Effect of dietary net energy and digestible lysine levels on performance of weaned and starter pigs fed low protein-amino acids fortified diets

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Introduction
- Adequate dietary supply of lysine is essential to achieve maximum growth of the pigs because it is the first limiting amino acid (AA) for pigs.
- Because the energy density of the diets may influence feed (AA) intake, it is a common practice to maintain an optimum lysine to energy ratio in swine diets.
- Increased lysine requirement has been reported in recent studies with nursery pigs (Nemechek et al., 2012).
- However, published data on the optimal dietary SID Lys:NE ratios in diets for young pigs are scarce.

Objective
- To evaluate the effect of dietary standardized ileal digestible (SID) Lys and net energy NE levels on growth performance of 7- to 10-kg pigs (Exp. 1), and 9- to 17-kg pigs (Exp. 2).

Materials & Methods

Experiment 1 (7- to 10-kg pigs)
- 288 pigs (PIC; initial BW 7.0 ± 0.45 kg)
- 6 replicates (3 barrows and 3 gilts/pen)/treatment
- 6 diets based on corn, soybean meal, whey, wheat bran and crystalline AA
  - 2 x 3 factorial design
  - 2 levels of Lys (1.35 and 1.42% SID Lys)
  - 3 NE levels (10.00, 10.35 or 10.70 MJ/kg)
  - Soy oil was added to increase NE content
  - Other AA were balanced to meet requirements
- Duration: 14 days

Experiment 2 (9- to 17-kg pigs)
- 288 pigs (PIC; initial BW 9.2 ± 0.39 kg)
- 6 replicates (3 barrows and 3 gilts/pen)/treatment
- 6 diets based on corn, soybean meal, whey, wheat bran and crystalline AA
  - 2 x 3 factorial design
  - 2 levels of Lys (1.22 and 1.32% SID Lys)
  - 3 NE levels (9.75, 10.10 or 10.45 MJ/kg)
  - Soy oil was added to increase NE content
  - Other AA were balanced to meet requirements
- Duration: 21 days

Results

Table 1: Effect of dietary lysine and NE contents on performance and utilization efficiency

<table>
<thead>
<tr>
<th>Item</th>
<th>SID Lys, %</th>
<th>SEM</th>
<th>NE (MJ/kg)</th>
<th>SEM</th>
<th>Lys</th>
<th>NE</th>
<th>Lys x NE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.35</td>
<td>1.42</td>
<td>10.00</td>
<td>10.35</td>
<td>10.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADFI, g/d</td>
<td>3.01</td>
<td>2.94</td>
<td>9.89</td>
<td>3.00</td>
<td>2.92</td>
<td>3.00</td>
<td>12.1</td>
<td>0.72</td>
</tr>
<tr>
<td>SID Lys, g/kg gain</td>
<td>17.46</td>
<td>17.20</td>
<td>0.27</td>
<td>12.90</td>
<td>12.81</td>
<td>13.16</td>
<td>0.33</td>
<td>0.04</td>
</tr>
<tr>
<td>NE, MJ/kg gain</td>
<td>13.38</td>
<td>12.53</td>
<td>0.27</td>
<td>12.90</td>
<td>12.81</td>
<td>13.16</td>
<td>0.33</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Figure 1: Main effect of dietary SID Lys and NE contents on ADG of 7- to 10-kg pigs
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Table 2: Effect of dietary lysine and NE contents on performance and utilization efficiency

<table>
<thead>
<tr>
<th>Item</th>
<th>SID Lys, %</th>
<th>NE (MJ/kg)</th>
<th>P (Lys): 0.035</th>
<th>P (Lys x NE): 0.46</th>
<th>P (NE): 0.46</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADFI, g/d</td>
<td>1.22</td>
<td>1.32</td>
<td>9.75</td>
<td>10.10</td>
<td>10.45</td>
</tr>
<tr>
<td>SID Lys, g/kg gain</td>
<td>20.78</td>
<td>21.57</td>
<td>0.37</td>
<td>21.88</td>
<td>0.45</td>
</tr>
<tr>
<td>NE, MJ/kg gain</td>
<td>17.20</td>
<td>16.50</td>
<td>0.29</td>
<td>16.81</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Figure 2: Main effect of dietary SID Lys and NE contents on G:F of 7- to 10-kg pigs

Figure 3: Effect of SID Lys:NE ratio on G:F of 7- to 10-kg pigs

Figure 4: Main effect of dietary SID Lys and NE contents on ADG of 9- to 17-kg pigs
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Results (Continued)

Summary & conclusions

- No NE x SID Lys interactions for all parameters (Exp.1 and 2).
- The ADFI was not affected by the SID Lys or NE levels (Exp. 1 and 2).
- The ADG and G:F were not affected by dietary NE level (Exp. 1 and 2).
- Increasing SID Lys from 1.35 to 1.42% increased G:F of 7- to 10-kg pigs.
- Increasing SID Lys from 1.22 to 1.32% increased ADG of 9- to 17-kg pigs.
- G:F of 7- to 10-kg pigs maximized at 1.42 % SID Lys and 10.35 MJ/kg NE (SID Lys:NE of 1.37 g/MJ).
- ADG of 9- to 17-kg pigs maximized at 1.32 % SID Lys and 10.10 MJ/kg NE (SID Lys:NE of 1.31 g/MJ).

References