T178 Fermentation biomass can replace protein from fish and soybean meals in nursery diets. V. G. Perez*[1], H. Yang[1], T. R. Radke[1], J. Less[2], and D. P. Holzgraefe[1], *[1]ADM Alliance Nutrition Inc., Quincy, IL, [2]ADM Specialty Feed Ingredients, Decatur, IL.*

Fermentation biomass (FBM) is a co-product of threonine production, which contains about 81.5% CP, 5.1% Lys, and 3.9% Thr. A total of 128 pigs (about 21 d of age; 4.9 ± 0.20 kg BW) were used to determine the extent in which FBM can effectively replace fish meal (FM) and soybean meal (SBM) in nursery diets. The experiment was a randomized complete block design; blocks were 2 categories of initial BW. Dietary treatments had a 4 (FBM replacing 0, 25, 50, or 100% of FM) × 2 (FBM replacing 0 or 4% of SBM) factorial arrangement. The FBM replaced FM in feeding phases 1 (7 d) and 2 (12 d), or SBM in feeding phase 3 (10 d). The FM was included at 6, 4, and 0% of the diet in feeding phases 1, 2, and 3, respectively. All diets among treatments were formulated to provide similar ME, CP, and digestible Lys contents within feeding phase. The ME and coefficients of amino acid digestibility used in FBM were generated in broilers, as no swine data were available. Treatments were replicated with 4 pens of 4 pigs per pen. Results are presented by main effects of FM and SBM replaced by FBM because no interactions were detected. Replacing FM or SBM with FBM affected neither growth rate nor feed intake. Overall, pigs fed diets with FBM replacing 0, 25, 50, or 100% of FM had an ADG of 384, 398, 388, and 372 g/d (SEM = 13), respectively. Pigs fed diets with FBM replacing 0 or 4% of SBM had an ADG of 394 vs. 377 g/d (SEM = 9). The G:F was reduced ($P <$ or = 0.05) as more FBM replaced either FM or SBM. At the end of feeding phase 2 (d 19), pigs fed diets with FBM replacing 0, 25, 50, or 100% of FM had a G:F of 926, 886, 868, and 847 g/kg, respectively (FBM linear effect, $P < 0.01$; SEM = 17). Overall, pigs fed diets with FBM replacing 0, 25, 50, or 100% of FM had a G:F of 853, 832, 809, and 798 g/kg, respectively (FBM linear effect, $P = 0.01$; SEM = 14). Pigs fed diets with FBM replacing 0 or 4% of SBM had a G:F of 837 vs. 808 g/kg ($P = 0.05$; SEM = 11). The ME in FBM from broilers probably overestimated ME for swine, which may decreased G:F as more FBM was used. Fermented biomass can replace 100% of FM and up to 4% SBM in nursery diets without affecting growth rate.

Key words: threonine biomass, fish meal, pigs

T179 The digestibility marker used and their inclusion level influence the magnitude of ileal amino acid digestibility response to phytase supplementation of a swine diet. O. A. Olukosi[1], O. Bolarinwa[2], A. J. Cowieson[3], and O. Adeola*[2], *[1]Avian Science Research Centre, Scottish Agricultural College, Ayr, Ayrshire, United Kingdom, [2]Department of Animal Sciences, Purdue University, West Lafayette, IN, [3]Poultry Research Foundation, Faculty of Veterinary Science, The University of Sydney, Camden, Sydney.*

