38 (Invited) Do the gastrointestinal microflora of non-ruminants contribute to the amino acid needs of their host? M. Fuller*, *Stony Brook University, Stony Brook, NY*.

Non-ruminants have a large and highly active population of gastrointestinal microflora which are intimately involved in the digestion of food and the recycling of nitrogen. Absorption of amino acids synthesized by the microflora has been observed by giving [^{15}N]ammonia or [^{15}N]urea and measuring the entry into the body of [15N]lysine (which does not transaminate) or by giving [^{14}C]polyglucose and observing the uptake of [^{14}C]-labeled indispensable amino acids. Germ-free rats showed no [^{15}N]lysine labeling after [^{15}N]ammonia was given. Rats in which coprophagy was prevented also showed no lysine labeling: in this species, at least, microbial amino acids are obtained only by coprophagy. In experiments with pigs, however, coprophagy was prevented and in this species, and also in human subjects, microbial lysine was absorbed in nutritionally significant amounts. In pigs, most of this absorption occurred in the upper digestive tract, not in the large intestine. This does not necessarily mean that microbial amino acids make a significant net contribution to meeting the host's amino acid needs: that depends upon whether the microbial amino acids are synthesized de novo from materials such as non-starch polysaccharides and urea, or whether microbes utilize for protein synthesis pre-formed amino acids from the diet, or from the endogenous secretions of the host, that would otherwise have been absorbed directly. Observations in pigs suggested that only a small proportion of valine was synthesized de novo. However, by giving human subjects antibiotics it was estimated that the microflora supplied approximately 20% of the daily leucine requirement. While there is little doubt that microbial amino acids are absorbed, and that a proportion of these is synthesized de novo, important questions remain.

Key Words: amino acid, non-ruminant

39 Does lysine level fed in one phase influence performance during another phase in nursery pigs? J. E. Nemechek*, M. D. Tokach, S. S. Dritz, R. D. Goodband, J. M. DeRouchey, and J. L. Nelson, *Kansas State University, Manhattan*.

A total of 320 weanling pigs (PIC barrows, initially 5.7 kg and 21 d) were used in a 35-d trial to determine whether the lysine level fed during one phase in the nursery influences the response to dietary lysine during another phase. Eight dietary treatments were allotted and arranged as a 2 x 2 x 2 factorial, with 5 pigs/pen and 8 pens/treatment. Diets were fed in 3 phases, with each treatment being assigned as normal or low lysine level. Standardized ileal digestible lysine levels were 1.35 vs 1.55% during phase 1 (d 0 to 7), 1.15 vs 1.35% in phase 2 (d 7 to 21), and 1.05 vs 1.25% during phase 3 (d 21 to 35; see table below). Pigs and feeders were weighed on d 0, 7, 14, 21, 28, and 35 following weaning to calculate ADG, ADFI, and G:F. There were no dietary interactions between phases ($P > 0.12$). From d 0 to 7 increasing the dietary lysine did not influence ($P > 0.37$) ADG (160 vs 157 g) or ADFI (151 vs 164 g), but improved ($P < 0.006$) G:F (1.05 vs 0.96). Similar to phase 1, increasing dietary lysine from d 7 to 21 did not influence ($P > 0.18$) ADG (370 vs 352 g) or ADFI (512 vs 521 g), but improved ($P < 0.03$) G:F (0.72 vs 0.68). From d 21 to 35, the high lysine diet improved ($P < 0.001$) ADG (599 vs 559 g) and G:F (0.65 vs 0.61). We did not detect an influence of the lysine level fed during an earlier phase on the response to lysine during a subsequent phase. However, the lysine level fed during the late nursery phase had a greater impact on overall performance than the level fed in earlier phases.

Table 1.

D 0 to 7, %	1.35	1.35	1.35	1.35	1.55	1.55	1.55	1.55	
D 7 to 21, %	1.15	1.15	1.35	1.35	1.15	1.15	1.35	1.35	
D 21 to 35, %	1.05	1.25	1.05	1.25	1.05	1.25	1.05	1.25	SEM
D 0 to 7									
ADG, g	161	151	152	162	155	163	159	161	20
G:F	0.96	0.93	0.97	1.00	1.05	1.09	1.07	0.98	0.06
D 7 to 21									
ADG, g	363	365	366	371	346	333	370	375	16
G:F	0.67	0.69	0.72	0.71	0.68	0.66	0.74	0.72	0.02
D 21 to 35									
ADG, g	561	616	579	614	555	573	540	593	27
G:F	0.60	0.67	0.61	0.64	0.61	0.65	0.61	0.64	0.01
D 0 to 35									
ADG, g	402	422	407	426	389	395	395	419	11
G:F	0.65	0.69	0.67	0.68	0.66	0.68	0.68	0.69	0.01

Key Words: lysine, nursery pig

40 (Invited) Amino acid nutrition for efficient immune responses. B. D. Humphrey*, *California Polytechnic State University, San Luis Obispo*.

The immune system manages the amount and location of pathogens within the body. While it is important for the animal to resist disease, the decline in animal performance is the trade-off associated with immune system activation. The ability to minimize this trade-off, that is to have animals resist disease while maintaining high levels of performance, is one way of improving the efficiencies and welfare of animal production systems. Protein and amino acid nutrition is tightly interwoven into immunophysiology, both in healthy and diseased animals. Activation of the innate immune system results in a metabolic response that results in altered nutrient use, especially for amino acids. Nutritional approaches aimed to complement the amino acid needs of an activated immune system may help to prevent excessive endogenous losses and help to promote efficient immune responses. Understanding these relationships will provide a better understanding of how protein and amino acid nutrition can be utilized to provide nutritional support to the immune system with the long-term goal of promoting animal health and performance.

Key Words: amino acid, immune system

41 (Invited ASAS Animal Science Young Scholar) Methionine sources in swine nutrition: Current knowledge and future directions. J. A. Jendza* and O. Adeola, *Purdue University, Department of Animal Sciences, West Lafayette, IN*.

There has been extensive research attempting to determine the bioefficacy of the hydroxy analog of Met (MHA) relative to synthetic DL-Met in poultry. However, much less work has been done to achieve the same goal in swine. Efforts along this line have been impeded by