age blood Mono from 24 birds per diet were evaluated. The percentage phagocytic blood Mono was maximized at an A:L ratio of 1.25 although there was an overall decrease in Mono and nitrite production at 32 C. The number of E. Coli phagocytized per Mono and nitrite production 40 h post-LPS, but not 24 h post-LPS, decreased with A:L ratio. Numerically, the greatest nitrite production 24 h post-LPS was at the A:L ratio of 1.25. These data indicate that phagocytic functions of monocytes and macrophages are influenced by dietary A:L ratio.

Key Words: Macrophage, Monocyte, Phagocytosis, Nitrite, Heat stress

281 Immunosuppression - the Real Culprit Behind Persistent Disease Problems in Some Broiler Flocks. N.L. Tablante*, Virginia-Maryland College of Veterinary Medicine, University of Maryland-LESREC, Salisbury, MD.

It is not uncommon to encounter broiler flocks with persistent or recurring disease problems. In some cases, growers and poultry company personnel address one condition at a time and therefore fail to get the total picture. In 1999, two broiler flocks that had been experiencing persistent field problems such high mortality, poor feed conversion, respiratory complex, and colibacillosis, were referred to the Virginia-Maryland Regional College of Veterinary Medicine for evaluation. Both flocks were monitored weekly during their current grow-out cycles. Necropsy, serology, and histopathology indicated immunosuppression caused by Infectious Bursal Disease (IBD) virus field challenge between 2 to 3 weeks of age. Changes in vaccination and biosecurity programs that were implemented during the succeeding grow-out cycle resulted in improved flock performance and a significant reduction of disease problems.

Key Words: Immunosuppression, Field challenge, Broilers, Infectious Bursal Disease

283 Expression and Activity of Brush Border Enzymes and Glucose Transporter in the Chicken Small Intestine., Z. Um*, O. Gal-Garber†, and D. Sklan†, 1Dep. od Animal Science, Faculty of Agriculture, Hebrew University of Jerusalem Israel.

Modern meat-type chickens which are selected for rapid growth are dependent upon efficient digestion of the carbohydrates and proteins in their diet and upon efficient absorption of amino acids and monosaccharides. Thus, intestinal BBM aminopeptidase (AP) and sucrase-isomaltase (SI) play a central role in digestion and the sodium-glucose cotransporter (SGLT-1) plays a fundamental role in uptake of glucose from the diet, providing glucose as an immediate source of energy for cellular metabolism. To study the SGLT-1 and BBM enzymes activity, not just in terms of biochemical capacity, but also with respect to RNA expression we isolated and sequenced three fragments from genes expressed in small intestine enterocytes. These are: a) a 1.7-Kb cDNA fragment encoding chicken intestinal AP, b) a 768-bp cDNA fragment encoding chicken intestinal SI, and c) a 970bp cDNA fragment encoding chicken intestinal SGLT1. These cDNA’s were isolated by RT-PCR reaction using specific primers chosen from conserved regions of the above genes and were used as probes to determine its mRNA expression in the three regions of the small intestine, with age and under several nutritional conditions. Results showed higher RNA expression and higher biochemical activity of AP and SI in the jejunum than in the duodenum and ileum. In general, the first two days post hatch exhibit higher expression and activity of these BBM enzymes compare to days 4-7 post hatch. Vitamin A deficient diet, environmental heat or withdrawal of feed, lowered their expression and activity. SGLT1 RNA expression raised only from day 7 post hatch. It was decreased in conditions of feed withdrawal and was increased in conditions of refeding. This study demonstrates that expression of AP, SI and SGLT1 mRNA were changed by nutritional status and that quantification of expression of intestinal mRNA of these genes provides important information regarding the capacity of small intestine to digest and absorb.

Key Words: Small intestine, Sucrase-isomaltase, Aminopeptidase, SGLT-1, Gene expression

282 Seropidemiology of Influenza infection (H9N2) in domestic village chickens and sparrows in Isfahan in Iran . Majid Bouzar†* and Fatemeh Imantabar‡, 1Isfahan University, 2Veterinary Organization of Iran.

