Coupling swine technologies: swine system options

Mark S. Honeyman
Iowa State University, honeyman@iastate.edu
Coupling swine technologies: swine system options

Abstract
Three major alternative swine production systems were researched and demonstrated at Iowa State University research farms: hoop structures at Allee Farm near Newell and Rhodes Farm near Rhodes, outdoor farrowing at the Western Farm near Castana, and a deep-bedded Swedish system at the Armstrong Farm near Lewis.

Keywords
Animal Science, Hoops and alternative livestock systems

Disciplines
Agriculture | Animal Sciences | Bioresource and Agricultural Engineering

This article is available at Iowa State University Digital Repository: http://lib.dr.iastate.edu/leopold_grantreports/143
Coupling swine technologies: 
Swine system options

Abstract: Three major alternative swine production systems were researched and demonstrated at Iowa State University research farms: hoop structures at Allee Farm near Newell and Rhodes Farm near Rhodes, outdoor farrowing at the Western Farm near Castana, and a deep-bedded Swedish system at the Armstrong Farm near Lewis.

Background

Swine system options for producers include things such as housing, nutrition, breeding, manure, health, and marketing. Some options may include hoop structures, outdoor production systems, remodeled facilities, bedding, various feeding approaches, a variety of breeding schemes, composting manure, and marketing niches and networks. The producer who opts for an alternative production system needs keen management skills and superior animal husbandry skills.

The swine industry has been experiencing profound structural changes causing widespread concern about their impacts on family farms, rural communities, and market access. Some farmers wonder whether the swine industry will leave the region, even though raising pigs has been a key element of agriculture in the Midwest for many years.

These changes also have raised serious environmental questions related to odor and to surface and groundwater contamination by swine manure. While pig farms have increased in size (and amounts of manure generated), the number of hog farmers is declining each year. In 1992, Iowa had more than 30,000 hog producers. In 1997, there were only 18,000 farmers raising hogs.

Animal care and animal welfare in confinement units is another topic under public scrutiny. Farmers and workers in confinement systems are reporting health problems, usually respiratory ailments. The Food and Drug Administration is seriously questioning the use of subtherapeutic levels of antibiotics in livestock feeds as a growth promotant. Economic losses plague hog farmers as prices have dipped to their lowest levels in recent years.

Given these factors, alternative swine production and marketing approaches may be beneficial for farmers. These approaches allow more freedom of movement and choice for the pig. They rely less on equipment, automation, and buildings to control the pig, requiring farmers to practice more intensive husbandry. Bedding is frequently an integral part of these systems, which require less capital and energy than conventional confinement operations. Marketing frequently consists of producing pork for specialty uses or to unique specifications.
Approach and methods

The project work included

1. Research related to feeding and rearing market pigs in deep-bedded hoop structures in comparison to mechanically ventilated confinement. Work was done at the ISU Rhodes Research Farm in central Iowa.
2. Demonstration of a deep-bedded Swedish feeder pig production system at the ISU Armstrong Research Farm, Lewis.
3. Research related to outdoor farrowing at the ISU Western Research Farm, Castana.
4. Demonstration of a small-scale hoop structure at the ISU Allee Demonstration Farm, Newell.
5. Use of deep-bedded hoop structures for gestating sows at the Lauren Christian Swine Research Farm, Atlantic.
7. Preparation of budgets for alternative swine systems, including organic pork production and outdoor-hoop systems.

Results and discussion

Hooped structures Since 1996, more than 1,500 hoop structures have been built for raising pigs in Iowa. These quonset-like, low-cost structures are most often used for feeding grow-finish pigs or for gestating sows. The total cost of production for finishing pigs in hoops is similar to confinement, although the distribution of costs differs. Hoops have lower fixed costs and slightly higher variable costs (bedding and feed) on a year-round basis. Hoop pigs require about 10 percent more feed in the winter because they are in a colder environment. Depending on bedding quality and care provided by the manager, each pig raised in hoop structures needs about 200 pounds of bedding. Internal parasite control programs must be aggressive in hoops because pigs have contact with their feces. Behavioral studies of pigs and surveys of farmers show that both the pigs and the farmers seem to like hoops.

