Feeding Brood Sows

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By L. J. Kortan, Extension livestock specialist, and R. C. Wahlstrom, professor of animal science

Pregestation, gestation, and lactation are critical periods in swine nutrition. Work at many experiment stations has shown that sows will produce larger litters if their energy intake is limited during gestation than if they are allowed access to a self feeder. In the gestation period weight gains must be controlled, because over-fatness often decreases litter size besides increasing feed costs. In the nursing period, plentiful milk production requires liberal feeding, however, there is evidence that milk production is to some extent related to the number of nursing pigs and it would appear reasonable to feed the lactating sow on a basis of the number of nursing pigs. A suggested level might be 1 pound per pig per day of a 16% lactation ration.

In formulating swine breeding rations, always consider the nutrients supplied in available form by natural feedstuffs. Supplement swine rations only by the amount of nutrients needed to balance ration. No evidence exists that superfortification of a ration above the nutrient requirement will bring about any additional benefits. In fact, in many instances, it may be harmful.

NUTRIENT REQUIREMENTS OF SOWS

Protein

Proteins are complex chemical substances present in various body tissues and fluids. Proteins are made from smaller and simpler protein building blocks called amino acids.

Ten of the amino acids are called essential, because they can not be produced by chemical changes within the pig’s body, as is the case with other amino acids. The pig’s growth or performance can be limited by a lack of any one of the essential amino acids, even though the other nine are supplied.

Protein is needed for maintenance, growth, gestation, and lactation. The carcass of a new born pig on a dry matter basis is composed of 70% protein or nitrogenous materials. Therefore, proper protein level in the ration is of special importance for gestating-lactating sows.

In numerous experiments swine have been fed good quality proteins to determine the most desirable level of crude protein in complete rations fed in dry lot and of the concentrates fed on pasture. Recommended crude protein allowances for breeding stock are given in Tables 1 and 2.

Energy Allowances

Energy is needed to maintain necessary life processes. After these processes are supplied, surplus energy may be stored as fat.

Carbohydrates and fats of available feeds are the chief sources of heat and energy in swine rations. Protein rich feeds are seldom used for this purpose because of their relatively high cost. Carbohydrates, which make up 75% of the dry matter in most plants, are the most abundant nutrients in all common feeds and are especially abundant in cereal grains and their by-products.

Swine require fat in a ratio. Research data indicates that a level of 0.22% fat is adequate. The practical swine ration contains at least this amount. After the essential fatty acid requirement has been met, additions of fat increase the energy content of the diet.

Swine are single-stomach animals rather than ruminants, and not considered roughage consuming animals. However, the brood sow can be fed some roughage. Levels of 15 to 25% fibrous feed, such as ground alfalfa hay or meal, are commonly used for bred sows and, if self-fed, you may want to consider higher levels. Recommended energy requirements are given in Tables 1 and 2.

Minerals

Mineral requirements for breeding swine favor the use of simple mineral mixtures. Providing excessive amounts of minerals when unnecessary is expensive and wasteful and may actually injure animals.
Minerals considered most essential in swine breeding rations and therefore most apt to be deficient are given in Tables 1 and 2. Minerals can be mixed with other feeds, fed free-choice, or both. When added to other feeds, mix so that minerals make up about 1¼ to 2% of the complete feed intake. Lactating sows have the highest daily mineral requirement.

Table 1. Nutrient Requirements of Breeding Swine: Percentage or Amount per Kilogram of Diet

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Bred gilts and sows*</th>
<th>Lactating gilts and sows†</th>
<th>Boars (young and adult)‡</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein and energy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude protein</td>
<td>%</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Digestible energy</td>
<td>kcal</td>
<td>3,300</td>
<td>3,300</td>
</tr>
<tr>
<td>Inorganic nutrients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>%</td>
<td>0.75</td>
<td>0.6</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>%</td>
<td>0.50</td>
<td>0.4</td>
</tr>
<tr>
<td>NaCl (salt)</td>
<td>%</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Vitamins</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>β-Carotene</td>
<td>mg</td>
<td>8.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>IU</td>
<td>4,100</td>
<td>3,300</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>IU</td>
<td>275</td>
<td>220</td>
</tr>
<tr>
<td>Thiamine</td>
<td>mg</td>
<td>1.4</td>
<td>1.1</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>mg</td>
<td>4.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Niacin</td>
<td>mg</td>
<td>22.0</td>
<td>17.6</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>mg</td>
<td>16.5</td>
<td>13.2</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>mcg</td>
<td>13.8</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Liveweight range (kg): 110 to 160. †Liveweight range (kg): 140 to 200. ‡Liveweight range (kg): 110 to 180.

