5 Current lysine:calorie ratio recommendations and their use in diet formulation. R. D. Goodband*, M. D. Tokach, S. S. Dritz, J. M. DeRouchey, and J. L. Nelssen, *Kansas State University, Manhattan.*

The response to dietary energy and standardized ileal digestible (SID) Lys in pigs is highly variable due to the wide range in genetic capacity for lean gain, health, and environmental conditions. Furthermore, studies conducted in commercial research facilities suggest that feed intake is much lower than studies in university settings. This suggests that finishing pigs are very likely to be in an energy dependent phase of growth to heavier weights than previously estimated. As long as pigs respond to dietary energy changes, this necessitates the use of a Lys:calorie ratio. Unfortunately, over the past 10 years, only a limited number of published Lys studies for finishing pigs are in the public domain. However, they provide reasonable starting estimates on which to set Lys concentrations. Assuming a protein deposition of 150 g/d from 20 to 120 kg, adapting equations from Main et al. (2008) and the National Swine Nutrition Guide (van Heugten, 2010), the equation: g /SID Lys:Mcal = 0.000146 × (BW, kg)^2 ± 0.0377 × (BW, kg) + 4.352; describes the SID Lys:calorie ratio for barrows while; g/SID Lys:Mcal = −0.00000094 × (BW, kg)^3 + 0.000306 × (BW, kg)^2 ± 0.0435 × (BW, kg) + 4.414) describes the g SID Lys:Mcal ratio for gilts (Table 1). A second option for estimating Lys requirements uses g Lys/kg gain. A review of the literature indicates that for nursery pigs (<20 kg) require approximately19 g of SID lysine/kg of gain, whereas finishing pigs require approximately 20 g/kg of gain. With this approach, accurate growth and energy intake curves are required to generate a customized Lys:calorie ratio. As an increasing variety of feed ingredients are used, the range of dietary energy levels has expanded, increasing the need for accurate Lys:calorie ratios in diet formulation.

Table 1. SID lysine recommendations as influenced by weight

Pig wt, kg	g/kg gain	g/Mcal ME[2]	%[1,2]	g/Mcal ME[3]	%[1,3]
5	19	4.17	1.40	4.20	1.40
10	19	3.99	1.34	4.01	1.34
15	19	3.82	1.28	3.83	1.28
20	19	3.66	1.22	3.66	1.23
30	20	3.35	1.12	3.36	1.13
40	20	3.08	1.03	3.10	1.04
50	20	2.83	0.95	2.89	0.97
60	20	2.62	0.88	2.70	0.91
70	20	2.43	0.81	2.55	0.85
80	20	2.27	0.76	2.41	0.81
90	20	2.14	0.72	2.29	0.77
100	20	2.04	0.68	2.18	0.73
110	20	1.97	0.66	2.08	0.70
120	20	1.93	0.65	1.98	0.66

[1]Percentage is for a diet containing 3,350 kcal ME/kg using NRC (1998) nutrient values.
[2]Barrows.
[3]Gilts.

Key Words: calorie:lysine ratio, energy, lysine

6 Effects of reducing crude protein level and replacement with crystalline amino acids on growth performance, carcass composition, and fresh pork quality of finishing pigs fed Paylean. J. K. Apple*[1], C. V. Maxwell[1], J. W. S. Yancey[1], R. L. Payne[2], and J. Thomson[2], *[1]Department of Animal Science, University of Arkansas Division of Agriculture, Fayetteville, [2]Evonik-Degussa Corp., Kennesaw, GA.*

Crossbred pigs (n = 216) were blocked by initial BW, and, within blocks, pens of pigs (6 pigs/pen) were randomly assigned to dietary treatments where CP of finisher I, II, and III diets was: 1) 16.04, 14.55, and 16.23%, respectively; 2) 14.76, 13.48, and 15.27%, respectively; 3) 14.26, 12.78, and 14.28%, respectively; or 4) 12.65, 12.38, 13.32%, respectively. All finisher III diets included 10 mg/kg of Paylean and an SID Lys:ME ratio of 2.79 g/Mcal. At slaughter, HCW and FOM data were recorded, and a subsample of bone-in hams (3/pen) and loins (2/pen) were transported to the University of Arkansas. Hams were knife-dissected into lean, fat, and bone, and 2.5-cm-thick chops from the semimembranosus (SM) and the LM were used to measure fresh pork quality. Both ADG and G:F decreased linearly ($P \leq 0.053$) as CP decreased in finisher I diets, whereas ADFI was reduced linearly ($P = 0.009$) in response to decreasing CP in finisher II diets. When RAC was included in the finisher III diets, ADFI and BW decreased linearly ($P \leq 0.027$) with decreasing CP. Across the entire finishing period, ADG and ADFI decreased linearly ($P \leq 0.012$) in response to reductions in dietary CP. Conversely, reducing CP in finisher diets did not ($P \geq 0.329$) affect fat depth, LM depth, or calculated fat-free lean yield, and dietary CP content did not ($P \geq 0.263$) alter the composition of fresh hams. There was no effect of dietary CP on the visual and instrumental color, firmness, or drip loss percentage of the LM ($P \geq 0.179$) or SM ($P \geq 0.120$). However, there were linear increases in LM marbling scores ($P = 0.020$) and intramuscular fat content ($P = 0.032$) as CP was reduced in the finisher diets. Although reducing dietary CP decreased ADG and ADFI by approximately 6.1 and 4.9%, respectively, carcass composition was not affected. Reducing dietary CP, while meeting the SID requirements for Lys, Thr, Trp, Met, Ile, and Val with crystalline AA, did not affect pork color or water-holding capacity and actually increased the intramuscular fat content of the LM.

Key Words: crude protein level, intramuscular fat content, pork quality, swine

7 How to feed pigs without whole grains and soybean meal. H. M. J. van Hees*[1], P. J. L. Ramaekers[1], and A. Pharazyn[2], *[1]Nutreco Swine Research Centre, St Anthonis, the Netherlands, [2]Nutreco Canada Agresearch, Guelph, Ontario, Canada.*

Worldwide, barley, wheat and corn are important constituents of pig diets, not only for energy (starch) but as substantial contributors to the supply of dietary amino acids. Soybean meal, with its amino acids counterbalances the deficiencies of cereal protein, particularly lysine. The 2008 and 2011 surge in cereal grain prices demonstrate that pig farmers will face more volatile and higher price levels (Rabobank, 2005). Currently, almost 3 quarters of the EU's protein requirements for animal feed needs to be imported. The EU's dependency on soy imports will remain high despite increased rapeseed production for biofuel and initiatives to increase protein crops. Also, a foreseen lift of the ban on meat and bone meal will only slightly alleviate this. In the longer term, the requirements needed in 2050 to feed the world