Influenza infection in domestic and confined birds is responsible for major disease problems ranging from subclinical or mild upper respiratory disease to loss of egg production to acute generalized fatal disease. In contrast, free flying birds typically do not experience significant disease problems, yet the infection is widespread in many of these birds. There is considerable speculation about the epidemiologic significance of these birds as vectors. In 1998, an influenza infection (H9N2) was reported in chickens in the center of Iran. It rapidly spread throughout the country and caused a great loss because of high mortality and slaughter of chickens of affected flocks. It was speculated that the virus could have spread to domestic chickens through wild birds that had access to poultry houses. To examine this hypothesis, 158 serum samples from sparrows were collected from four different areas from October, 1998 to February, 1999. Serum samples (119) were collected from domestic village chickens from four different areas during October, 1998 through August, 1999. Hemagglutination inhibition (HI) test was used. All sera from sparrows was negative while 31 sera from domestic village chickens were positive for HI antibodies with titers of 2-7 (log2) in two areas. It was concluded that the virus had spread to domestic chickens which may act as a reservoir, allowing transmission of the virus to other domestic birds and wild birds under village conditions.

Key Words: Sparrow, Domestic village chicken, Influenza virus (H9N2)

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284 The Effect of Broiler Body Temperature at Placement on Subsequent Performance and Immune Response. Alfonso Mireses Jr.†*, Sun Kim†, and Russell Thompson‡, Foster Farms Feed Research Department. Two studies were conducted to examine the effect of initial body temperature of chicks on broiler performance, inflammatory response, and antibody titers. In the first study, cloacal temperature of chicks was measured upon placement. Birds were separated into low body temperature (LBT) and high body temperature (HBT) groups. Mean temperatures were 38.3 and 38.9 C, respectively. Each treatment had 2 replicate pens of 50 birds. Body temperature was the same for both groups at 10 days (41.4 vs. 41.4 C). Weight gain and feed/gain were different (P<0.05) at 48 days (2.57 vs. 2.51 Kgs and 1.86 vs. 1.90). Body temperature changes due to S. typhimurium lipopolysaccharide challenge at 35 days was lower for LBT than HBT birds. The experiment was repeated with 4 replicate pens of 50 unsexed birds per treatment. Initial temperature for LBT and HBT birds were 39.0 and 39.9 C, respectively. 48 Days weight gains were similar for both groups (2.59 vs. 2.61 Kg). Feed/gain was better (P<0.05) for LBT than HBT birds (1.79 vs. 1.82). Body temperature changes due to handling stress were lower for LBT than HBT birds. Bronchitis titers were higher (P<0.05) for HBT vs LBT birds (8655 vs 4792). Differences in initial body temperature disappeared after placement. LBT birds had better performance and more attenuated immune response than HBT birds. Thus, initial body temperature may be an indicator of an immune response that inversely affects subsequent performance.

Key Words: Body Temperature, Immune System, Acute Phase Response, Broiler, Stress an Immune System

285 GMO (Bt) Corn is Similar in Composition and Nutrient Availability to Broilers as Non-GMO Corn. Alfonso Mireses Jr.†*, Sun Kim†, Russell Thompson‡, and Bill Amundsen§, Foster Farms Feed Research. Two studies were conducted to compare nutrient composition and availability in GMO corn and Non-GMO corn. In the first study, Sibbald’s method of precision feeding (1976) was used to estimate true metabolizable energy (TME) and amino acid digestibility of the test ingredients. Each treatment had 9 replicate cockerels. Ash (1.2 vs. 1.3%), crude fat (3.7 vs. 3.8%), crude protein (8.0 vs. 8.9%), and moisture (12.5 vs. 12.9%)
286 Age, weight and environmental temperature effects on heat production in broiler breeder hens. S. J. Dixon1,*, R. G. Teeter1,*, and C. W. Wiens1,2. 1 Oklahoma State University, 2 Cobb-Vantress, Inc.

ABSTRACT A trial was conducted to quantify heat production (HP) through indirect calorimetry (IC) for both the fed and fasted states in broiler breeder hens (BBH) representing a range of ages and body sizes and to examine the relationship between basal metabolic rate (BMR) and body composition. One hundred four BBH, representing 10 age groups ranging from 5 to 50 weeks of age (at 5 week intervals), were allocated to individual metabolic chambers such that feeding, age, and body size effects on heat production might be quantified by IC. Three environmental temperature levels (ETL) were planned: thermoneutral (TN) at 23°F, heat stress (HS) at 90°F, and cold stress (CS) at 60°F. Range for all three was +/- 2°F. Birds were fed per breeder recommendations. Oxygen consumed and CO2 produced were recorded; this data was used to estimate HP utilizing Brouwer's equation. Quantification of BMR followed a 36-hour fast with birds (TN ET only) housed in the dark. Birds were euthanized then scanned with a Hologic X-ray densitometer (XD) to determine each bird's partitioning of lean tissue and fat. The HP (kcal/h/kg BW) for each age group was found to decrease as birds transitioned from the fed to the fasted state. Regressing log HP on lean tissue wt (g) and fat wt (g) as determined by XD scans: BMR (kcal/h/kg BW) for each age group was found to be 1.507586 + 0.000076(lean tissue wt) + 0.004524(fat wt). Each bird was assigned to one of nine weight classes: 289 350, 880, 1350, 2000, 2700, 2970, 3175, 3315, 3500 (each class +/- 50 g). The HP (kcal/h/kg BW) for each weight class was compared among ETL. Significant ETL to weight class interactions were found (p < .01). Utilization of IC allowed the calculation of HP and BMR in BBH for a range of ages and weights at three ETL. The HP within some weight classes differed significantly among the ETL. An equation to predict BMR was developed using multiple regression.

Key Words: Heat production, Basal metabolic rate, Broiler breeder hens

287 Effect of Dietary Acid-base Balance on Incidence of Pulmonary Hypertension Syndrome in Cold-stressed broiler chickens. G. Roth1,*, M. Boulianne1, and L. De Roth1. 1 Faculty of Veterinary Medicine, University of Montreal.

Pulmonary hypertension syndrome (PHS) follow by ascites is an important cause of mortality in broiler chickens. It has been suggested that rapid growth rate associated with an important pectoral mass markedly increase oxygen needs. The inability of the modern broiler's respiratory and cardiovascular systems to respond to these increased needs eventually leads to hypoxia and respiratory acidosis, furthering the development of right ventricular failure, then ascites. The objective of this study was to verify the effects dietary acid-base balance (Na+ + K+ + Cl- ) on the incidence of pulmonary hypertension syndrome (PHS), blood gases, electrolytes and growth performances in cold-stressed broilers. The experimental design was a 4x6 factorial with 228 male chicks per group. Six diets were used for each group to obtain acid-base balance of 0, 100, 200, 250, 300 (high in sodium) and 300 (low in sodium) meq/kg. Acid-base balance was modulated with the addition of ammonium chloride, sodium bicarbonate or potassium carbonate. Broilers were fed ad libitum and submitted to cold-stress starting at 21 days of age with temperatures decreasing to 19, 14, and 11.5°C over a two-week-period. Weekly body weights, daily feed consumption, mortality, right ventricular/total ventricular weight ratios, blood gases, and electrolytes were measured at 7-28 days. Each treatment had 6 replicate cages of 8 chicks each. Weight gain (1,123 vs. 1,056 gms/chick) and feed per gain (1.63 vs. 1.62) were similar between groups. Results suggest that, for broilers, the nutritional value of GMO corn is similar to that of Non-GMO corn.

Key Words: GMO Corn, Brecher True, Metabolizable Energy, TME, Acid-base Digestibility

288 Soapstock, beef tallow, soybean oil and mixtures of fat sources in broiler diets. J.B. Gaitto1, J.F. Menten1, A.M.C. Racanici1, M.C. Iafigliola2, and A.A. Pedroso3. 1 Universidade de Sao Paulo, Piracicaba, SP, Brazil.

