

Energy use and nutrient cycling in pig production systems

Abstract:

Researchers explored all aspects of energy use in hog production from the perspective of two systems currently in use in Iowa—conventional confinement systems and bedded hoop barns.

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How much energy does it take to raise a pig in different systems in Iowa? The project answered the question by calculating direct and indirect energy flows into and through pig production systems based on physical material flows.



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What was done and why?

Energy is used in all aspects of pig production, from the manufacture of materials for building construction to the cultivation and processing of feedstuffs. A pig production system includes pigs, buildings that house pigs, feed given to pigs and cropland used to grow the feed and as a site for recycling of manure nutrients. This project examined how energy is used by different types of pig production systems in Iowa.

A system for producing hogs consists of three elements: buildings used to house pigs, diets fed to the animals, and cropland used to produce the feedstuffs. The project examines non-solar energy use of different facility type \times crop sequence \times diet formulation strategies. Greenhouse gas emissions also are estimated based on non-solar energy use. A corn-soybean crop sequence is commonly used throughout Iowa and corn-soybean meal diets are most commonly fed to pigs in the United States. This project also looked at several different crop sequences and diet strategies for pigs. Diverse crop rotations that include perennial forages have demonstrated environmental benefits, but those types of feedstuffs are not well utilized by pigs.

What did we learn?

Three major differences exist between the conventional and hoop barn-based systems:

- non-solar energy necessary to operate buildings on a daily basis,
- amount of feed required by pigs housed in the different facility types and
- amount of nitrogen retained in manure and ultimately delivered to cropland in the two systems.

The hoop barn-based system has a clear advantage in terms of energy used for building operation. Research has reported that raising pigs in hoop barns requires approximately 3 percent more feed than conventional facilities. It should be noted that the genetic lines used in those studies have been developed for optimal performance in the conventional confinement facility. The fact that performance between the two housing systems was similar points to the adaptability of the pig. It is possible that through genetic selection and refinement of husbandry practices, the feed consumption by pigs housed in bedded hoop barns may be equal to or less than feed consumption in conventional systems.