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Improving Feed Conversion

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Feed conversion is calculated by dividing the amount of feed fed by the amount of pig weight gain.

$$\text{Feed Conversion} = \frac{\text{Pounds of Feed Fed}}{\text{Pounds of Gain}}$$

Improving feed conversion is a matter either of decreasing the amount of feed fed or increasing the amount of gain, or a combination of both.

Minimizing Feed Waste

Not all the feed placed in a feeder will be eaten by the pig. Records show that more than 30% of the feed fed can be wasted. Detecting feed waste can be difficult—up to 10% feed wastage is almost undetectable on a feeding floor. Properly managing feeders minimizes feed waste before it occurs. Stale feed in the feeder trough is usually rejected by pigs. The pigs will root the stale feed out of the trough in order to get to fresh feed. Saliva from the pigs will mix with feed and tend to slow down feed flow; thus, daily observation and adjustment of feeders is absolutely necessary.

Managing feeders to minimize feed waste:

- ◆ Open feeder just enough to start feed flow.
- ◆ Use rod to pull feed into pan.
- ◆ Your goal is to cover 1/3 (ONLY 1/3) of the feeding pan with feed.
- ◆ Check and adjust feeders daily.
- ◆ Maintain feeders in good working order, repair any holes, and replace worn out parts promptly.

Another way to limit feed waste is to limit-feed pigs. While most growing pigs in the U.S. are fed with self-feeders, most pigs in Europe are limit-fed. Limit-fed pigs are fed small amounts of feed multiple times a day. They are fed only what they will clean up between feedings. Typically pigs are fed 3-4 times per day on a clean feeding floor. Limit-fed pigs have an improved feed conversion rate, although limit feeding can be difficult with large groups and could result in uneven pig size.

Properly matching diets with the size of the pigs is a final strategy to minimize feed waste. As discussed in section 300 of this handbook, under- or over-feeding of different nutrients requires the pig to adjust feed intake and metabolism to compensate. For example, if protein is overfed, pigs must break down the extra protein into energy. This increases the energy spent simply digesting the feed and results in poorer feed conversion. The extra protein has been utilized less effectively for energy than it would have been for muscle growth. This is a form of feed wastage. Most of the impact of diets mismatched with pig needs is on growth rate, but feed conversion is about 60% correlated with growth rate.

Sow Productivity

In farrow-to-finish operations, sow productivity may have a substantial impact on feed conversion. A sow producing 10 pigs per year will eat almost the same amount of feed as a sow producing 18 pigs per year. Assume a sow eats 3,000 lb of feed in a year and produces 2 litters of pigs. If only 10 pigs are sold per sow, each pig must pay for 300 lb of sow feed. If 18 pigs per sow are sold annually, each pig must

account for only 167 lb of sow feed. This has a dramatic impact on overall herd feed conversion.

Similarly, the difference between producing two litters of 5 pigs annually and one litter of 10 pigs affects overall feed conversion. If only one litter of pigs is farrowed annually, lactation feed would be significantly reduced. Sows that are not pregnant or nursing can be maintained on much less feed than a sow that is nursing.

On the other extreme, litter size can influence the young pig's ability to survive and thrive. It has been shown that some sows are physically capable of producing up to 18 live pigs per litter. However with increasing litter size, the weight of each pig decreases. Newborn pigs that are born small are at a disadvantage and are more likely to be crushed by the sow and become chilled, and they do not grow as rapidly.

The goal for niche market producers should be to have sows that will consistently farrow a litter of 9-12 vigorous pigs with an average birth weight of about three pounds.

Sow Feeding

Gestating sows have the potential to eat large amounts of feed. However, overfeeding gestating sows is detrimental to sow and pig productivity. Piglet crushing and sow mortality rates increase as sows become overly fat, especially in warm conditions. Milk yields also can decrease, triggering starve-outs and unthrifty, low viability pigs that are more susceptible to disease problems. A good strategy to satisfy the appetite of a gestating sow without excessive weight gains is to feed a low-cost, high-fiber feed.

Tracking feed use by gestating sows is important. Remember, you manage what you measure. Some farms that have begun to measure sow feeding have found that they are actually overfeeding each sow 3 to 4 lb per day. This is almost a doubling of

gestation feed use that is not only unnecessary but detrimental to the overall performance of the pig herd.

Feed particle size

Digestive enzymes work on the surface area of feed particles. If feed particle size is too big, there is insufficient surface area for the digestive enzymes to work and the feed is not well-utilized by the pig. If feed particles are too small, they can lead to ulcers in the pig and bridging in the feeders. The goal for feed particle size is a medium grind, 700 μm (micron) diameter or about 0.03 in. An acceptable range for feed particle size is 650 to 750 microns. Feed particle size should be measured regularly. Kansas State University provides detailed equipment list and instructions at the following Web site:

<http://www.asi.ksu.edu/DesktopModules/ViewDocument.aspx?DocumentID=2771>

If feed particle size is outside of the acceptable range, adjustments should be made on the grinding equipment such as rotating or replacing worn hammers, rollers, or screens.

Other Factors

- ◆ **Environment:** The environmental conditions that a pig confronts determine the functional limit to growth and thus affect feed conversion. Cold weather will increase the amount of feed needed to simply keep the pig warm. Muddy and cold conditions also can increase the amount of feed needed for body maintenance. Heat will reduce feed intake and may affect feed conversion.
- ◆ **Genetics:** Pig genetics set the upper limit to growth. Animals that are leaner and grow faster will have more potential for better feed conversion. However, it is important to match the genetics of the pig with the environmental conditions

and the meat quality expectations of the niche market.

- ◆ Herd health: Sick pigs do not eat as much as healthy pigs. As feed intake decreases, growth rate slows. Feed conversion is poorer because more feed nutrients are used for fighting disease and maintaining body function and less for growth.
- ◆ Mycotoxins and anti-nutritional factors: Toxins from molds and other microorganisms will reduce feed intake, growth rate, and feed conversion. In some cases they can be toxic to pigs. Similarly, feeds that are not well digested by pigs will lower feed conversion. A balance between feeding a low cost but less digestible diet and a more expensive but better utilized diet must be found. Feed ingredients should be free of contaminants and readily utilized by the pig.
- ◆ Age at weaning: Pigs weaned at 21 or 24 days will grow faster in the finishing phase than pigs weaned at 10 or 14 days. The improved growth rate in finishing results in an improved feed conversion for

the entire lifetime of the pig. Most niche markets require a weaning age of greater than 35 days.

Additional Resources

Iowa State University Extension. 1996. Life Cycle Swine Nutrition. PM-489. Iowa State University. Ames.

Kansas State University Extension. 2007. Measuring feed particle size. <http://www.asi.ksu.edu/DesktopModules/ViewDocument.aspx?DocumentID=2771>

Lewis, Austin J. and L. Lee Southern editors. 2001. Swine Nutrition 2nd Edition. CRC Press. Boca Raton, FL.

U.S. Pork Information Gateway
<http://pork.porkgateway.org/web/guest/home>