191 Supplementation of broiler breeders and their offspring with antibiotic growth promoters or functional oils: chicken performance, antioxidant capacity, and carry over effects. Jean Paulo Contini,1 Daiana Rossete Martins Gonçalves*2, Daiane Horn1, Elisângela Vanrooij1, Thais Lina Taniguti1, Heloisa Lais Fialkowski Bordignon,1 and Jovani Jor Muller Fernandes,1,1 Universidad Federal do Paraná, Setor Palotina, Palotina, Paraná, Brazil, 1Universidade Estadual do Oeste do Paraná, Marechal Cândido Rondon, Paraná, Brazil.

Phytopgenic additives have been shown to have antioxidant activity and contribute to lipid protection against oxidative damage. Supplementation of such products may thus yield a positive carry over effect from the breeder to the offspring. A 2 × 2 factorial design (maternal effect: supplementation of enramycin or functional oils; offspring effect: supplementation of bacitracin methylene disalicylate (BMD) or functional oils), with 9 pens per treatment and 40 birds per pen was used to evaluate the effects of a commercial blend of functional oils (Essential, Oligo Basics Ltda.; active ingredients: cashew nut shell liquid and castor oil) or antibiotic growth promoters (AGP) on performance, antioxidant capacity and carry over effects. At 42 d of age, blood was collected from 2 birds per pen, to determine both the serum antioxidant capacity by the DPPH test (2.2-Diphenyl-1-picrylhydrazyl) and the lipid oxidation by measuring the TBARS (thiobarbituric acid reactive substances. At the 7th day there was a positive maternal effect on FCR (P < 0.05) due to enramycin and a maternal by offspring interaction (P < 0.05) of DPPH in the offspring. In conclusion, the tested organic acids showed to be effective to promote early and effective defense in the immune system by presenting mitigating effect of stress. This effect is represented by the glucose levels of 243.75 g/dL, below the values found in other treatments (P < 0.05) and also maintained within normal values found in healthy birds (from 200 to 500 mg/dL). During the 3 stages of analysis, birds of all treatments showed marked anemia, represented by the low hematocrit concentration. It is concluded that organic acids are effective to replace the antibiotic growth promoters on immunity of broilers under the mentioned experimental conditions.

Acknowledgments: We thank Nutricia/Btech for donating the organic acids.

Key Words: antimicrobial additives, challenge, Eimeria, immunology, stress.

192 Organic acids promote mitigating action of stress in broiler chickens in the initial phase. Kelry Mayara da Silva*1, Robert Guaracy Aparecido Araujo1, Claudia Harumi Oka1, Gustavo do Valle Polycarp2, Paulo Henrique Yamada3, and Valquiria Caçao Cruz-Polycarpo1, 1UNESP, University of Estadual Paulista, Dracena, Brazil, 2University of São Paulo, Pirassununga, Brazil, 3UNESP - University of Estadual Paulista, Botucatu, Brazil.

The aim of this research was to evaluate the effect of organic acids administered in the diet of broiler chickens from 1 to 21 d as an alternative to antibiotic growth promoters on the performance. 840 male Cobb broiler chicks were distributed in a completely randomized design with 7 replicates and 30 birds per experimental unit. The dietary treatments were: T1- basal diet - without additives (BD) - unchallenged birds; T2- basal diet - without additives (BD) - challenged birds; T3- BD + organic acids - challenged birds; T4- BD + antibiotic plus anticoccidial - challenged birds. The organic acids were a blend composed of lactic (40%), propionic (5%) and butyric acid (1%) with addition of 8 kg/t. The utilized antibiotic was avilamycin 20% added with 50 g/t and the anticoccidial was sodium monensin 40% added with 300 g/t, allotting 10 and 120 ppm of active principle, respectively. The broilers were challenged by inoculation orally at 11 d with 2 × 10² sporulated oocysts/mL of Eimeria acervulina and 2 × 10³ sporulated oocysts/mL of E. maxima and E. tenella. At 0 (before challenge), 3 (14 d-old) and 10 d post-inoculation (21 d-old) blood samples were drawn from 56 birds previously identified for hematological analysis. All data were submitted to ANOVA followed by Tukey test. Differences between treatments for erythrocytes, total leukocytes, total protein and glucose were observed (P < 0.05). Birds that received the inclusion of organic acids showed to be effective to promote early and effective defense in the immune system by presenting mitigating effect of stress. This effect is represented by the glucose levels of 243.75 g/dL, below the values found in other treatments (P < 0.05) and also maintained within normal values found in healthy birds (from 200 to 500 mg/dL). During the 3 stages of analysis, birds of all treatments showed marked anemia, represented by the low hematocrit concentration. It is concluded that organic acids are effective to replace the antibiotic growth promoters on immunity of broilers under the mentioned experimental conditions.

