

120 Effect of age of introduction and level of soybean meal on performance of segregated early weaned pigs. P. R. O'Quinn*, J. L. Nelsson, M. D. Tokach, R. D. Goodband, and J. R. Bergstrom, *Kansas State University, Manhattan*.

A 35d growth trial was conducted to evaluate the effects of age of introduction and level of soybean meal (SBM) on the performance of segregated early weaned (SEW) pigs. One hundred seventy-five SEW pigs (initially 12-15d and 4.0 kg BW) were randomly allotted to one of seven dietary treatments blocked on initial BW to provide five pigs per pen and five replicate pens per treatment. The trial consisted of three ages of introduction to SBM (12-15, 19-22, or 26-29d) and two levels of SBM (20% or 40%) within each age. A positive control with no SBM was included as a seventh treatment. A combination of skim milk, fish meal, and blood meal was used to replace the SBM in the experimental diets. All experimental diets were formulated to contain 1.60% lysine, .44% methionine, .90% Ca, and .80% P. A common phase II diet was fed to all pigs from d 21 to 35. From d 0 to 7, no effect of treatment ($P > .15$) was found on ADG, ADFI, or feed efficiency (G/F). From d 0 to 14, the change from the control diet to diets containing SBM adversely affected ($P < .10$) ADFI. Feed efficiency was improved ($P < .01$) by changing from the control diet to the diet containing 20% SBM. No effect of treatment ($P > .10$) was observed from either d 0 to 21 or d 0 to 35 for ADG, ADFI, or G/F other than a small decrease ($P < .10$) in ADFI over the total trial for pigs fed the control diet for one week followed by 20% SBM as compared to pigs fed 20% SBM throughout. These data indicate that 40% SBM may be added to the diets of high-health status, SEW-reared pigs with no detrimental effects on growth performance.

Table 1. Timeline for introduction to soybean meal

| Trial (d) | Treatment (% Soybean Meal) | | | | | | | Age (d) |
|------------|----------------------------|----|----|----|----|----|----|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| d 0 to 7 | 0 | 20 | 40 | 0 | 0 | 0 | 0 | 12-15 |
| d 7 to 14 | 0 | 20 | 40 | 20 | 40 | 0 | 0 | 19-22 |
| d 14 to 21 | 0 | 20 | 40 | 20 | 40 | 20 | 40 | 26-29 |

| Growth Performance (d 0 to 35) | | | | | | | |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|
| ADG, kg | .43 | .44 | .42 | .40 | .42 | .42 | .44 |
| ADFI, kg | .55 | .55 | .53 | .51 | .54 | .54 | .54 |
| G/F | .78 | .80 | .80 | .79 | .77 | .79 | .81 |

Key Words: Pigs, Soybean Meal, Segregated Early Weaning

121 Relative nutritional value of roller-dried versus spray-dried whey for pigs weaned at 11 or 20 days. T. D. Crenshaw, *University of Wisconsin, Madison*.

The relative nutritional value of roller-dried (RDW, International Ingredients, Corp.) and spray-dried (SDW, USDA extra grade) whey was evaluated using 126 crossbred (1/2 Duroc X 1/4 Large White x 1/4 Landrace) pigs weaned at either 11±1 (n=54) or 20±2 (n=72) days of age. Pigs were randomly assigned within age groups to pens (n=3/pen) and fed one of six dietary treatments arranged as a 2 x 3 factorial to provide either marginal (1.20, 1.05 and 0.90%) or adequate (1.50, 1.20 and 1.05%) lysine concentrations formulated in diets containing either no whey (NW), RDW or SDW whey sources. Whey sources were added at 20, 10 and 0% for three periods, age 11-20, 20-35, and 24-45 respectively. Only 11-d pigs were fed diets in the first period while 11-d and 20-d pigs were fed the period 2 (20 to 35 d) and period 3 (35 to 48 d) diets. Gain, feed intake and feed efficiency were determined at 3 d intervals in periods 1 and 2 and weekly for period 3. In period 1 no differences were detected in growth (101 g/d) or efficiency (1.67 F/G) but pigs fed RDW consumed more feed ($P < .05$) in marginal (169, 202, 130 g/d) but not adequate (141, 176 and 180 g/d) lys diets for NW, RDW or SDW respectively. Differences were not detected in cumulative responses through period 2 for respective 11-d and 20-d groups in growth (196 and 146 g/d) or efficiency (1.94 and 2.18 F/G). In period 2 pigs fed RDW consumed more feed especially when fed diets with marginal lys in 11-d (378, 484 and 364 g/d) but not 20-d (323, 351 and 338 g/d) groups. No differences were detected in 11-d pigs fed adequate lysine (344, 360 and 325 g/d) but 20-d pigs fed adequate lysine and SDW consumed less than pigs fed NW or RDW (301, 302 and 257 g/d). The failure to detect major differences between RDW and SDW in either 11-d or 20-d pigs fed diets with marginal lys levels suggest the relative nutritional value of RDW and SDW are comparable. Noteworthy is the observation that no beneficial effects could be attributed to pigs fed whey compared with pigs fed control diets without whey.