Hoops work well to house gestating sows. Overall costs are competitive or lower than for crated gestation confinement systems. In hoops, sows live on bedding in a group setting. Feeding stalls are important to control individual sow feed intake, to minimize fighting, and to manage the sows as individuals. Batch farrowing (i.e., moving large groups of sows in at a time) works better than introducing small numbers of sows.
The Leopold Center's hoop initiative (a.k.a. the "hoop group") research has centered on the ISU Rhodes Research Farm in central Iowa, comparing finishing pigs in hoops and confinement. Two groups of pigs (winter 1997 and summer 1998) were fed identical diets, were of similar genetics, and were managed by the same staff at the same location.

In winter, the hoop-dwelling pigs grew more slowly and were less efficient in weight gain than the confinement pigs. In summer, the hoop pigs grew faster and were more efficient. Combining these figures on a year-round basis shows that there were no major differences in feed intake, growth rate, feed efficiency, mortality, or lightweights for pigs in hooped houses compared with confinement units. On an annual basis, pigs in confinement seem to be leaner than pigs in hoops, but adding a fibrous feed to hoop hog diet may alter this situation.

Outdoor farrowing For the last nine years, ISU has been researching and demonstrating outdoor or pasture farrowing at the Western Research Farm, Castana. Major work has compared piglet mortality in different styles of floorless outdoor farrowing huts. The English arc-style hut was superior with less than a 4 percent prewean mortality rate. Other huts had a higher mortality rate (up to 20 percent), possibly because of hut size and shape and the location of the door. Budgeting work shows that outdoor farrowing is cost-competitive and may have advantages when coupled with early weaning or hoops for gestation.

Deep-bedded Swedish feeder pig production systems A small, deep-bedded Swedish feeder pig production system was demonstrated for 2 1/2 years at the ISU Armstrong Research Farm, Lewis, and received a good deal of visitor attention. Breeding and gestation of sows were performed in a hoop structure. Farrowing occurred in a remodeled 1950s-style hog house. Litter size and birth weight were excellent. However, prewean mortality was very high (more than 27 percent) and primarily occurred in the first three days after birth. The high mortality rates resulted from piglets being crushed by the sows.

At 10 to 14 days after farrowing, the farrowing boxes were removed. Group lactation often to 14 litters was allowed and went well. The pigs were weaned at about five weeks of age by removing the sows. The pigs remained in the same setting for 26 days after weaning to minimize stress. Growth rate without feed antibiotics was 1.22 lb/day. Because of the large litters and high conception rates, the Swedish system was superior to the ISU Swine Enterprise Records averages. Using farrowing crates and then moving litters to group lactation may help diminish high prewean mortality rates.
**Conclusions**

These swine system options or alternative production systems are environmentally friendly, pig-friendly, producer-friendly, and community-friendly. All systems could be easily adopted and are economically competitive with traditional systems. Further refinements are needed to achieve maximum performance with each alternative system.

**Impact of results**

The work has generated considerable interest and is important to sustaining the hog industry in Iowa where swine production is changing rapidly. The Leopold Center's interdisciplinary hoop initiative was a direct outgrowth from this project.

**Education and outreach**

Twenty-three published reports and three refereed journal articles were written by project participants about their research findings. *The Swine Source Book: Alternatives for Pork Producers*, issued by the University of Minnesota in 1999, included nearly 30 articles derived from results of this project.

A key outreach activity for this project was the February 1999 Swine Systems Options Conference attended by 360 people. Results from this project were shared at several concurrent sessions.

Ten presentations were made to groups in several states, and ten radio interviews were conducted to discuss the project. In addition to five field days, attended by 550 persons, 3,500 visitors viewed the Swedish deep-bedded project.