The mineral mixture listed below when self-fed is adequate under most South Dakota conditions. It is recommended that breeding swine have free access to the mixture in a self-feeder.

- Limestone: 30%
- Steamed bone meal or Dicalcium phosphate: 50%
- Trace mineral salt: 20%

Vitamins

Vitamins represent a class of chemical food compounds, separate from carbohydrates, fat, proteins, and minerals. Many appear to function as regulators of body processes. Vitamin A, for example, is essential to the maintenance and normal functionings of the epithelia tissues. Also, several water-soluble vitamins are essential to formation of certain blood constituents.

Breeding animals produced under dry lot conditions may become vitamin deficient. Supplemental sources of vitamins A, D, and the B vitamins—riboflavin, niacin, pantothenic acid, and B₁₂ are sometimes required.

Whether or not vitamin supplementation is needed will depend upon the quantity and quality of the ingredients in the ration. Using either green, high producing alfalfa pasture or 25-35% well-cured, green, leafy alfalfa hay will eliminate most vitamin deficiencies of breeding swine under practical farm conditions.

Table 2. Nutrient Requirements of Breeding Swine: Amounts per Animal per Day—Expressed in Units of Metric System

<table>
<thead>
<tr>
<th>Breeding swine, liveweight class (kg) *†</th>
<th>Bred gilts</th>
<th>Bred sows</th>
<th>Lactating gilts</th>
<th>Lactating sows</th>
<th>Young boars</th>
<th>Adult boars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110-160</td>
<td>160-250</td>
<td>140-200</td>
<td>200-250</td>
<td>110-180</td>
<td>180-250</td>
</tr>
<tr>
<td>Protein and energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude protein</td>
<td>g</td>
<td>280</td>
<td>280</td>
<td>750</td>
<td>825</td>
<td>350</td>
</tr>
<tr>
<td>Digestible energy</td>
<td>kcal</td>
<td>6,600</td>
<td>6,600</td>
<td>16,500</td>
<td>18,150</td>
<td>8,250</td>
</tr>
<tr>
<td>Inorganic nutrients</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>g</td>
<td>15.0</td>
<td>15.0</td>
<td>30.0</td>
<td>33.0</td>
<td>18.8</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>g</td>
<td>10.0</td>
<td>10.0</td>
<td>20.0</td>
<td>22.0</td>
<td>12.5</td>
</tr>
<tr>
<td>NaCl (salt)</td>
<td>g</td>
<td>10.0</td>
<td>10.0</td>
<td>25.0</td>
<td>27.5</td>
<td>12.5</td>
</tr>
<tr>
<td>Vitamins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>β-Carotene</td>
<td>mg</td>
<td>16.4</td>
<td>16.4</td>
<td>33.0</td>
<td>36.3</td>
<td>20.5</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>IU</td>
<td>8,200</td>
<td>8,200</td>
<td>16,500</td>
<td>18,150</td>
<td>10,250</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>IU</td>
<td>550</td>
<td>550</td>
<td>1,100</td>
<td>1,210</td>
<td>690</td>
</tr>
<tr>
<td>Thiamine</td>
<td>mg</td>
<td>2.8</td>
<td>2.8</td>
<td>5.5</td>
<td>6.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>mg</td>
<td>8.2</td>
<td>8.2</td>
<td>16.5</td>
<td>18.2</td>
<td>10.3</td>
</tr>
<tr>
<td>Niacin</td>
<td>mg</td>
<td>44.0</td>
<td>44.0</td>
<td>88.0</td>
<td>96.8</td>
<td>55.0</td>
</tr>
<tr>
<td>Pantothenic acid</td>
<td>mg</td>
<td>33.0</td>
<td>33.0</td>
<td>66.0</td>
<td>72.6</td>
<td>41.3</td>
</tr>
<tr>
<td>Vitamin B₁₂</td>
<td>µg</td>
<td>27.6</td>
<td>27.6</td>
<td>55.0</td>
<td>60.5</td>
<td>34.5</td>
</tr>
</tbody>
</table>

*Total air-dry feed requirements (in grams) for the liveweight classes are respectively as follows: 2,000; 2,000; 5,000; 5,500; 2,500; and 2,0000. †Expected daily gain for bred gilts is 0.35 to 0.45 kg; for bred sows, 0.15 to 0.30 kg; and for young boars, 0.25 to 0.45 kg.
**Antibiotics**

No clear-cut evidence exists to explain the functioning of antibiotics. Most investigators think, however, that antibiotics act upon some system connected directly or indirectly with the microbial flora of the host animal.

