247 Meta-analysis of broiler studies shows that *Bacillus subtilis* DSM 32315 can improve bird performance similar to an antibiotic growth promoter. A. Sokale*, Evonik Corporation, Kennesaw, GA.

Intensive poultry production often predispose birds to conditions which can alter the gut microbiota and increase their susceptibility to enteric disease, resulting in loss of performance. Sub-clinical enteric diseases, which are often unnoticed, can negatively impact performance and cause economic losses to producers. Direct-Fed microbials or Probiotics are increasingly more successful in commercial poultry production due to their ability to support intestinal microbiota balance, improving gut health and performance of birds. In 8 independent trials, the effect of *Bacillus subtilis* DSM 32315 (B. subtilis DSM 32315) on the performance of broiler chickens raised under challenging environmental (used litter and heat stress) and dietary (meat and bone meal, and distillers dried grains with solubles) conditions, was tested. It was hypothesized that inclusion of *B. subtilis* DSM 32315 to broiler diets could improve broiler performance under various production conditions. All trials were conducted in floor pens from either d 0 to 35 or d 0 to 42. In each trial, *B. subtilis* DSM 32315 and antibiotic growth promoter (AGP) were independently compared with the non-medicated control group (NMC) for the evaluation of body weight (BW), adjusted feed conversion ratio (aFCR), and mortality. The standard difference in means and 95% confidence interval were used for the analysis. The average percent change in BW, aFCR, and mortality between NMC vs. AGP, and NMC vs. *B. subtilis* DSM 32315 was calculated and reported. In comparison to NMC, AGP and *B. subtilis* DSM 32315 increased BW of birds by 31g and 36g, respectively. In addition, AGP and *B. subtilis* DSM 32315 decreased aFCR of birds by 3.1 and 3.3 percentage points, respectively, over the NMC group. Similarly, AGP and *B. subtilis* DSM 32315 lowered mortality by 1.71% and 2.08%, respectively, in comparison to NMC. In conclusion, in various simulated commercial grow-out conditions presenting mild enteric challenges to broiler chickens, the supplementation of *B. subtilis* DSM 32315 significantly (*P* ≤ 0.05) improved growth performance in a manner that is similar to AGP.

**Key Words:** phytomolecule, broiler, performance, intestinal health, antibiotic

248 Standardized phytomolecules successfully replace avilamycin in broiler raised under commercial-like conditions. J. Grandmaison* and J. S. Caahualpa, Pancosma SA, Geneva, Switzerland.

Routine inclusion of antibiotic growth promoters (AGP) in the diet of commercial livestock continues to be standard practices in many countries. Among them Avilamycin is one of the most well-known. Plant extracts have shown inconsistent results when compared with AGP in research stations, limiting their interests for livestock industries. The objective of this trial was to evaluate if blends of standardized phytomolecules could efficiently replace Avilamycin in broilers housed in commercial situations. Day-old-broilers Cobb 500 (n = 1080) were allotted to 3 groups of 360 birds and assigned into 6 replicates for 42 d. Pens were allocated into a broiler commercial farm. Following feed treatments were applied: CONTROL - No supplementation; AVILAMYCIN - Avilamycin at 100 g/t; XT - from d 1–21 XTRACT Nature (4% capsicum + 4% turmeric oleoresins, Pancosma, Switzerland) at 100 g/t and from d 22–42 XTRACT 6930 (5% carvacrol, 3% cinnamaldehyde, 2% capsicum oleoresin, Pancosma, Switzerland) at 100 g/t. Growth performance and histological parameters were measured. Data were analyzed using mixed model of XLSTAT. Broilers from XT group performed better than broilers from CONTROL and AVILAMYCIN groups. From 0 to 42 d, they had significantly lower feed conversion ratio in comparison to CONTROL (*P* = 0.047) and numerically lower than AVILAMYCIN. Final Body Weight (BW) of XT broilers was heavier (2.589 kg) than final BW of CONTROL broilers (2.527 kg; *P* = 0.071) or AVILAMYCIN broilers (2.568 kg). Enterocytes integrity of XT broilers were significantly improved in the jejunum (*P* = 0.047) and the ileum (*P* = 0.012) in comparison to the 2 other groups. Jejunum villus height of broiler feed XT were also significantly greater (184.2 µm) than jejunum villus of broiler feed CONTROL and AVILAMYCIN (173.3 and 176.7 respectively, *P* < 0.001). These histological indicators are signs of better intestinal health. These findings confirm that standardized phytomolecules, used at the right dose and at optimal physiological stage could efficiently replace avilamycin in broiler housed in commercial like conditions.

**Key Words:** phytomolecule, broiler, performance, intestinal health, antibiotic

249 Effect of dietary protein source and *Bacillus subtilis* probiotic (Alterion) supplementation on growth performance and meat yield of broiler chickens reared to 46 days of age. C. Starkey*1,2, R. Shirley2, A. Welsch2, O. Tejeda1, L. Spencer1, and J. Starkey1,1Auburn University, Auburn, AL, 2Adisseo USA Inc., Alpharetta, GA.

The objective of this 3 × 2 factorial study was to determine whether the growth and meat yield of broilers that were hatched and reared without antibiotics differed when fed: 1) 3 different dietary protein sources and 2) with or without supplemental *Bacillus subtilis* probiotic (PROB; Alterion; DSM 29784; Adisseo USA). To investigate this, 3 dietary treatments were formulated to include either: 1) soybean meal (SBM), 2) poultry by-product meal + feather meal (50:50 blend; PBM) or 3) mammalian meat and bone meal (MBM). All diets were formulated to meet or exceed the nutrient recommendations of the primary breeder and were both iso-caloric and iso-nitrogenous. Diets that contained either SBM, PBM or MBM were either: 1) not supplemented with the *Bacillus subtilis* (-PROB) or 2) supplemented with the *Bacillus subtilis* (+PROB). Upon arrival, day-of-hatch, male Yield Plus × Ross 708 broiler chicks (n = 1,800) were randomly assigned to 1 of the 6 treatments; each treatment was replicated across 12 pens, with 25 birds per 2.3 mm2 floor pen. In each litter treatment,broilers received 1 of 6 diets in 4 phases: starter (d 1 to 12), grower (d 13 to 27), finisher (d 28 to 38), and withdrawal (d 39 to 46). Mortality-adjusted BW, feed intake (FI), and FCR were determined for each phase. On d 47, following a 24-h static water chill, broiler carcasses were deboned and part yields were determined. Data were analyzed using the MIXED procedure of SAS. Means were considered significantly different when *P* ≤ 0.05. While d 0 to 46 broilers fed PBM tended to have lower BW gain compared with those fed MBM or SBM (*P* = 0.053), FCR was similar among protein sources (*P* = 0.437). Broilers fed MBM and SBM yielded heavier carcasses (*P* = 0.0149) with less abdominal fat (*P* = 0.0015), and had heavier breast fillets (*P* = 0.005) and tenders (*P* < 0.0001) compared with those fed PBM. Supplementing the PROB significantly improved broiler BW gain and FCR from d 0 to 12 (*P* < 0.0001) and from 0 to 27 (*P* ≤ 0.0292). Supplementing PROB in the starter phase significantly improved the BW gain of broilers fed MBM and SBM (*P* = 0.0018);
however, it did not alter BW gain in broilers fed PBM. Furthermore, broilers fed SBM and PROB during the starter and grower phases had lower FCR than those fed SBM alone (P = 0.0357). In the finisher phase (d 0 to 38), broilers fed PROB and either MBM or SBM had lower FCR than those receiving no PROB (P = 0.0171). No difference in FCR was detected between broilers fed PMB, with or without PROB. Overall, the results of this study indicate that supplementation of broiler diets containing different protein sources with this *Bacillus subtilis* probiotic can positively impact growth performance and feed efficiency.

**Key Words:** broiler chicken, protein source, *Bacillus subtilis* probiotic, growth performance, carcass yield

250 Use of Alquernat Neb sui (botanical product) as an alternative to an antibiotic growth promoter in broilers. J. P. Orpí1, A. Tesouro2, and M. Rosenberg3, 4

Alquernat Neb sui is a natural product based on active botanical molecules called pronutrients that improve intestinal physiology to optimize feed utilization and, consequently, increase productive performance. An experiment was conducted to evaluate whether Alquernat Neb sui could replace an antibiotic growth promoter (AGP) in broilers through the analysis of growth performance and the intestinal relative weight (as a indicator of intestinal efficiency). The trial was carried out in an experimental poultry unit with 300 one-day-old broilers of the Cobb 500 strain. Chickens were raised for 42 d and allotted to 4 treatments: 1) CN (basal diet without growth promoters); 2) BA (basal diet + bacitracin methylene disalicylate at 0.5 kg/ton, continuously, complying with the withdrawal period); and 3) AN (basal diet + Alquernat Neb sui at 0.5 kg/ton, continuously during all the trial). There were 10 replicate pens per treatment and 10 broilers per pen. Feed intake, body weight and feed conversion rate (FCR) were evaluated weekly. Efficiency index and relative intestinal weight were evaluated at the end of the trial. AN obtained the best FCR (1.56), followed by BA (1.58) and CN (1.61), with significant differences between AN and CN (P < 0.05). No significant differences were observed in the other parameters (feed intake, final body weight and efficiency index), although AN and BA obtained better results than CN (regarding final body weight and efficiency index). Relative intestinal weight was lower in AN, compared with the other groups, which is correlated with a better efficiency of the organ. Dietary supplementation of Alquernat Neb sui can better feed conversion rate and improve the physiology of the digestive tract in broilers. Results suggest that this product can be used as a natural growth promoter to replace AGPs.

**Key Words:** pronutrients, growth promoter, broiler, growth performance, gut efficiency

251 Effect of an organic acid drinking water acidifier on the growth performance, feed efficiency and footpad quality of broiler chickens raised under typical US production conditions. G. Page1, and Y. Han2, 3

As the poultry industry continues to reduce antibiotic use, the interest in effective alternatives to antibiotic growth promoters (AGPs) is increasing. However, little attention is paid to water hygiene, despite water a critical component of the production system. The goal of this study was to assess impacts on broiler performance supplied acidified drinking water using a blend of free and buffered organic acids (OA), in comparison to animals fed in-feed antibiotics. 1360 Cobb 500 cockerels were randomly allocated to one of 5 treatment groups, with 16 replicates of 17 birds/pen. Treatments included: 1) control, 2) BMD (50 g/ton), 3) OA Low (0.5 L/1000L, pH 4.4), 4) OA Medium (1.2 L/1000L, pH 3.8), and 5) OA High (2.0 L/1000L, pH 3.6). The experiment was conducted under commercial conditions, with re-used litter from the previous 3 flocks using spray vaccinated (Coccivac-B52) chicks. Corn-soy based diets were fed in 3 phases: starter crumbles for d 0–10, grower pellets for d 11–22 and finisher pellets for d 23–42. Dosage levels of the drinking water additive were determined based on water titration, with daily adjustments based on pH levels. Body weight (BW) and feed intake (FI) were assessed by pen on d 0, 11, 23 and 42. Footpad scoring was performed on d 42. Pairwise comparison of means (Tukey’s) was used to determine significance between treatment means (P < 0.05). The observed growth performance was typical of commercial Cobb broilers grown to 42 d with an overall average BW 2.96 kg. Broilers that received OA in the water, regardless of dosage, were observed to have a numerically higher average BW (2.97 kg) compared with the control treatment group (2.92 kg), and similar to the group fed a diet containing BMD (P = 0.241). The cumulative FCR (d 0–42) of OA High was significantly lower than control and BMD (P = 0.021). Mortality was not significantly different among treatments (P = 0.266), although birds given OA-supplemented water had numerically lower mortality rates (~4.4% on average) compared with BMD (7.72%). Footpad quality was significantly improved in OA Medium and OA High compared with control and BMD (P < 0.001). The results suggest that the use of free and buffered organic acids in drinking water may be an important component of an integrated management program to support the US broiler industry’s move toward antibiotic-free production.

**Key Words:** organic acids, broiler, antibiotic reduction, performance, footpad quality

252 Performance of broiler chickens fed diets with different nutrient density supplemented with hydroxy copper chloride in combination with a synergistic blend of organic acids. L. Pineda1, G. Page1, N. de Groot2, and Y. Han2, 3

An experiment was conducted to evaluate the effects of supplementing hydroxy copper chloride (IBC) in combination with a synergistic blend of organic acids (OA, buffered short- and medium–chain fatty acids, phenolics) on performance, microbiota profile and economics of broiler chickens fed diets with different nutrient density. Cobb broiler chicks (n = 840) were randomly allocated to 5 treatments and provided the following diets: Treatment 1 – Standard diet based on Cobb broiler nutrient specification with 15 ppm CuSO4 (Standard), Treatment 2 – modified Cobb broiler diet with low protein and energy content and 15 ppm CuSO4 (Modified), Treatment 3 – As T1 with 50 ppm Zn bacitracin (AGP), Treatment 4 – Standard diet with 150 ppm IBC & synergistic OA in water in combination with a blend of OA in feed (Standard + OA), Treatment 5 – modified diet with 150 ppm IBC + OA (Modified + OA). Birds were reared on floor pens with recycled litter and a house temperature of 32°C from d 5 until d 35. The broilers’ body weight and feed consumption were recorded at 14, 28 and 35 d of age; the FCR was calculated as the feed:gain ratio. Digesta sample was collected at d21 for microbiota analysis. Litter moisture and foot-pad score were determined at d21 and 35, while carcass yield was recorded at d35. Data were analyzed by ANOVA with P ≤ 0.05 considered significant. Birds in all treatments had similar survival rate during the experiment (P > 0.05). Feed intake was comparable in all the groups (P > 0.05). However, body weight gain was significantly depressed in broilers fed with modified diets compared with AGP and standard diets with or
without FA ($P < 0.05$). The addition of FA in either diets did not result in a significant increase in ADG and production efficiency, but the numerical improvement resulted in parallel performance to broilers fed with AGP supplemented diet. The FCR was lower for broilers fed the standard diet supplemented with FA and AGP compared with the rest of the treatments ($P < 0.05$). The cost per kg gain was lowest for AGP, standard and standard+FA groups in relation to modified diets with and without FA ($P < 0.05$). The cost per kg gain was lowest for AGP, standard and standard+FA groups in relation to modified diets with and without FA ($P < 0.05$). The effect of treatment on carcass yield, litter moisture and foot-pad score was similar for all groups (all, $P > 0.05$). The supplementation of FA can potentially alter microbiota population, by numerically decreasing the population of pathogenic bacteria (E. coli and Clostridium) and favoring the proliferation of Lactobacillus bacteria ($P > 0.05$). In conclusion, the combined use of blends of organic acids by feed and water and hydroxy copper chloride in standard and modified Cobb broiler diets shows comparable benefits as in-feed antibiotics on performance and health of broilers.

**Key Words:** broiler chickens, nutrient density, organic acids, hydroxy copper chloride, microbiota