Soybean oil is the standard source of fat commonly supplemented to broiler diets. The alternative sources of fat are beef tallow, poultry oil and soapstock, which may reduce bird performance because of less absorption, lower availability of energy, imbalance between saturated and unsaturated fatty acids or reduced bile secretion. The objective of this research was to evaluate soapstock as an alternative to soybean oil and tallow in broiler chicken diets. A total of 1,440 day-old male Ross chicks were raised to 42 days of age in floor pens in a randomized block design of six treatments and six replicates, and fed corn-soybean meal diets containing 4% of supplemental fat from the sources: soybean oil (SOY4), beef tallow (TAL4), soapstock (SOAP4), soapstock and tallow 1:1 (SOAP2/TAL2), soapstock and soybean oil 1:1 (SOAP2/SOY2) and soybean oil and tallow 1:1 (S/TAL2). Live weight (WG), weight gain (WG), feed intake (FI), feed conversion index (FCI) and the incidence of pulmonary hypertension syndrome (PHS), blood gases, and electrolytes were recorded and results were statistically analysed using non-orthogonal contrasts. All treatment groups (54 birds/treatment) were better (P < .05) than those devoid of soybean oil in the diet (2.650 kg, 61.7 g/d and 1.731, respectively), but FI (4.513 kg) and M (1.87 cent) did not differ. On the other hand, the mixtures containing 2 per cent soybean oil (SOAP2/SOY2 and S/TAL2) resulted in performance similar to SOY4 in all variables (P > .05) and the presence of soybean oil in the mixture equally improved the results of soapstock and tallow (WG 2.689 vs 2.687 kg; WG 63 vs 63 g/d, F/G 1.693 vs 1.684, respectively). The performance of birds fed SOAP4 (WG 2.647 kg, WG 62 g, F/G 1.731) was inferior to those fed SOAP2/SOY2 (P < .06) but was similar to those fed SOAP2/TAL2 (2.660 kg, 62 g/d and 1.731, respectively). These results confirmed the superiority of soybean oil relative to the other fat sources to broilers and demonstrated that the quality of soapstock and beef tallow may be improved when used in 1:1 mixtures with soybean oil.

Key Words: Soapstock, Beef tallow, Soybean oil, Broiler, Fat

289 Maternal Dietary Alpha-Linolenic Acid (18:3 n-3) Alters n-3 Polysaturated Fatty Acid Metabolism and Liver Enzyme Activity in Hatched Chicks. Gita Cherian1,*, Jeong Sim1,*, 1 Department of Animal Sciences, Oregon State University, Corvallis, Oregon, 2 Department of Agriculture, Food and Nutritional Science, University of Alberta, Edmonton, Alberta.

The effects of dietary α-linolenic acid (LNA, 18:3 n-3) to laying hens on the fatty acid content of chick liver microsomes and activity of δ-6 desaturase, a rate limiting enzyme in polyunsaturated fatty acid (PUFA) synthesis in hatched chicks was investigated. Laying hens (n=10) were fed wheat-soy bean meal-based diets with 15% ground flax (Flax) or 3% tallow (Control). At day 21 of feeding, fertile eggs were collected and incubated. On the day of hatching, chicks (n=6) were sacrificed and liver microsomes were isolated and assayed for δ-6 desaturase enzyme activity. The total n-3 fatty acids in the Flax eggs were 13.0 % compared with 2.3% (P <0.001) in the Control group. LNA was the major n-3 fatty acid in the Flax eggs at 10%. The long chain n-3 PUFA (20:5 n-3 and 22:6 n-3) constituted to 3.1% in Flax eggs compared with 1.5% in Control eggs. Docosahexaenoic acid (22:6 n-3) was the major long chain n-3 PUFA in the Flax and Control eggs at 2.1 and 1.2%, respectively (P <0.05). The liver microsomes from flax chicks incorporated higher content (P <0.05) of LNA, 20:5 n-3, 22:5 n-3 and 22:6 n-3 with a concomitant reduction in n-6 fatty acids and arachidonic acid (20:4 n-6) and 22:4 n-6 when compared with Control chicks (P <0.05). The activity of δ-6 desaturase enzyme in Flax and Control chicks were 49.4 and 82.8 pmol/min per mg of protein (P <0.05). These results demonstrate the role of maternal and egg yolk n-3 fatty acids in modulating the activity of rate limiting enzyme for PUFA synthesis in newly hatched chicks.