Key Words: DPHH, oxidative stress, broilers, TBARS

193 Organic acids in replacement to antibiotic growth promotors in the initial phase of broiler chickens on growth performance. Valquiria Caçao Cruz-Polycarpo*1, Kelry Mayara da Silva1, Gustavo do Valle Polycarpo2, Robert Guaracy Aparecido Cardoso Araujo1, Victor Hugo Alderenike Amaral1, and Gabriela Ventura1, 1UNESP, University of Estadual Paulista, Dracena, Brazil, 2University of São Paulo, Pirassununga, Brazil.

The aim of this study was to evaluate the effect of organic acids administered in the diet of broiler chickens from 1 to 21 d as an alternative to antibiotic growth promoters on the performance. 840 male Cobb broiler chicks were distributed in a completely randomized design with 7 replicates and 30 birds per experimental unit. The dietary treatments were: T1- basal diet - without additives (BD) - unchallenged birds; T2- basal diet - without additives (BD) - challenged birds; T3- BD + organic acids - challenged birds; T4- BD + antibiotic plus anticoccidial - challenged birds. The organic acids were a blend composed of lactic (40%), propionic (5%) and butyric acid (1%) with addition of 8 kg/t. The utilized antibiotic was avilamycin 20% added with 50 g/t and the anticoccidial was sodium monensin 40% added with 300 g/t, allotting 10 and 120 ppm of active principle, respectively. The broilers were challenged by inoculation orally at 11 d of age with 2 × 10² sporulated oocysts/mL of Eimeria acervulina and 2 × 10³ sporulated oocysts/mL of E. maxima and E. tenella. All data were submitted to ANOVA followed by Tukey test. At 21 d, broilers of the negative control (unchallenged) presented same BW, FI and FCR (P > 0.05) of the broilers fed with antibiotic plus anticoccidial (challenged), showing the control action of those drugs in the gastrointestinal tract, even with direct contact with pathogens. However, the organic acids inclusion did not increased the broiler performance, which presented lower results than the antibiotic growth promotors (P < 0.05) and the same results of BD - without challenge (P > 0.05). In conclusion, the tested organic acids are not a
viable alternative on the broiler performance to replace antibiotic growth promoters in the challenge conditions presented.

Acknowledgments: We thank Nutriacid/Btech for donating the organic acids.

Key Words: butyric acid, lactic acid, propionic acid, challenge, eimeria

194 Tributyrin increases yield of broilers noble cuts. José M. Assafi1, Sarah Sgavioli*1,2, Alessandro A. Bandeira1, Jesse D. Salah1, Hirá G. Azevedo1, and Rogério Isupa1, 1Ilender Pharm. Corp., Paulínia, São Paulo, Brazil, 2Federal University of Grande Dourados, Dourados, Mato Grosso do Sul, Brazil.