Six barrows fitted with simple T-cannula at the distal ileum were used in an experiment to determine whether the type of digestibility marker (TiO_2 or Cr_2O_3) or its level of inclusion (3 or 5 g/kg diet) affect the magnitude of apparent ileal amino acid digestibility (AIAAD) response to phytase (0 or 1000 FTU/kg diet). The pigs were allocated to 4 diets in a 6 × 4 Youden Square Design and a 2 × 2 factorial arrangement (phytase at 0 or 1000 FTU/kg and combination of digestibility markers TiO_2 and Cr_2O_3 at either 3 or 5 g/kg of diet). Each experimental period lasted 7 d and included a 5-d adjustment period and a 2-d ileal digesta collection. The AIAAD was calculated for each AA using each marker from analyses of diets and ileal digesta for AA, Ti, and Cr. The AIAAD data were analyzed as appropriate for a split-plot design. Phytase or dietary concentration of digestibility marker did not affect AIAAD. The AIAAD values calculated using Ti were greater ($P <$ 0.05) than those calculated using Cr (77.6 vs. 76.8%) but there were no effect of the inclusion level of the marker on AIAAD. By setting the AIAAD values at no phytase supplementation to zero, the magnitude of AIAAD response to phytase supplementation was determined for each AA using each marker. These values as calculated using Ti was greater ($P < 0.05$) than those calculated using Cr (5.03 vs. −0.82) at 3 g/kg. At 5 g/kg marker level, there were no differences in magnitude of AIAAD response as determined with either marker except for Asp and Ser, which had greater ($P < 0.05$) values for Ti than for Cr. At 3 g/kg marker level, Pro and Gly had the greatest magnitude of response to phytase where Glu, Trp, and Met had the least response. The greatest difference in magnitude of AIAAD response to phytase supplementation as measured with either Ti or Cr was for Cys and Thr whereas the least difference was for Arg and Trp. These data show that the type of marker used and the level of inclusion of the marker influence the magnitude of apparent ileal amino acid digestibility response to phytase supplementation.

Key words: amino acid, digestibility marker, phytase

T180 Evaluation of different lysine to threonine ratios on growth performance, relative organ weight, meat quality and blood profiles in broilers. H. W. Cho*, L. Yan, and I. H. Kim, *Dankook University, Cheonan, Choongnam, South Korea.*

A study was conducted to evaluate Lys to Thr ratio on growth performance, relative organ weight, meat quality and blood profiles in broilers. One-d-old ROSS 308 broiler chicks were randomly assigned to 1 of 4 dietary treatments with 10 replicates of 13 chickens each. This experiment lasted for 4 wk. Dietary treatments included: 1) T1: 1.42% Lys: 0.93% Thr, 2)T2: 1.42% Lys: 0.99% Thr, 3)T3: 1.42% Lys: 1.06% Thr, and 4)T4: 1.42% Lys: 1.13% Thr. Growth performance was measured on d 7, 21 and 28 and other response criteria were measured on d 28. During the 1 to 3 wk, broilers fed T3 diet showed a higher ADG than broilers feed T4 diet ($P < 0.05$). Overall experimental period, T2 and T3 diets had a higher ADG than T1 and T4 diets. Moreover, T4 diet had a higher ADG than T1 diet. No changes in ADFI and G:F was observed in response to any of the treatments ($P < 0.05$). On d 28, the T4 treatment had higher blood creatinine level than other treatments ($P < 0.05$). On d 28, the gizzard breast meat, bursa of fabricius, liver, spleen and abdominal fat were removed by trained personel and weighed. Relative organ weight was not significantly different among all treatments. There were no differences in meat quality among all treatments (meat color, drip loss, and water holding capacity). In conclusion, the ratio of 1.42% Lys: 1.06% Thr can improve growth performance of broilers without influence on organ weight and meat quality.

Key words: growth performance, Lys:Thr ratio, broiler

T181 Essential amino acids to crude protein ratio in placenta and uterus during gestation. Y. L. Ma*[1], N. Trottier[2], J. Liesman[2], R. L. Payne[3], and M. D. Lindemann[1], *[1]University of Kentucky, Lexington, [2]Michigan State University, East Lansing, [3]Evonik-Degussa Corp., Kennesaw, GA.*

Because body tissues do not have similar AA profiles, it is necessary to analyze different tissues to accurately model protein accretion. Collected tissues from a separate study were available for analysis of the profiles for placenta and uterus. In that study, crossbred gilts (n = 69) were selected at 183 ± 2.7 d and 137 ± 10 kg BW and allotted to receive Se (0.3 mg/kg diet) as Na selenite or organic Se (Sel-Plex; Alltech Inc., Nicholasville KY). Gilts were then slaughtered at defined time points throughout gestation (d 43, 58, 73, 91, 101, or 108 of gestation; n = 6 to 12 gilts/d) for a variety of fetal and maternal measures. Placenta and uterus samples were each pooled within Se treatment and day of slaughter (n = 4 and 6/d of slaughter for placenta and uterus, respectively) and analyzed to characterize differences in essential AA (EAA) to CP ratio during gestation. There were no consistent effects of Se or day of slaughter on AA profile ($P < 0.05$). The EAA:CP profiles differed between placenta and uterus (Table 1). In general, the means of EAA:CP in uterus were greater than in placenta for lysine, arginine, isoleucine, methionine, and total sulfur AAs and were lower than in placenta for histidine, phenylalanine, tryptophan, and valine and were similar as placenta for leucine and threonine. Total EAA as a percentage of CP was 43.90% for placenta and 44.67% for uterus. The results demonstrate tissue differences in EEAs composition of placenta and uterus.

Table 1. Average of AA to CP ratio (g/16 g N) in placenta and uterus from d 43 to 108 of gestation

Amino acid	Placenta	Uterus	*P*-value	SEM
Lysine	6.36	6.92	< 0.01	0.13
Arginine	6.30	7.12	< 0.01	0.07
Histidine	2.68	2.45	< 0.01	0.07
Isoleucine	3.43	3.60	< 0.01	0.06
Leucine	8.08	8.00	0.33	0.15
Methionine	1.67	1.73	< 0.01	0.03
Total Sulfur	3.29	3.46	< 0.01	0.06
Phenylalanine	4.53	4.39	< 0.01	0.08
Threonine	4.17	4.20	0.65	0.10
Tryptophan	1.22	1.05	< 0.01	0.05
Valine	5.45	5.22	< 0.01	0.10

Key words: essential amino acids, gestation

T182 Estimating fermentative amino acid catabolism in the upper gut of growing pigs. D. Columbus*, J. P. Cant, and C. F. M. de Lange, *Department of Animal and Poultry Science, University of Guelph, Guelph, Ontario, Canada.*

Fermentative catabolism of dietary and endogenous AA in the upper gut of pigs (FAAC) reduces AA available for protein synthesis. Manipulating dietary fiber and protein levels may influence the microbes' preferred N and energy sources and alter FAAC. A 4 d continuous isotope tracer infusion was performed to determine whole body urea flux, upper gut ammonia flux and FAAC, and urea recycling in ileal-cannulated growing pigs individually fed a control diet (C, 20.6% CP; n = 6), a high fiber diet with 12% added pectin (F, 19.5% CP; n = 4) or low protein diet (LP, 14.9% CP; n = 6). ^{15}N-ammonium chloride and ^{13}C-urea were infused intragastrically and intravenously, respectively. Ileal ammonia flow was lower in pigs on LP compared with pigs on F (0.25, 0.47, and 0.13 mmol N/kg BW/d; $P < 0.05$). There was an impact of dietary protein level on urea flux (25.3, 25.7, and 10.3 mmol N/kg BW/d; $P < 0.05$), urea excretion (14.4, 15.0, and 6.2 mmol N/kg BW/d; $P < 0.05$), and urea recycling (12.1, 11.3, and 3.23 mmol N/kg BW/d; $P < 0.05$). ^{15}N enrichments in blood urea [(3.10, 4.46, and 4.89 atoms % excess (APE)] were higher than in ileal ammonia (0.45, 0.23, and 0.95 APE), suggesting rapid absorption of ammonia before the distal ileum and lack of uniformity for enrichment in the digesta ammonia pool. Simple isotope dilution calculations are, therefore, inappropriate for calculating FAAC. Assuming rapid absorption of ammonia and based on tracer kinetics, a 2 compartment model was developed with digesta ammonia and plasma urea as N pools and representing fluxes of FAAC, microbial AA synthesis, absorption and recycling of N, endogenous AA catabolism, and loss of N to the colon and urine, allowing for minimum and maximum estimates of FAAC in the upper gut. Maximum estimated FAAC was lower when dietary protein content was decreased (32.9, 33.5, and 17.4 mmol N/kg BW/d; $P < 0.05$) but there was no impact of dietary fiber on FAAC ($P > 0.05$). There are several challenges associated with quantifying FAAC in the upper gut of pigs. The 2-compartment model presented here allows for estimates of FAAC and further investigation to improve the model and estimates is warranted.

