

diet) were analyzed for baseline concentration of FA in the phospholipid fraction (PL) of the yolk. Residual yolk (RY) samples (10 per treatments) were taken at hatch for FA analyses in PL. Fatty acids consumption was calculated by subtracting concentration of FA in RY from the baseline concentration. Data were analyzed as completely randomized design with a factorial arrangement (strain, diet and interaction) using GLIMMIX procedures of SAS. There was an interaction between strains and diets ($P < 0.05$) on ALA and EPA of yolk PL; both n-3 sources decreased ALA and increased EPA to a greater extent in Shaver white compared with ISA brown. Shaver white also deposited 29.4% more DHA in yolk PL than ISA brown ($P < 0.001$). The interactive effect of strains and diets ($P = 0.019$) on consumed ALA was such that DMA and FFF reduced ALA uptake to a greater extent in Shaver white compared with ISA brown. There was no interaction effect between strains and diets on consumed EPA and DHA ($P > 0.05$). While embryos of DMA and FFF consumed identical EPA ($P = 0.950$), less ALA ($P = 0.007$) and total PL ($P < 0.001$), they preferentially consumed more DHA (DMA: 13.69 and FFF: 12.53 mg) compared with CON (10.43 mg). Shaver white embryos consumed more ($P < 0.05$) ALA (6.9%), EPA (90.9%), and DHA (37.4%) compared with ISA brown. In conclusion, our results suggest that feeding egg-type breeders n-3 PUFA can modify the pattern of FA uptake by embryos. The preferential consumption of DHA might be attributed to higher demand for embryonic development and warrant further investigations to characterized potential benefits on the progeny.

Key Words: egg-type breeders feeding, omega-three fatty acids, embryonic period

526P Crude protein digestibility of soybean meals from beans produced in USA, Brazil, and Argentina: An in vitro study. Lewis Aguirre*¹, O. Chandi¹, L. Cámara¹, A. Smith², J. J. Arroyo³, and Gonzalo Mateos¹, ¹UPM, Madrid, Madrid, Spain, ²DSM Nutritional Products (UK) Ltd., Heanor, Derbyshire, United Kingdom, ³DSM Nutritional Products Iberia S.A., Alcalá de Henares, Madrid, Spain.

An assay was conducted to determine the in vitro CP digestibility of soybean meals (SBM) from beans of 3 origins. Samples ($n = 25$ by origin) from USA, Brazil (BRA), and Argentina (ARG) were collected from European crushing plants or at the arrival of the vessels to European ports. The samples were analyzed for key nutrient [CP, amino acids, crude fiber, neutral detergent fiber (NDF), sucrose, oligosaccharides, and minerals] and for protein quality variables [trypsin inhibitor activity (TIA), KOH solubility (KOH), protein dispersibility index (PDI), and heat damage indicator (HDI)]. On 88% DM bases, the BRA SBM had more CP (47.0%) and NDF (9.3%) and less sucrose (5.7%) and stachyose (4.3%) than the USA and the ARG meals (46.3 and 46.4%, 8.6 and 8.8%, 7.4 and 6.8%, and 5.1% and 4.5%, respectively) TIA, KOH, and PDI values were higher but HDI values was lower ($P < 0.01$) for the USA SBM than for the BRA and the ARG SBM. The in vitro test used in the study (2 steps) simulated the processes occurring in the gastrointestinal tract of the chicken (pepsin and pancreatic digestibilities). Briefly, 0.4 g of the sample was ground using a 0.75 mm screen and mixed with 5 mL of distilled water in falcon tubes. The samples were incubated with 10 mL of pepsin solution (containing 2,500 U/mg, Sigma) and 0.12 N of HCl solution at pH 1.9 at 39°C and 190 rpm for 45 min. Then, 0.18 mL of NaOH and 13.5 mL of the pancreatin solution (8 × USP, Sigma) was added to the sample and incubated during 1 or 3 h at pH 7.8 and 39°C. After incubation, the samples were placed on ice and 5 mL of trichloroacetic acid were added. The tubes were equilibrated by weight, centrifuged (8,700 rpm), and filtered. Crude protein was determined by the Kjeldahl method. Data were analyzed as completely randomized design with origin of the SBM as main effect. The Tukey test was used

to separate treatments means. Origin of the SBM affected the in vitro digestibility of the protein fraction, with USA meals presenting higher digestibility than the BRA and the ARG meals (78.4, 76.1, and 75.8% at 1 h of incubation and 82.1, 80.7, and 80.5%, at 3 h of incubation, respectively; ($P < 0.001$)). The data suggest that country of origin of the beans of these 3 origins affects the digestibility of the CP of the SBM. The data on CP digestibility obtained in vitro, favor the use of SBM from USA over the use of South American SBM.

Key Words: crude protein digestibility, in vitro test, soybean origin

527P Influence of energy concentration and standardized ileal digestible lysine content of the diet on performance and egg quality of brown-egg laying hens from 19 to 59 weeks of age.

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An experiment was conducted to determine the effects of the AMEn concentration and standardized ileal digestible lysine (SID Lys) content of the diet on performance and egg quality of brown Classic Lohmann hens from 19 to 59 wk of age. There were 8 treatments organized as a 2 × 4 factorial with 2 AMEn concentrations (2,750 and 2,650 Kcal/Kg) and 4 levels of SID Lys (0.68, 0.72, 0.76, and 0.80%) in the diet. All other indispensable amino acids were formulated according to the ideal ileal protein concept. Each treatment was replicated 9 times and the experimental unit was a cage with 9 hens. The experiment lasted for 10 periods of 4 wk each. All birds had free access to feed and water throughout the trial. Production data (egg rate, feed intake, egg weight, egg mass, FCR, BW gain, and mortality) were collected by period. Egg quality traits (egg weight, Haugh units, and egg shell resistance to breakage) were measured in 8 eggs randomly select from each replicate the last 2d of each of the 10 experimental periods. Data were analyzed as a completely randomized design using the mixed procedure of SAS with energy concentration, level of SID Lys and the interaction as main effects. In addition, treatment sum of squares of the level of SID Lys, was partitioned into lineal (L) and quadratic (Q) effects. All differences were considered significant at $P < 0.05$. No interactions between AMEn and SID Lys were found for any trait and therefore, only main effects are presented. An increase in the energy content of the diet, improved egg weight ($P < 0.001$) and FCR ($P < 0.05$) but did not affect any of the other variables studied. The diet with the higher energy content had more added fat than the diet with the lower energy content (3.5% vs. 1.3%). Consequently, the higher level of added fat might have resulted in the improvement in egg size observed. An increase in the level of SID Lys from 0.68% to 0.80% improved linearly egg weight ($P < 0.05$) and egg mass production ($P < 0.05$) but did not affect ADFI, FCR, BW gain, or hen mortality. The level of SID Lys of the diet did not affect egg shell resistance to breakage or albumen quality. In conclusion, an increase in the energy content of the diet from 2,650 to 2,750 Kcal AMEn did not affect the number of eggs produced but increased egg weight. Hens require no more of 0.68% digestible Lys in the diet (736 to 752 mg SID Lys per day for the low and high energy diet respectively) to optimize egg production. However, if the objective is to maximize egg weight or egg mass production, higher levels of SID Lys might be required.

Key Words: egg weight, egg production, energy, laying hens, standardized ileal digestible lysine

528P Not Presented