The present trial was designed to evaluate the effect of tributyrin on the broiler’s carcass yield and cuts. A total of 880,000 broilers, Cobb mixed lots were housed in 44 commercial poultry farms, conventional, with negative pressure. The broilers were randomly distributed in a 2 × 2 factorial arrangement, with 2 treatments (with and without tributyrin at 3 kg/ton in 1–5 d old broilers) and 2 sex (male and female). The product used in this trial tributyrin (C4 Powder SI) was provided by Ilender Pharmaceutical Corporation (Lima, Peru). At 45 d of age 440 birds were selected, 10 birds/farm were slaughtered and subsequent carcass yield and cuts were evaluated. After the preliminary analysis, the datas were submitted to ANOVA using the GLM procedure of SAS (SAS Institute, 2003) considering the probability of 5%. There was a significant ($P < 0.05$) for the inclusion of tributyrin to yield thigh + drumstick, thigh, drumstick, breast, steak, and sassami with higher yield of cuts in birds fed tributyrin (0.75; 0.40; 0.33; 1.24; 1.27 and 0.21%, respectively). Carcass yield was lower for birds fed tributyrin ($P < 0.005$) (1.14%). There were a higher yield of thigh + drumstick and thigh ($P < 0.05$) (0.65, 0.40%) for males, while for sassami, wing and highest yields were obtained for females ($P < 0.05$) (0.08 and 0.30%). We conclude that the inclusion of 3 kg/ton of tributyrin during the pre-starter phase results in higher yield cuts for broilers, of both sex.

Key Words: butyric acid, butyric glyceride, commercial poultry farm

195 Effect of lemon pulp as an antibiotic growth promoter substitution on performance and some serum biochemical parameters in broiler chickens. Majid Toghyani* and Reihaneh Basir, 1Department of Animal Science, Isfahan (Khorasan) Branch, Islamic Azad University, Isfahan, Iran.

This experiment was conducted to investigate the effect of dried lemon pulp (DLP) as an antibiotic growth promoter substitution on performance and some serum biochemical parameters in broiler chicks. A total of 280, day-old broilers (Ross 308) were randomly assigned to 4 treatments with 5 replicates based on a completely randomized design. Dietary treatments included control, antibiotic growth promoter (flavophospholipol), 5 and 10 g DLP/kg diet. Broilers received dietary treatments from 1 to 42 d. Body weight of broilers were measured at 1, 14, 28 and 42 d, feed intake was measured at the same periods and feed conversion was calculated, accordingly. At d 42, 2 birds per replicate were slaughtered for determination of carcass and organ weights and also blood samples were taken for measuring serum antioxidant capacity, triglyceride, total cholesterol, high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol. The data were analyzed by SAS (2008) and Means were compared for significant ($P ≤ 0.05$) differences by using the LSMEANS. The obtained results showed that dietary supplementation of flavophospholipol increased final body weight and improved feed conversion ratio of broilers compared with those fed diets supplemented with DLP and control ($P < 0.05$). Inclusion of DLP to broilers diet had not significant effect on body weight, feed consumption and feed conversion. Carcass yield, abdominal fat and lymphoid organs (bursa of Fabricius and spleen) weight were not affected significantly by dietary treatments. Broilers fed 10 g/kg DLP had a significantly higher serum concentration of total antioxidant capacity, cholesterol and HDL cholesterol ($P < 0.05$). Serum concentration of triglyceride and LDL cholesterol were not affected by dietary treatments. The results suggested that dietary inclusion of 5 and 10 g/kg DLP as an antibiotic growth promoter substitution failed to induce any significant improvement on growth performance of broiler chickens. Nevertheless application of DLP in the diet proved to have antioxidant activity.

Key Words: broiler, lemon pulp, antibiotic, performance, antioxidant

196 Effect of supplementing exogenous protease in low protein poultry by-product meal based diets on growth, carcass response and nutrient digestibility in broilers. Tahir Mahmood*1, Muhammad A. Mirza1, Haq Nawaz1, Muhammad Shahid2, Muhammad Athar1, and Mubashar Hussain1, 1Institute of Animal Sciences, University of Agriculture, Faisalabad, Punjab, Pakistan, 2Department of Biochemistry, University of Agriculture, Faisalabad, Punjab, Pakistan, 3Hi-Tech Feeds (Pvt) Ltd., Lahore, Punjab, Pakistan.

