Bottom Line of Nutrition: Swine

July 23, 2007

Split-sex feeding in nursery pigs

PREVIOUS research by the NCR-42 Committee on Swine Nutrition reported that gilts had a greater lysine requirement from 35 to 105 kg than did barrows. This research led to the split-sex feeding technology swine producers use today. It was innovative because it addressed the different growth rates, feed efficiencies and nutrient requirements among gilts and barrows.

Swine producers typically want intact litters to minimize stress and haven’t applied the split-sex feeding technology during the nursery phase of production.

Many nursery studies have been conducted to determine the nutrient requirements of mixed-sex pigs and to study group size and floor space allowance.

However, no research has been conducted to determine if there are different nutrient requirements for barrows and gilts during the nursery phase of production.

It has been reported that gilts grew faster and ate more feed than barrows when weaned at 25 days of age, regardless of dietary crude protein concentrations of the diet (16 versus 22%), but barrows and gilts fed the 22% crude protein diets gained faster compared with those fed the 16% diet.

Another researcher reported that sex did not affect any production variable during the nursery phase. Two other researchers have reported that the digestible lysine requirement was 1.03% and 1.30% for nursery pig diets.

Six members of the NCCC-42 Committee on Swine Nutrition — G.M. Hill of Michigan State University, S.K. Baidoo of the University of Minnesota, G.L. Cromwell of Kentucky, D.C. Mahan of The Ohio State University, J.L. Nelssen of Kansas State University and H.H. Stein formerly of South Dakota State University — conducted a six-station intern study.

They sought to determine (1) if gilts and barrows from different stations and of differing management strategies and genetic backgrounds respond similarly to increased protein (lysine) after weaning and (2) if the current National Research Council (NRC) estimated lysine requirements are adequate to maximize growth performance during the nursery phase of production.

(Note: The NCR [North Central Research] designation has been changed to NCCC [North Central Coordinating Committee].)

The study used 748 pigs that were weaned at approximately 19 days of age and with an average weight of 6.7 kg. The pigs were allotted to four treatments (barrows versus gilts at two lysine levels) in 32 replications (five to seven pigs per pen) in a randomized complete block design. Barrows and gilts were penned separately.

The nursery diets were fed in three phases: phase 1 (days 1-7), phase 2 (days 8-21) and phase 3 (days 22-35).

The total lysine of the diets was provided at the NRC estimated requirements or at 0.20% greater than the NRC requirement for each of the three phases. The additional lysine was supplied by increasing the levels of fish meal.

The dispensable amino acids were included at constant ratios relative to lysine. Table 1 summarizes the basic composition of the diets and the total lysine levels of the diets.

Feed and water were available ad libitum throughout the study. Pigs’ weights were recorded at the start and at the end of each phase. Average daily gain (ADG), average daily feed intake and gain/feed were calculated for each phase and for the entire experiment.

Table 2 summarizes the effect of sex and dietary lysine on nursery pig growth performance.

The nutrition committee members provided the following interpretations of the results from this six-station study:

• The station effect was different for all parameters. The only significant interaction was station x sex for overall gain/feed, which ranged from 0.65 to 0.70. However, the gilts had greater gain/feed at half of the stations, whereas the barrows had greater gain/feed at the other stations. The station effect may be due to differences in genetics, management and health status of the pigs.

• ADG was not significantly affected by sex or dietary lysine concentration during phases 1 and 2.

• Gilts and barrows had greater ADG during phase 3 and overall when fed the 1.35% dietary lysine diet than pigs fed the 1.15% dietary lysine diet. These results are in agreement with some previous trials but not others. This disagreement among studies may be that in most earlier studies, only one diet was fed throughout the nursery period.

With the rapid change in amino acid requirements for nursery pigs of this age, it is likely that the “one nursery diet” approach would result in over- and/or under-supplementation of amino acids in nursery diets for different bodyweights.

• Both barrows and gilts grew faster when lysine was supplied at levels 20% greater than the 1998 NRC recommendations during phase 3.

• During phase 2 of this study, average daily feed intake decreased when pigs were fed the higher dietary lysine level (1.45%) compared to the pigs fed the NRC level (1.25%) of dietary lysine. These results concur with previous reports on optimum dietary lysine levels during phase 2.

However, many of these studies were done before the current commercial genetic sources of nursery pigs became available. Other studies that used current genetics for nursery pigs did not observe a change in feed intake with increasing dietary lysine.

• The authors suggested that factors other than dietary lysine concentration may be involved in regulating feed intake of weaning pigs since there wasn’t any effect of dietary lysine on average daily feed intake during phases 1 and 3. In this study, where fish meal was used to increase dietary lysine level, it may have been a confounding factor that influenced average daily feed intake during phase 2 for both barrows and gilts.

Table 1

<table>
<thead>
<tr>
<th>Ingredient, %</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soybean meal 48%</td>
<td>9.05</td>
<td>7.30</td>
<td>5.55</td>
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<tr>
<td>Dried whey</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Soybean meal-48%</td>
<td>9.05</td>
<td>17.30</td>
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<tr>
<td>Fish meal, salat</td>
<td>5.00</td>
<td>14.00</td>
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<td>Soy protein concentrate</td>
<td>4.00</td>
<td>2.00</td>
<td>0</td>
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<tr>
<td>Dried amino plasma</td>
<td>5.00</td>
<td>5.00</td>
<td>5.00</td>
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<tr>
<td>Lactose</td>
<td>2.00</td>
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<tr>
<td>Total lysine</td>
<td>1.03</td>
<td>1.35</td>
<td>0.56</td>
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Table 2

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Lysine level, barrow</th>
<th>Lysine level, gilt</th>
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<tbody>
<tr>
<td>ADG, g</td>
<td>NRC +0.2% NRC +0.2%</td>
<td>NRC +0.2% NRC +0.2%</td>
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<tr>
<td>Overall</td>
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<td>Phase 1</td>
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<td>Phase 2</td>
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<td>Phase 3</td>
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</tbody>
</table>

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