Key words: fermentative catabolism, amino acids, pigs

T183 Serum amino acid concentration and expression of amino acid transporter bo,+ in pigs fed diets with different protein and amino acid levels. H. García[1], A. Morales[1], A. B. Araiza[1], M. Cervantes*[1], J. Yáñez[2], and P. Carrillo[1], *[1]ICA, Universidad Autónoma de Baja California, Mexicali, BC, México, [2]Universidad Autónoma de Tlaxcala, Tlaxcala, Tlax, México.*

Cationic AA are mainly absorbed by the transporter protein bo,+, which exchanges Leu by cationic AA at the apical cell membrane. Lys is the first limiting AA in typical cereal-soybean meal diets that contain excess of Leu and Arg. Low protein diets may reduce the Leu and Arg excesses but become deficient in Lys. An experiment was conducted to analyze the effect of dietary protein level and supplementation of free Lys, Thr, Met, and Leu on the expression of the cationic AA transporter bo,+ and serum concentration (SC) of indispensable AA. Twenty crossbred pigs (BW of 14.9 ± 1.8 kg) were used. Treatments (T) were: T1, basal wheat-based diet; T2, as in T1 plus free 0.70% Lys, 0.27% Thr, and 0.10% Met; T3, as in T2 plus 0.80% Leu; and T4, wheat-soybean meal diet, 20.0% CP, 1.05% Lys, 0.75% Thr, control. At the end of a 28-d trial, all pigs were sacrificed; mucosa from jejunum and blood were collected to analyze expression of bo,+ and SC of AA. Four contrasts were constructed to analyze the effect of the protein level (basal vs. control), AA level (basal vs. free AA), and source of AA (protein-bound in control vs. free AA). Relative expression of bo,+ (arbitrary units, b0,+ mRNA Mol/18S rRNA Mol), was: 4.50, 20.79, 6.06, 0.49 for T1 to T4 respectively. Free AA in T2 increased the expression of bo,+ in jejunum, but Leu in T3 decreased it ($P < 0.05$). Serum AA concentration (μMol/ml) was: Arg, 0.08, 0.10, 0.16, 0.13; Ile, 0.03, 0.04, 0.01, 0.10; Leu, 0.04, 0.06, 0.11, 0.11; Lys, 0.01, 0.21, 0.12, 0.06; Met, 0.03, 0.04, 0.04, 0.08; Phe, 0.03, 0.05, 0.05, 0.06; Thr, 0.07, 0.26, 0.27, 0.12; Val, 0.07, 0.08, 0.09, 0.20, for T1 to T4, respectively. Supplemental Lys increased the SC of Lys; Leu increased the SC of Leu and Arg ($P < 0.05$). SC of Lys was higher ($P < 0.01$) in pigs fed the diet with free Lys than the protein-bound Lys diet. These data indicate that the dietary levels and source of protein and free AA affect the expression of cationic AA transporter and the cellular AA availability in growing pigs.