Key Words: Chicks, Linolenic Acid, Desaturase, Liver Microsomes
Broiler response to equilobar high oil corn and normal corn diets with added oil. N. J. Dahgir, M. T. Faran, and G. W. Barbou. "American University of Beirut," "Agriculture Research Institute." Broiler response to equilobar diets based on the cultivar #37497 high oil (6.49% oil, 9.14% CP, and 90% DM) and normal dent Pegaso (3.71% oil, 9.61% CP, and 88% DM) corn hybrids were tested during a 42 day production trial. Three starter and three finisher experimental diets were fed from 5-21 days and from 22-42 days, respectively. Weight gain and feed conversion at three weeks of age were significantly better with the normal corn supplemented with corn oil (NC+O) than the control (NC) or high oil corn (HOC) diets. At six weeks of age, only the feed conversion was significantly better with the NC+O than the NC treatment. At forty-two days, the birds were sacrificed and ready-to-cook (RTC) carcasses, abdominal fat pad, pectoralis major, thigh, and drumstick weights were recorded. Carcasses were also analyzed for protein, fat, and moisture content. Carcass fat and abdominal fat pad (% RTC) in birds receiving the NC+O were significantly higher than those of the control, but not different from those of the HOC treatment. There were no significant differences among the treatments for the other criteria measured. The improved feed conversion of birds on NC+O could be attributed to a better availability and utilization of the supplemental oil in comparison with the endogenous oil of the HOC.

**Key Words:** High oil corn, Broiler, Performance, Carcass composition

291 Quality control parameters for commercial full-fat soybeans (FFSB) processed by two different methods, and fed to broilers. N. Ruiz, F. Belalcazar, and G. J. Diaz. "ContiGroup Companies, Inc., Gainesville, GA," "Nutrilanis Ltda., Santafe de Bogota, Colombia," "National University of Colombia, Santafe de Bogota, Colombia." FFSB samples obtained from 2 experiments conducted at the National University of Colombia were analyzed in vitro for urease activity (UA), Soy-Chek score (SCS), trypsin inhibitor activity (TI), and KOH protein solubility (KOHPS). They were also analyzed in vivo for amino acid digestibility (AAD) using the precision-fed cecotomized rooster assay at the University of Illinois. Samples from Exp. 1 corresponded to 6 temperature treatments (T1T) in a commercial extruder (Ander- son Expander-Extruder-Cooker, Anderson Int'l Corp., Cleveland, OH, 44105): raw, 112, 120, 122, 126, and 140C. Samples from Exp. 2 corresponded to 6 temperature TIRT along with different retention times in a commercial toaster (Thermal Processor for FFSB and Cereals, M. To- var & A. Watember, Barranquilla, Col.): raw, 131,120, 130, 135, and 150C, and 0, 3.0, 4.5, 6.5, 7.0, and 9.5 min., respectively. In vitro results were compared to the already published performance data. TI & UA were significantly (P<0.05) correlated to body weight gain (BWG) in Exp. 1. TI, UA, and SCS were significantly (P<0.05) correlated to BWG & FCR in Exp. 2. There was no significant correlation in any Exp. between KOHPS and performance data. The analysis of the samples from the 2 Exps. allowed to conclude that the QC parameters applicable to FFSB are considerably different than for soybean meal. Less than 18,000 TI units/g, or less than 0.10 pH units of UA are adequate for optimum broiler chicken performance. Both, performance data and in vivo determined AAD failed to demonstrate that FFSB were over-processed in any of the experiments even though solubility values dropped as temperature TIRT increased.