Key Words: swine, protein quality, weaning

122 Determining the optimal isoleucine:lysine ratio for the SEW-reared, 10 to 20 kg pig. J. R. Bergstrom*, J. L. Nelsson, M. D. Tokach, and R. D. Goodband, *Kansas State University, Manhattan*.

A 21 d growth trial was conducted to determine the isoleucine:lysine ratio necessary to optimize growth performance of the 10 to 20 kg pig. Two hundred and seventy pigs (Newsham Hybrids) were blocked by weight (initially 11.4 ± .84 kg), and allotted to each of ten dietary treatments, with 4 or 5 pigs/pen and 6 pens/treatment. The ten experimental corn-soybean meal diets were formulated to contain either .75 or 1.1% apparent digestible lysine. L-isoleucine was substituted for corn starch to provide five apparent digestible isoleucine:lysine ratios (45, 50, 55, 60, and 65%) within each lysine level in a 2 x 5 factorial arrangement. Other essential amino acids were calculated to meet or exceed estimates suggested by the University of Illinois ideal ratio on an apparent digestible basis. From d 0 to 21, ADG and feed efficiency were improved ($P < .05$) by feeding 1.1% digestible lysine rather than .75% digestible lysine. Average daily gain was improved (linear, $P < .01$; quadratic, $P < .09$; cubic, $P < .03$) by increasing the isoleucine:lysine ratio, with little apparent benefit to increasing digestible isoleucine above 50% relative to lysine. A lysine x isoleucine interaction ($P < .09$) was observed for ADFI, because of low feed intake observed among pigs fed .75% digestible lysine and 45% digestible isoleucine:lysine. Feed efficiency was not affected by increasing the digestible isoleucine:lysine ratio. These data suggest that the digestible isoleucine requirement is not greater than 50% of lysine for the SEW-reared, 10 to 20 kg pig.

| Item | Dig. Ile:Lys Ratio, % | | | | | Dig. Lys, % | |
|------------------|-----------------------|-----|-----|-----|-----|-------------|------|
| | 45 | 50 | 55 | 60 | 65 | .75 | 1.10 |
| d 0 to 21 | | | | | | | |
| ADG, g | 438 | 508 | 497 | 508 | 524 | 415 | 575 |
| G/F ^a | .51 | .50 | .50 | .51 | .51 | .45 | .59 |

^aLysine effect ($P < .05$).

^bIsoleucine effect (linear, $P < .01$; quadratic, $P < .09$; cubic, $P < .03$)

Key Words: Pigs, Amino Acids, Isoleucine

123 Determining the optimal isoleucine:lysine ratio in diets for the segregated early-weaned pig weighing 5 to 8 kg. J. R. Bergstrom*, J. L. Nelsson, M. D. Tokach, and R. D. Goodband, *Kansas State University, Manhattan*.

A 14 d growth trial was conducted to determine the isoleucine:lysine ratio necessary to optimize growth performance of the segregated early-weaned (SEW) pig. Three hundred and sixty pigs (Newsham Hybrids) were weaned at 14 ± 2 d of age, blocked by weight (initially 5.5 ± 1.0 kg), and allotted to twelve dietary treatments with 5 pigs/pen and 6 pens/treatment. The experimental diets were corn-based and contained 20% dried whey, 15% lactose, 6.5% spray-dried animal plasma, 3% select menhaden fish meal, and 2% spray-dried blood meal. Soybean meal (.89% or 10.23%) was added to achieve either 1.15 or 1.5% apparent digestible lysine. L-isoleucine was substituted for corn starch to provide six digestible isoleucine:lysine ratios (40, 45, 50, 55, 60, and 65%) within each lysine level in a 2 x 6 factorial arrangement. Other essential amino acids were calculated to meet or exceed estimates suggested by the University of Illinois ideal ratio on an apparent digestible basis. No lysine x isoleucine interactions were observed. During the entire 14 d trial, ADG and feed efficiency (G/F) were improved ($P < .03$), and d 14 plasma urea N (PUN) was increased ($P < .03$), by feeding 1.5% digestible lysine. From d 0 to 7, ADG and G/F improved (linear, $P < .03$) as the isoleucine ratio increased, and appeared to plateau at 60% digestible isoleucine:lysine. No differences in growth performance were observed among the various isoleucine:lysine ratios from d 7 to 14, or for the entire d 0 to 14 period. However, increasing the isoleucine:lysine ratio decreased (linear, $P < .03$) d 14 PUN, with pigs fed 60% digestible isoleucine:lysine having the lowest PUN. These data suggest that the digestible isoleucine requirement is not greater than 60% of lysine for the high-lean growth SEW pig immediately postweaning. Growth performance from d 7 to 14 postweaning, and overall (d 0 to 14 postweaning), indicates that the isoleucine requirement may decrease rapidly after weaning.

Key Words: Pigs, Amino Acids, Isoleucine