated at that time. CO2 was collected at 30 minute intervals for 4 to 6 hours and 14CO2 expiration rate as % of infusion dose was plotted against time. The lysine requirement for pre-laying broiler breeders aged 20 to 23 weeks was determined to be 51% of the NRC requirement for broiler breeders at peak production. IAAO will allow determination of individual AA requirements for specific ages and types of birds over short periods of time. The data will begin to allow more accurate formulation of broiler breeder diets.

Key Words: broiler breeder, pullet, amino acid requirement, indicator amino acid oxidation, lysine


Two experiments were conducted with Hy-Lyme W36 hens to evaluate their Lys requirement in a corn-soybean meal diet. Eight experimental diets were used in each experiment with graded levels of Lys: 0.76, 0.72, 0.68, 0.64, 0.60, 0.56, 0.52, 0.48, and 0.40%. and 0.38%, Supplemental amino acids (AA) such as methionine, tryptophan, isoleucine, and valine were added to all diets to ensure that Lys was the first-limiting AA. Egg production (EP), egg content (EC), and daily Lys intake were significantly increased with increasing dietary Lys levels. Broken-line regression indicated a daily Lys requirement of 633.1 and 642.9 mg per hen per day in experiment 1, and of 606.5 and 606.6 mg per hen per day in experiment 2 for EP and EC, respectively. The Lys requirements to produce a gram of EC were 13.35 and 13.20 mg in experiments 1 and 2, respectively.

Key Words: Commercial layer, Egg content, Egg production


An experiment was conducted with Hy-Line W36 hens to reevaluate their ile requirements in a corn-soybean meal diet. Eight experimental diets were fed with ile levels of 0.60, 0.57, 0.54, 0.51, 0.48, 0.45, and 0.39%. Supplemental amino acids (AA) were added to ensure that Ile was the first-limiting AA. Increasing levels of Ile above 0.5% significantly increased egg production (EP), egg weight (EW), and egg mass (EM). Broken-line regression indicated a daily Ile requirement 449.8, 497.0 and 469 mg per day for EP, EW and EM, respectively, which indicated a requirement of 9.30 mg Ile per gram of EM.

Key Words: commercial layer, isoleucine, egg production, egg content