High levels (0-300 gm) of feed additives may be beneficial just prior to and at breeding and farrowing time but are not recommended during the entire gestation-lactation period unless specific disease problems are present.

**Water**

Water is an often neglected, but important, nutrient required for gestating-lactating sows.

Daily water requirements for gestating sows is 4 to 5 gallons per day. Lactating sows require higher amounts—up to 6 gallons daily—as their milk is 80% water. A lactating sow will produce a maximum of 8 to 12 pounds milk daily during the first 3-4 weeks, then decline gradually.

**HERD REPLACEMENT GILTS**

Select and separate gilt markets from hog markets when they weigh 150-160 pounds. During the development period prior to and prior to breeding, feed the gilts a limited diet (4 to 5.5 pounds) of 13% to 15%, protein. They should weigh at least 250 pounds and have had at least one heat period at breeding.

Flushing Before Breeding

Flushing means feeding sows or gilts so they gain at least 1 ¼ pounds daily for three weeks prior to breeding. The sows should be put back on limited feeding one day might be considered. If such pasture is unavailable and gilts should weigh at least 250 pounds and have had at least one heat period at breeding.

**PASTURE-REPLACED FEED**

Successfully feeding the brood sow in South Dakota often consists of making maximum use of pasture and feeding a generous quantity of high quality ground alfalfa hay when pasture is not available. Pasture or high quality ground alfalfa will increase the quantity and improve the quality of proteins, provide necessary vitamins, and improve the mineral content of the ration. Pasture also reduces feed costs, provides exercise area, and is an important part of a good sanitation program.

Gilts and, especially, mature sows make excellent use of green pastures that are not stressed. The condition (fattiness) can be well controlled while considerable concentrate feed is saved by limited-feeding gilts on good-quality pasture. A feed saving of $30 to $70 per acre is possible. Sows in early pregnancy can be maintained largely on good pasture and minerals.

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mum of 4.5 pounds of ration containing .80% calcium and .60% phosphorus will furnish these amounts. Under a very limited feeding program on pasture when the intake is reduced to 3 pounds of complete ration daily, increase the calcium and phosphorus percentage per pound of total ration to 1.00 to 1.10% calcium and 0.80 to 0.85% phosphorus.

If grain and supplements are hand-fed daily in dry lot, be sure the amount of supplement meets the sow’s protein needs even though grain, the energy feed, is limited. Daily supplement requirements (a 35 to 40% crude protein supplement) under a hand feeding program is 1.3 pounds for gilts and 1.2 pounds for sows.

SELF-FEEDING DURING GESTATION

Self-feeding takes less labor but increased feed costs. To keep sows from getting too fat, rations need more fiber (generally ground alfalfa hay or meal) than usual. Provide 20 to 35% in a meal. When following a self-feeding program it is necessary to grind fibrous feeds fine (3/16 inch hammer mill screen) to prevent sows from sorting. A ration with 12% protein, .50% calcium, .40% phosphorus and .50% salt content is needed under a self-feeding program.

FEED COST

Feed makes up about 70% of the cost of producing pork. Buildings, equipment, labor, interest, and miscellaneous costs make up the rest. Estimated cost of feed per sow and litter of eight pigs is listed in Table 4.

Table 4. Figuring the Cost of Feed Per Sow and Litter of Eight Pigs Under Confined Feeding, Using Concentrate Ration and Hand-feeding from Start of Breeding Period to Farrowing a Total of about 135 days. Pigs weaned at six weeks weighing 25-30 lbs. and fed until they weigh 40 pounds. Sows from farrowing through weaning and until ready to be sold or rebred in 8 weeks.

Start of Breeding to Farrowing (Gestation)
Feeding an average of 5.5 lbs. of hand fed mix per day—135 days. 743 lbs.
Lactation (Pigs weaned at 6 weeks, sows fed until sold or rebred).
56 days using an average of 11 lbs. feed fed per day 616 lbs.
Total 1359 lbs.

Creep Feeding
40 lbs. per 40-lb. pig (8 pigs) 320 lbs.
Total feed per sow and pigs from breeding to weaning 1679 lbs.

Feed Costs (Sow feed .0264—Creep feed .0585)
Total feed costs (Average .0325): .0325 x 1679 = $54.59
Total feed cost per pig (8 pig litter: 54.59 + 8 = $6.82

Four-Year Pasture Rotation with Alfalfa or Alfalfa Mixture. Each year in the pasture plan above:

- Gilts and sows rotate to new pasture.
- One pasture is kept free of hogs and may be utilized for hay crops.
- One pasture is seeded to new pasture with oats as a nurse crop.
- One pasture is plowed and planted to corn.
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Brood Sows

Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture