

203 Adaptation of protein metabolism to changes in lysine intake in growing pigs. J. J. G. C. Van den Borne*, S. Borgjink, J. Dijkstra, and W. J. J. Gerrits, *Wageningen University, Wageningen, The Netherlands*.

The indicator amino acid technique is a well-known tool to estimate amino acid requirements within a subject. It involves measurement of responses in protein metabolism to step-wise changes in amino acid imbalance. The objective of this experiment was to compare lysine requirement estimates from increasing vs. decreasing titration strategies, and to study adaptive responses to changes in lysine intake. Pigs (n=14; 27.1±0.2 kg) were housed in metabolism crates and assigned to one of two treatments, with digestible lysine intake either increasing from 4.7 to 14.0 g/kg (INCR) or decreasing from 14.0 to 4.7 g/kg feed (DECR) in 7 equidistant steps, at identical intakes of other nutrients. Each step lasted 4d. Four complete 24h urine collections were performed from all pigs for each lysine level. Total urinary N and urea excretion were determined for all 24h collections. [¹⁵N]glycine was provided orally at d 3 of each lysine level and enrichment was measured in urinary urea. A linear-plateau model was fitted to N efficiency (in %) data. Treatment effects on slopes and inflection point estimates of the model were then analyzed statistically. Based on the F-test, for 11 of the 14 pigs the linear-plateau model fitted data better ($P<0.01$) than a straight line. The slope was higher ($P<0.01$) for DECR than for INCR (4.7 vs. 3.8 %/g). The lysine requirement, estimated from the inflection point, was lower ($P<0.05$) for DECR (10.1 g/kg) than for INCR (11.4 g/kg). Protein turnover increased linearly with lysine intake. With increasing lysine intakes, the increase in protein turnover rates was markedly greater for DECR than for INCR ($P<0.05$). No consistent changes in urinary N output were observed between the 4 subsequent 24h collections, although it was lower ($P<0.05$) for d 1 and 3 compared with d 2 and 4. In conclusion, increasing and decreasing lysine titration strategies resulted in different estimates for lysine requirement in pigs, indicating that adaptive processes in protein metabolism interfere with requirement estimates in within-subject titration techniques.

Key Words: Pig, Lysine, Protein Metabolism

204 Effects of fortifying low crude protein diet with crystalline amino acids on ammonia and uric acid production and excretion in broilers. N. F. Namroud, M. Shivazad*, and M. Zaghari, *University of Tehran, Karaj, Tehran, Iran*.

A study was conducted to evaluate the effects of providing all EAA in low CP diets equal to that of higher CP diets in broilers. Also, the effects of additional mixture of Gly and Glu or supplementation of excess EAA to low CP diets on the live performance, body composition, and excreta characteristics including pH, moisture, nitrogen, uric acid, ammonia concentration, and some blood factors related to nitrogen metabolism were measured to assess the reason of decreasing performance, especially appetite in low CP diets that have adequate amount of EAA. Male broiler chickens growing from 10 to 28 days of age were fed 8 experimental diets. Reducing dietary CP below 19% affected live performance and fat deposition in whole-body and abdominal cavity significantly ($P\leq 0.05$). Adding the Gly and Glu mixtures to low CP diets improved live performance and decreased fat deposition ($P\leq 0.05$). Nitrogen content, ammonia, uric acid level, moisture, and acidity of excreta were influenced by dietary CP ($P\leq 0.05$). Blood ammonia level was increased, and plasma uric acid was decreased with reduction of CP to 17% ($P\leq 0.05$). Supplementing Gly and Glu to low CP dietary treat-

ments increased plasma and excreta uric acid level in spite of decreasing level of ammonia production ($P\leq 0.05$). Reduction of dietary CP had no significant influence on the most free plasma amino acid levels; however, appetite was depressed ($P\leq 0.05$). The liver weight was elevated with increase in blood ammonia level ($P\leq 0.05$). This difference may be due to adaptation process of liver to high blood ammonia level. Therefore, our suggestion is that blood ammonia level, which has fatal effects on living cells may regulate appetite, besides the aminostatic mechanism in broilers.

Key Words: Crude Protein, Ammonia, Broiler

205 The effect of the level of crude protein and dietary fiber on the productive performance and health status of piglets. R. G. Hermes*, F. Molist, M. Iwazaki, M. Nofrarias, J. Gasa, and J. F. Pérez, *Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain*.

Protein (CP) and dietary fiber (DF) are considered factors involved on the digestive maturation and health status of piglets. In the present study, ninety six 35-days-old piglets (7.66 ± 0.92kg BW) were placed in 32 pens of 3 animals each, and allotted to four dietary treatments for 21 days. The four diets were formulated based on rice, dairy products and soybean meal in a 2×2 factorial design, with 2 levels of CP (LP, 16%CP and HP, 19%CP) and 2 levels of DF (LF, 5%NDF and HF, 7% NDF). The HF diet was obtained by the supplementation of the basal diet with 4% of wheat bran and 2% of sugar beet pulp. Animal performance was weekly registered, and samples of feces collected for microbiology on days 1 and 21. On day 21, one pig from each pen was sampled for blood analyses of the acute-phase protein (PigMap) and sacrificed to register the digestive tract weight and colon histology. Animals fed on the HF diet increased the average daily gain (390 vs. 457 g/d; $p\leq 0.001$), and the large intestine weight (4.4 vs. 5.4% of BW; $p\leq 0.05$). It coincided with a decrease ($p\leq 0.05$) on the *E. coli* counts (7.77 vs. 6.86 log of CFU/g feces), and an increase ($p\leq 0.05$) on the ratio Lactobacilli:Enterobacteria (0.76 vs. 1.37). On the other hand, CP level did not modify the productive performance, but HP increased the weight (% of BW) of the small (6.5 vs. 7.7), and large intestine (3.8 vs. 4.3) ($p\leq 0.05$). In the large bowel, HP diet increased the numbers of goblet cells (4.6 vs. 5.4/100µm; $p\leq 0.05$), while reduced the numbers of intraepithelial lymphocytes (1.8 vs. 1.3/100µm; $p\leq 0.05$). In relation with the health status, a significant interaction was observed, with the LP-HF treatment showing the highest incidence of diarrhea, antibiotic interventions and PigMap concentration ($p\leq 0.05$). As a whole, CP has major effects on the gastrointestinal growth, while DF promotes major changes on the microbial colonization. An early increase on DF supplementation appears to promote a healthier status when this change is concomitant with a high CP level.

Key Words: Piglets, Dietary Fiber, Health Status

206 Pea protein as a substitute of soy bean protein in diets for young pigs: Effects on nutrient digestibility and digestive traits. D. G. Valencia¹, M. P. Serrano¹, C. Centeno², R. Lázaro¹, and G. G. Mateos^{*1}, ¹Universidad Politécnica de Madrid, Spain, ²Instituto del Frio, C.S.I.C., Madrid, Spain.

A trial was conducted to study the effects of using pea protein concentrate (PPC), soybean meal (SBM) or fullfat soybean (FFSB) as a substitute