**Key Words:** Full-fat soybeans, Trypsin inhibitors, Urease activity, KOH protein solubility, Digestible lysine

292 Effect of pearl millet and corn based rations supplemented with different levels of soybean oil on the egg quality parameters of laying hens. K. Murmamatsu, J.H. Stringhini, M. B. Caffe, M. S. Leandro, R. M. F. Jardim, and L. Andrade. "Universidade Federal de Goias." This study was carried out to evaluate the use of pearl millet or corn based rations supplemented with different levels of soybean oil on the egg quality parameters of laying hens. In a 12-week feeding trial (37-49 week of age) divided in three periods of 28 days, 256 Isa Babcok hens were allotted in a randomized block design. The seven experimental rations are: T1=corn + 0 % oil, T2=pearl millet + 0 % oil, T3=corn + 2.5 % oil, T4=pearl millet + 3.3 % oil, T5=corn + 3.5 % oil, T6=pearl millet + 4.3 % oil, and T7=corn + 4.5 % oil. The percentage of yolk (in the whole egg) was influenced by the different diets in period 1, pearl millet + 3.5 % oil had a higher proportion of yolk than corn + 0 % oil . In period 3, corn + 0 % oil diet had a higher percentage of egg shell than corn + 4.5 % oil diet, and it was observed that corn + 0 % oil and corn + 3.5 % oil diets had thicker shells than corn + 4.5 % and pearl millet + 5.3 % oil diets. In period 1 the specific gravity of eggs from pearl millet + 3.3 % oil treatment had higher values than pearl millet + 5.3 % oil diet. And in period 2 corn + 0 % oil diet had better specific gravity values than pearl millet + 3.3 % and pearl millet + 4.3 % oil diets. No significant differences (p<0.05) were detected for egg and albumen weight and percentage of albumen (in the whole egg) among the different treatments. The results reported here indicates that the influence of diets in egg quality parameters (percentage of yolk) are more visible in older hens (47-49 wk) and supplementation of diets with high levels of soybean oil seems to decrease the egg shell quality.

**Key Words:** Pearl millet, Soybean oil, Layers, Egg quality, Yolk

293 The impact of replacing dietary fat with lecithin on broiler chicken performance. W.R. Cox, S.J. Richie, M. Sifri, V. Bennett, and D.D. Kitts. "Animal Health Research Services, B.C. Canada," "S. J. Ritchie Research Farms, B.C. Canada," "ADM Animal Health and Nutrition, Quincy, IL USA," "ADM Lecithin Division, Decatur, IL USA," "University of British Columbia, Canada." Soybean lecithin was evaluated for its potential use as a dietary fat replacement (2.5 - 3.5%) in straight-run broiler chickens by measuring body weight gain (BWG), total feed intake (FI), and feed conversion ratio (FCR) . The diets were designed to replace the added fat with 0%, 25%, 50%, or 100% soybean lecithin. The diets were fed to broiler chickens throughout a 39-day grow-out in a replicated floor-pen system. Treatments were assigned in a randomized complete block design. Body weights at 21 days of age were 0.739, 0.752, 0.751, and 0.757 Kg, and final weights at 39 days of age were 1.99, 2.01, 1.99, and 2.02 Kg for 0%, 25%, 50%, and 100% lecithin, respectively. The body weight differences were not statistically significant, but a trend (P=0.08) toward higher weights with added lecithin were seen. Feed consumption, in birds fed diets with added lecithin was significantly reduced (P<0.05), resulting in significant (P<0.05) improvements in feed conversion ratio (FCR) at 21 and 39 days of age. Feed conversion ratios were 1.487, 1.447, 1.304, and 1.386 at 21 days of age for 0%, 25%, 50%, and 100% lecithin, respectively. At this age, the 50% and 100% lecithin groups had significantly (P<0.05) better feed conversion ratios than the 0% lecithin group. The final feed conversion ratios were 1.921, 1.885, 1.836, and 1.838 for 0%, 25%, 50%, and 100% lecithin, respectively. All levels of dietary lecithin resulted in an improvement over the 0% lecithin group (P<0.05) of 1.87, 4.42 and 4.32%, respectively. There was no significant effect of any of the treatments on mortality.

**Key Words:** Lecithin, Fat, Broilers, Performance, Energy

294 Influence of feed quality in the brooding period of commercial turkeys and its subsequent effect on market performance. A.N. Crouch, S.P. Lerner, and D. Karunakaran. "British United Turkeys of America," "Rocco Turkeys." The purpose of this experiment was to quantify the effect of feeding starter feeds of different quality to commercial turkey hens and the subsequent effect on performance and carcass yields. Day-old turkey hen pouls were placed in floor pens on fresh pine shavings and were divided into two treatment groups (Group A - birds fed from Feed Mill A and Group B - birds fed from Feed Mill B). Both mills produced feeds that were designed to be isonitrogenous and isocaloric: a 28% CP pre-starter for the first 21 days and a 26% CP starter from days 22 through 42. The primary difference between groups was the final quality of feed. Feed Mill A produced pre-starter and starter diets that consisted of 72.94% pellets/crumbs and 27.06% granules/lines, while Feed Mill B produced diets that consisted of 44.13% pellets/crumbs and 55.87% granules/lines.