Key words: swine, amino acids, amino acid transporter

T184 Effect of dietary leucine and isoleucine on productive performance and myosin expression in growing pigs. V. Méndez[1], A. Morales*[1], M. Cervantes[1], B. A. Araiza[1], and M. A. Barrera[2], *[1]ICA, Universidad Autónoma de Baja California, Mexicali, B.C., México, [2]Universidad de Sonora, Hermosillo, Son., México.*

Branched chain AA, especially Leu, are recognized as activators of mTOR, which regulates protein synthesis in muscle cells; myosin is about 40% the total protein content in muscle. But, Leu also competes with Ile for absorption; high Leu in the diet may interfere with Ile for absorption. Thus, an experiment was conducted to evaluate the effect of adding Leu and Ile, above the NRC (1998) requirement, to wheat-based diets on the performance and the expression of myosin (Myo) mRNA in the Longissimus dorsi (LDM) and Semitendinosus (STM) muscles of growing pigs. The response variables were: ADG, ADFI, G:F, and expression of Myo. Twenty-four pigs, initial BW of 15.9 ± 0.6 kg, randomly distributed in 4 dietary treatments according to a randomized complete block design, were used. Treatments (T) were: T1, basal wheat-based diet fortified with 0.69% Lys, 0.27% Thr, 0.10% Met; T2, basal plus 0.50% Leu; T3, basal plus 0.50% Ile; T4, basal plus 0.50% Leu and 0.50% Ile. Pigs were sacrificed at the end of the experiment to collect samples from the LDM and the STM muscles. Performance of pigs, for T1 to T4 was: ADG, 541, 452, 447, 443, g/d; ADFI, 910, 970, 738, 733, g/d; G:F, 0.595, 0.466, 0.606, 0.604, respectively. ADG gain reduced because of the addition of Leu ($P = 0.032$), Ile ($P = 0.025$), or both ($P = 0.020$). ADFI and G:F were not affected by the individual or combined addition of any of these AA ($P > 0.10$). Relative expression values (arbitrary units) of Myo for pigs in T1 to T4 were: LDM, 1.8, 1.3, 6.9, 6.6; in STM, 16.0, 17.3, 2.2, 4.1. Relative expression of Myo in LDM increased because of Ile added alone or in combination with Leu ($P < 0.05$); but reduced in STM ($P < 0.01$). These results show that adding Leu and Ile, alone or in combination, to wheat-based diets, reduce growth rate and differently affect the expression of myosin in LDM and STM.

Key words: pigs, amino acids, myosin

T185 Preference for diets with free L-tryptophan in pigs with different tryptophan status. J. Suárez[1], E. Roura[2,3], I. Ipharraguerre*[2], and D. Torrallardona[1], *[1]IRTA-Mas de Bover, Constantí, Spain, [2]Lucta S.A., Barcelona, Spain, [3]Current address: University of Queensland, Brisbane, Australia.*

The chemosensorial system of pigs may have evolved to identify AA as indicators of protein in the feed, so the use of free AA could affect the palatability of the diet. A double choice test was conducted to determine the preference for diets with different free L-Trp levels in pigs under different Trp status. 108 piglets (18 ± 1.4 kg BW) were divided into 3 groups and adapted (1 wk) to diets that were either deficient (D), adequate (A) or excessive (E) in Trp (1.8, 2.4 or 3.0 g Trp/kg, respectively). After the period of adaptation, the animals were used in pairs to perform a series of double-choice tests (2 d) between diet D (taken as reference) and 3 diets with increasing levels of free L-Trp to provide Trp in excess (E1, E2 and E3; 3.0, 3.6 and 4.2 g Trp/kg, respectively). Diets only differed in their free L-Trp content, which was included at the expense of maize starch in the basal diet. For each double choice comparison and Trp status, a total of 6 observations were obtained. Preference for each tested diet was expressed as its proportional (%) contribution to total feed intake. Preference values were analyzed with ANOVA using the GLM procedure of SAS by considering the main effects of L-Trp level, Trp status, and their interaction. Additionally, each preference mean was compared with the neutral value of 50% (i.e., no difference between the reference and test diets) with the Student's *t*-test. No effects of pig's Trp status ($P = 0.924$), free L-Trp inclusion ($P = 0.995$) or their interaction ($P = 0.614$) on feed preference were observed. Overall, the addition of L-Trp resulted in a preference value of 41 ± 1.8%, which was lower ($P < 0.001$) than the neutral value of 50%. These results indicate that pigs have an aversion for the diets with free L-Trp. In conclusion, the addition of L-Trp decreases feed palatability in pigs, independently of its inclusion level and the Trp status of the animals.

