

# Swine Feed Efficiency: Impact of Feeder Design and Management

Author  
Russ M. Euken, Iowa State University

Reviewers  
Mike D. Tokach, Kansas State University  
Joel M. DeRouchey, Kansas State University

## Introduction

One of the factors that influence feed efficiency is how pigs access feed via the feeder. Feeder design primarily impacts feed efficiency by affecting the pigs' access to feed and feed wastage. Gonyou and Lou (1997) tested 12 feeders and found that all 12 feeders had wastage of less than 5%; smaller pigs wasted more feed (4.4%) than larger pigs (2.4%).

## Factors in Feeder Design

Feeder design includes how the feed is presented to the pig, the space allowed for the pig to consume the feed, storage capacity of the feeder, and the ability to manage how much feed is available to the pig in the feeder trough. Some feeder design features might impact water use, rate of gain, or carcass characteristics in addition to feed efficiency. Other factors in feeder design not covered in this factsheet include the initial cost of the feeder relative to performance benefits and how the feeder matches building and pen layout.

## Research Highlights on Feeder Design

The factors above would have some relationship to each other when attempting to determine the effect of feeder design on feed efficiency, but they will be reviewed individually.

***Feeder type - wet/dry vs. dry feeders.*** Wet/dry feeders provide water access at the same time and location as the feed, allowing the pig to drink while consuming wet feed. Several studies comparing dry feeders to wet/dry feeders found that pigs fed with wet/dry feeders in general had 5% increased gain and intake and ate a similar quantity in a shorter time period than pigs on dry feeders (Gonyou and Lou, 2000; Bergstrom et al, 2012). However, changes in feed efficiency were variable or unchanged. In experiments with recently weaned pigs, wet/dry feeders have not performed as well as dry feeders.

***Feeder type - single vs. multi space feeders.*** Provided that adequate space is provided for all pigs, most research found no difference between multi space and single space feeders in terms of feed efficiency over the entire feeding period (Nielsen, 1996; Gonyou and Lou, 1997). Smaller pigs had increased intake and gain with single space feeders, but feed efficiency was unchanged.

***Feeder space dimensions and design.*** Feeder space dimensions are the depth and width of the trough and the feeder lip height. Gonyou and Lou (2000) found feeding behaviors that cause feed waste included pigs backing away from the feeder, eating while their head was raised, fighting, and stepping into the feeder. Dimensions that minimize these behaviors should reduce feed wastage. Larger pigs need more than 8 inches of feeder trough depth to access the whole feed trough, but smaller pigs step in the feeder more often when the depth is greater than 8 in. A trough depth of 7.5 – 11.5 in. is a good compromise to meet the needs of small and large pigs and a lip height of 4 in. helps prevent pigs from stepping into the feeder. The feeder width should be approximately 10% greater than the shoulder width of a biggest pig to be fed. Thus, pigs nearing market weight would need approximately 14 in. of width per feeder space.

Design of the feeder space also involves the separation of the feeder spaces. Solid partitions that separate feeding spaces force pigs to stand at a 90° angle to the feeder. This limits aggression and allows access to all feeder space, but also limits how larger pigs can turn their head to access feed. With no partitions, pigs stand at approximately at a 30° angle to the feeder which appeared to give them greater ability to turn and angle their head to consume feed; however, not all spaces may be accessible, especially with larger pigs. There has been no evaluation of feed efficiency or other production measures that would compare partitions to no partitions.

***Number of head per feeder space.*** The number of pigs per feeder or the trough space per pig primarily affects the availability of feed to the pigs. If there are too few pigs per feeder space, some feeder space may not be used enough to provide fresh feed and the additional feeder space is simply extra cost. If there are too many pigs per feeder space, all pigs may not have enough time to eat what they desire, and competition and fighting increases at the feeder. Because smaller pigs eat slower than larger pigs, feeder space is more often limiting with small pigs. If feeder space is restricted a wider feed gap setting may be needed. Because pigs fed pelleted diets or with wet/dry feeders consume feed more quickly, more pigs per feeder space can be accommodated with pelleted diets or wet/dry feeders. Several studies have not shown feed efficiency differences with 4 to 15 pigs per feeder space, but feeder occupancy and eating time per pig does change. From a practical perspective, for pigs fed meal diets from dry feeders, 11 to 12 pigs can be fed from a feeding space while keeping feeder occupancy rate under 80% (Gonyou, 1999). The number can be increased to 15 pigs with wet/dry feeders.

***Feeder gap adjustment.*** Feeder adjustment influences growth rate more than feed efficiency; however, excess feed in the feed pan increases feed wastage and decreases feed efficiency. If feeders are adjusted too tightly, such that intake becomes limiting, growth rate will be reduced. A feeder gap setting that would allow 40 to 60% of the feeder trough to be covered with feed is recommended for all sizes of pigs with both wet/dry and dry feeders. To achieve this coverage, the gap setting usually must be wider for smaller pigs because they do not operate the feeder agitation gate as aggressively as larger pigs. Increasing feed gap settings to allow for greater than 60% trough coverage increases feed waste by the pig.

## Conclusion

---

Feeder design and selection impacts more than just feed efficiency. However, feeder design can influence feed efficiency by the amount of feed waste. Feeder designs that allow a pig to eat adequate feed with limited waste would excel in feed efficiency. The design or dimensions of the feeder space that allow the pig to eat with minimal wasted feed has been researched, but more research needs to be done across pig size, feeder type, feeder space allocation, and diet type. Feeder adjustment on any one particular feeder type is difficult to detail but the guideline would be to aim for 40 to 60% feeder trough coverage.

## References

---

- Bergstrom J.R., J.L. Nelssen, M.D., Tokach, S.S. Dritz, R.D. Goodband, and J.M. DeRouchey. 2012 The effects of two feeder designs and adjustment strategies on the growth performance and carcass characteristics of growing-finishing pigs. *J. Anim. Sci.* published online September 5, 2012 doi:10.2527/jas.2011-4485.
- Gonyou, H. 1999. Feeder and pen design to increase efficiency. *Adv. Pork Prod.* 10:103-113.
- Gonyou, H. and Lou, Z. 1997. An ergonomic evaluations of feeder design. In: *Prairie Swine Centre Inc annual report* p 55-58. <http://www.prairieswine.com/publications-psc/pdf-ar/AnnualReport1997.pdf>
- Gonyou, H. W., and Z. Lou. 2000. Effects of eating space and availability of water in feeders on productivity and eating behavior of grower/finisher pigs. *J. Anim. Sci.* 78:865-870.
- Nielsen, B. L., A. B. Lawrence, and C. T. Whittemore. 1996. Feeding behavior of growing pigs using single or multi-space feeders. *Appl. Anim. Behav. Sci.* 47:235-246.

... and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call 800-795-3272 (voice) or 202-720-6382 (TDD). USDA is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Cathann A. Kress, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa