

TA processing. However, phytase activity retention was not different ( $P = 0.9896$ ) when considering either processing technique. Pellet quality decreased with STD processing ( $P < 0.05$ ) in EXP1 but feed was crumbled to eliminate feed form effects in EXP2. During d1–7 of EXP2, TA treatment fed poult tended to have reduced BW, LWG, and LWG per poult ( $P > 0.10$ ). Interestingly, performance differences were not apparent from d8–28 ( $P > 0.05$ ). Poults that were selected for tibia excisions differed in average poult weight. Poults selected from the STD treatment were 46 g per bird heavier than those selected from TA treatments ( $P = 0.0081$ ). Therefore, bird weights were considered, and results represent mg of tibia ash per kg of BW. Difference in mg of tibia ash per kg of BW were not apparent ( $P = 0.2324$ ). In conclusion, feed manufacturing efficiency and pellet quality can improve with thermally-aggressive processing strategies. More importantly, maintaining poult performance and bone mineralization is feasible when applying thermally-aggressive processing strategies to improve manufacturing efficiency.

**Key Words:** poult, steam conditioning, pelleting, performance, tibia ash

**365 Fasting influences intestinal function to enhance feed energy digestibility of broilers.** Youli Wang\*, Jing Chen, Yuqin Wu, Xiaorui Guo, and Jianmin Yuan, *China Agricultural University, Beijing, Beijing, China.*

To evaluate feed digestible energy in poultry, traditionally, a same period of fasting before and after 2 d's feeding is needed to empty the digestive tract. However, more and more published data shows that fasting period influences the development of intestine, such as short-term fasting may promote the intestinal stem cells function while long-term fasting may impair the intestinal functions. So, it is necessary to investigate the impact of fasting period on feed energy utilization. In this study, a total of 5 hundred and 20 newly hatched broiler chicks were distributed into 40 cages with 13 birds in each cage. All the birds were fed same maize-soybean meal-based diet. At 23 d, one hundred and 75 broilers were transferred to metabolic room to evaluate feed energy utilization. These birds were divided into 5 treatment groups: ad libitum feeding, 12 h fasting, 24 h fasting, 36 h fasting, 48 h fasting. Each treatment had 7 cages with 5 broilers in every cage. The remaining birds left were divided in a similar way as the birds in metabolic room but each treatment had 8 replicates, which were used for tissue sampling. Excreta was collected daily, freeze-dried and tested for each day's energy and amino acid digestibility along with metabolic energy through classical total collection method. At the end of the first time fast and after one day refeeding, one broiler from each cage was killed to collect liver, spleen and intestinal mucosa samples. Intestinal morphology, mucosa and spleen enzyme activity, intestinal nutrient relative transporter, proliferation and apoptosis of intestinal epithelium were tested. Results showed that fasting for 48 h decreased the body weight by about 10%, while fasting for 12, 24 and 36 h increased ( $P < 0.05$ ) the feed intake. Likewise, fasting enhanced ( $P < 0.05$ ) the energy digestibility after one day refeeding and 12 h fasting improved ( $P < 0.05$ ) the apparent metabolic energy significantly, but decreased ( $P < 0.05$ ) the enzymatic activity in the brush border. Digestibility of most amino acids tended to increase slightly after 12 h fasting, however, it was reduced ( $P < 0.05$ ) after 36 h fasting. Broilers fasted for 36 h and 48 h exhibited lower ( $P < 0.05$ ) intestinal villus height and crypt depth, which can be attributed to increased expression of apoptosis marker gene *capase3* and decreased proliferation of cells in crypt ( $P < 0.05$ ). After one day refeeding, higher expression ( $P < 0.05$ ) of glucose and amino acid related genes in the jejunum was noticed. It can be concluded that fasting affects the intestinal functions and influences the value of metabolic energy in broilers.

**Key Words:** broiler, fast time, metabolic energy, digestibility, intestinal development

### 366 Not Presented

**367 Effect of the origin of the bean on the chemical composition, protein quality, and nutritive value of the soybean meal.** L. Cámara<sup>1</sup>, Lewis Aguirre<sup>1</sup>, G. Fondevila<sup>1</sup>, C. Dapozza<sup>2</sup>, and Gonzalo Mateos\*<sup>1</sup>, <sup>1</sup>UPM, Madrid, Madrid, Spain, <sup>2</sup>Evonik Nutrition and Care, GmbH, Barcelona, Spain.

Commercial samples of soybean meals (SBM) from USA (n = 42), Brazil (BRA; n = 51), and Argentina (ARG; n = 64) were collected from 2016 to 2018 to study the influence of the origin of the beans on chemical composition, nutritive value, and protein quality, including amino acid content per unit of protein of the SBM. All samples were collected in Europe by personal of the Quality Control Department of key feed mills and integrators. The SBM samples were either processed in the country of origin of the beans and then exported to Europe or crushed in Europe from identity preserved beans. Data were analyzed as a completely randomized design using the GLM procedure of SAS (SAS Institute Inc., 1990). Year of the crop was considered as a random effect and was not including in the model. When the model was significant, the Tukey test was used to make pairwise comparisons between treatment means. Brazilian meals had more CP than USA and ARG meals ( $P < 0.001$ ). USA meals had more stachyose and sucrose ( $P < 0.001$ ) and less neutral detergent fiber ( $P < 0.05$ ) than BRA and ARG meals, but an opposite effect was observed raffinose ( $P < 0.001$ ). Lys, Met, Cys, and Trp content per unit of protein was higher for the USA meals than for the BRA and ARG meals ( $P < 0.001$ ). Mineral content varied with the origin of the beans, with the ARG meals having more K, Mn, and Cu than the USA and BRA meals ( $P < 0.001$ ). BRA meals had more Mg, Zn, and Fe than the USA and ARG meals ( $P < 0.001$ ). Phosphorus content was higher for the ARG and USA meals than for the BRA meals ( $P < 0.001$ ). Protein quality indicators were affected by the origin of the beans. Protein dispersibility index, KOH protein solubility, and trypsin inhibitor activity were higher ( $P < 0.001$ ) for the USA meals than for the BRA and ARG meals. Heat damage indicator was lowest for the USA meals ( $P < 0.001$ ). The data reported confirm that chemical composition, amino acid profile, protein quality, and nutritive value of the SBM varied with the country of origin of the beans. Consequently, bean origin should be considered by the nutritionists when evaluating the nutritive value of commercial soybean meals.

**Key Words:** amino acid profile, chemical composition, protein quality indicators, soybean origin

**368 Influence of nutrient density and feed form on the growth performance and nutrient utilization in broilers fed wheat-based diets.** Fifi Zaefarian\*, Obright Hamungalu, Reza Abdollahi, and Ravi Ravindran, *School of Agriculture and Environment, Massey University, Palmerston North, New Zealand, Palmerston North, New Zealand.*

The interaction between dietary nutrient density and feed form on the growth performance, coefficient of apparent ileal digestibility (CAID) of nutrients and energy utilization in broilers fed wheat-based diets was investigated in a 35-d trial. A total of 10 dietary treatments were arranged in a  $5 \times 2$  factorial arrangement with 5 nutrient densities, VL, very low nutrient density (2800 and 2900 kcal/kg AMEn, 13.44 and 11.46 g/kg lysine); L, low nutrient density (2900 and 3000 kcal/kg AMEn, 13.92