Key words: palatability, double-choice, amino acid

T186 Effects of dietary inclusion of bioactive grape seed extract on protein and amino acid digestibility in broiler chicks. S. Chamorro[1], A. Viveros[2], C. Centeno[1], C. Romero*[3], I. Arija[2], and A. Brenes[1], *[1]Instituto de Ciencia y Tecnología de Alimentos y Nutrición, ICTAN, CSIC, Madrid, Spain, [2]Facultad de Veterinaria, Universidad Complutense de Madrid, Spain, [3]Escuela de Ingenieros Agrónomos, Universidad Politécnica de Madrid, Spain.*

Polyphenols are chemically and biologically active compounds. Grape seed extracts (GSE) have been widely used as a human food supplement for health promotion and disease prevention. However, there was little information regarding its application in animal nutrition. An experiment was conducted to investigate the effect of inclusion of GSE at levels of 0, 0.0025, 0.025, 0.25, and 0.50 g/kg in a wheat soybean basal diet on growth performance and apparent ileal digestibility (AID) of CP and AA at 21 d of age. Each treatment was randomly assigned to 7 replicates (5 birds/replicate). At 21 d-old, 15 birds/treatment were sacrificed, and ileal contents of 3 chicks from the same treatment were pooled (5 samples/treatment) to determine AID of CP and AA. Celite (10 g/kg) was added as an indigestible marker. Performance was not affected by dietary treatments except in the case of birds fed the highest GSE concentration which showed a reduction of body weight and G:F, by 5.7% ($P < 0.05$) and 5.1% ($P < 0.01$) respectively, compared with those fed the basal diet. Animals fed 0.0025 g/kg GSE diets had a higher protein AID than those fed basal diets (86.2 vs. 84.2%, $P < 0.005$). However, a reduction (from 84.2 to 82.2%, $P < 0.005$) in protein AID was observed in chicks fed 0.5 g/kg as compared with those fed the basal diet. Dietary supplementation with GSE increased the AID of arginine and alanine and reduced that of glutamic acid and histidine as compared with the basal diet. The addition of 0.025 g/kg GSE increased the AID of lysine, threonine, cystine, serine, and glycine. A further addition up to 0.5 g/kg GSE reduced the AID of methionine, leucine, isoleucine, valine, aspartic acid, phenylalanine, and proline. The results of this study indicated that dietary GSE addition up to 0.25 g/kg did not impair growth performance nor CP digestibility. Further inclusion worsened growth performance and the AID of CP and that of several AA.

Key words: apparent ileal digestibility, chicks, grape polyphenols

T187 Effect of levels of lysine and ractopamine on the performance of immunocastrated pigs from 97 to 124 kg. D. O. Fontes*[1], B. O. Rosa[1], U. A. D. Orlando[2], M. A. e Silva[1], and P. C. Silva[1], *[1]Department of Animal Science, Veterinary School of UFMG, Brazil, [2]BRF Foods, Brazil.*

This experiment was carried out to evaluate the effect of digestible Lys and ractopamine levels on the performance of immunocastrated pigs. A total of 240 pigs of a commercial line, with an initial BW of 97.72 ± 2.11 kg and final weight of 124.06 ± 4.12 kg were used in

a completely randomized experimental block design with 4 replications and 5 animals per experimental unit. The treatments consisted of a 4x3 factorial scheme, with 4 levels of digestible Lys (0.65, 0.80, 0.95, and 1.10%) and 3 levels of ractopamine (0, 5 and 10 ppm). Significant effect of digestible Lys was evaluated by the regression of the observed variable on digestible Lys level of diet while means of ractopamine supplemented animals were compared by SNK test at 5% probability level. No interaction effects of digestible Lys x ractopamine levels on the recorded variables were observed. The animals fed 10 ppm ractopamine supplemented diets were heavier at the end of the experiment (126.01 kg) than those fed non supplemented (122.25 kg) and 5 ppm supplemented diets (123.93 kg). The animals fed 10 ppm supplemented diets showed higher ($P < 0.05$) ADG (1.35 kg) in comparison to those fed non supplemented diets (1.17 kg) and 5 ppm ractopamine supplemented diets (1.25 kg). Animals fed 10 ppm supplemented diets showed an increase of 180 g in ADG, corresponding to an improvement of 13.33% in comparison to non supplement diet animal. No effects of ractopamine level ($P > 0.05$) on feed intake and on daily digestible Lys consumption were observed. The G:F of animals fed 10 ppm diets (0,384 kg/kg) and 5 ppm diets (0,362 kg/kg) were not different ($P < 0.05$), but bigger ($P < 0.05$) than no supplemented animals (0,331 kg/kg). No effects of digestible Lys ($P > 0.05$) on the performance traits were observed. The results suggest that 0.65% of digestible Lys (23.36 g/d) meets the requirement of immunocastrated pigs from 97 to 124 kg, and 5 and 10 ppm supplemented diets improve feed efficiency of pigs in 9.34 and 16%, respectively, in comparison to non supplemented animals.

Key words: swine, nutrition, additive

T188 Effect of L-tryptophan supplementation on hypothalamic serotonin level and aggression of nursery pigs fed diets varying large neutral amino acid concentrations. Y. B. Shen, G. Voilqué*, and S. W. Kim, *North Carolina State University, Raleigh.*

Cerebral serotonin has been shown as a controlling factor of aggressive behavior of pigs. Serotonin synthesis in the brain largely depends on availability of tryptophan (Trp), which has to compete with large neutral AA (LNAA) for LNAA transporter to cross the blood-brain barrier. The ratio between Trp and LNAA in diets would affect serotonin synthesis in the brain, which may affect aggression through changing Trp availability in brain. Thus, this study evaluated the effect of L-Trp supplementation on serotonin production and aggression of nursery pigs fed diets varying LNAA concentrations. Forty-eight barrows at 6 wk of age were housed individually and randomly allotted to 4 dietary treatments based on a 2x2 factorial arrangement (n = 12). First factor was L-Trp supplementation (0 or 0.6%) and the second factor was LNAA concentrations (4.5 or 3.8%). Pigs were fed the diets for 7 d. On d 4, pigs within a treatment were paired in a pen and their behavior was recorded for 1 d. On d 7, all pigs were euthanized to obtain hypothalamus. Supplementation of 0.6% L-Trp increased ($P < 0.01$) hypothalamic serotonin (99.2 vs. 66.1 ng/mg) and 5-hydroxyindoleacetic acid (896.6 vs. 599.3 ng/mg) in pigs. Supplementation of 0.6% L-Trp reduced the occurrence (1.17 vs. 0.33/hr), total duration (9.83 vs. 1.17 s), and average duration (5.50 vs. 1.17 s) of mutual biting when LNAA concentration was 4.5%. However, there were no changes in aggressive behavior of pigs by L-Trp supplementation when LNAA concentration was 3.8%. Both L-Trp supplementation and dietary LNAA concentrations did not affect the percentage of time that pigs spent on other physical activities such as lying, sitting, standing, eating, and drinking. Overall, L-Trp supplementation increased hypothalamic serotonin synthesis, which may have reduced duration, and the number of occurrence of mutual biting when LNAA concentration was increased from 3.8 to 4.5%.

Key words: pig, tryptophan, serotonin