A 3 × 2 × 2 experiment using 3 levels (0, 3 and 6%) of poultry by-product meal (PBM), 2 levels (19 and 18%) of crude protein (CP) and 2 levels of exogenous protease (with and without) was undertaken to examine the effect on growth performance, carcass response and nutrient digestibility in broilers. The experiment was statistically analyzed in 3 × 2 × 2 factorial design under CRD by generalized linear method of ANOVA using MINITAB. The significant means were separated by Tukey’s test. The birds (n = 1920) were randomly divided into 48 replicates with 4 replicates under each treatment (40 birds/replicate). Six iso-caloric diets (ME 2850) were formulated with 2 CP levels (19 and 18%). Each diet was divided into 2 parts. One was supplemented with exogenous enzyme (200 g/ton) while the other part was not supplemented. Supplementation of enzyme increased feed intake ($P < 0.001$) and body weight gain ($P < 0.001$). The feed: gain was also improved ($P < 0.01$) by supplementation of protease during d 1–21 and d 1–35. However, feed intake and body weight gain ($P < 0.001$) were decreased with decreasing level of CP during d 1–21 and d 1–35. Increasing level of PBM from 3 to 6% decreased feed intake and body weight gain ($P < 0.001$) during d 1–21. Feed: gain was poor ($P < 0.05$) during this period. Carcass characteristics remained unaffected ($P > 0.05$) by all the dietary treatments. No effect of reducing CP level on AME, AMEn and apparent digestibility co-efficient for nitrogen was noted. However, nitrogen retention ($N_{net}$) was decreased ($P < 0.001$) when CP level was decreased. Inclusion of PBM also had no effect on nutrient digestibility. A significant ($P < 0.05$) PBM and CP interaction was noted on AME, $N_{net}$ and AMEn. The addition of enzyme improved all these parameters. In conclusion, CP could not be reduced to below 19% in 3% PBM based diet supplemented with exogenous protease.

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Key Words: poultry by-product meal, protease, broiler, nutrient digestibility, carcass response

197 Effect of aqueous Moringa oleifera (Lam) leaf extracts on growth performance and carcass characteristics of Hubbard broiler chickens. Olushola John Alabi*1,2, Abdulganuyu Dele
Two hundred and 40 d-old Hubbard broiler chicks were used to study the effect of aqueous *Moringa oleifera* leaf extracts (AMOLE) on growth performance of broiler chickens. They were randomly allocated to 6 treatments with 4 replicates, and each replicate containing 10 chicks. The completely randomized experimental design was used. The treatments contained AMOLE<sub>0</sub>, (positive control with antibiotic treatment), AMOLE<sub>0</sub> (negative control with water), AMOLE<sub>60</sub>, AMOLE<sub>90</sub>, AMOLE<sub>120</sub> and AMOLE<sub>150</sub> containing 60, 90, 120 and 150 mL of moringa extracts, respectively. The extract was administered in the drinking water. The experiment lasted for 42 d. All data collected were analyzed using one way ANOVA. AMOLE treatments significantly ($P < 0.05$) influenced the final body weight, feed intake, water intake, growth rate, FCR and dressing percentage, as well as weight of the large intestines and lungs. However, there were no significant ($P > 0.05$) differences in the initial weight and all other carcass parameters. Chickens on positive control had the highest final body weight and growth rate (2392.00 g and 53.61 g, respectively) and the ones on 150 mL/l of AMOLE had the least (2042.00 g and 45.37 g, respectively). On feed intake, chickens on positive control had the highest (84.70 g) and the ones on 90 mL/liter of AMOLE had the lowest (73.19 g); while the results of feed conversion ratio (FCR) indicate that chickens on AMOLE<sub>90</sub> and AMOLE<sub>120</sub> performed better ($P < 0.05$) than the positive control treatment. Chickens on the AMOLE treatments had similar dressing percentages though that of positive control was highest (94.93%); while those on AMOLE<sub>60</sub> and AMOLE<sub>150</sub> had the highest large intestine and lung weights, respectively. It could, therefore, be concluded that up to 120 mL of aqueous *Moringa oleifera* leaf meal extracts can be included in the diet of broiler chickens for improved feed conversion efficiency and as a cheap source of plant growth promoter in broiler chicken production.

**Key Words:** aqueous, *Moringa Oleifera*, extract, performance