On-farm Examples of Alternative Winter Farrowing Systems

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Summary and Implications

There is growing demand in Iowa for pigs raised outdoors or in deep-bedded systems without the use of antibiotics, growth promotants, or animal by-products. Currently many producers selling naturally-raised pork market their animals to a company that requires adherence to the Animal Welfare Institute's (AWI) Animal Welfare Standards. One of the key components of these standards is the requirement for bedding and the prohibition of farrowing crates. While a pasture farrowing system is effective during most of the spring, summer, and fall, an alternative system is needed in order to farrow pigs in the winter for the naturally-raised pork market.

There are a variety of farrowing systems currently being used during cold weather to farrow pigs for the natural pork market. In general, all rely upon a primary heat source capable of maintaining a room temperature of at least 50º F and auxiliary heat sources (heat lamps, bedding pack, confined space) to create a warmer microclimate for the young pigs. The use of adequate bedding and a design in harmony with the natural instincts of the hogs are key to the success of the example systems. A final critical consideration is a breeding program that insures sows in a particular room farrow within a short time frame (7 days or less).

Three unique systems, detailed in this report are free stalls in retrofitted buildings, the Swedish system, and greenhouse with radiant tube heater. A relative comparison of the three winter farrowing alternatives is shown in table 1. No system has a clear advantage over the others, but each system has its own unique strengths and management requirements. Producers interested in capitalizing on the growing demand for natural pork born in the winter should consider their individual resources and goals as they adopt a system to meet their needs.

Introduction

Many Midwest hog farmers are active in niche markets for pigs raised outdoors or in a deep-bedded system, without the use of antibiotics or growth promotants and without animal by-products in the diet. Currently most producers selling naturally-raised pork follow a traditional production cycle with the bulk of farrowings occurring outdoors in spring and fall. While the weather in the Midwest is most conducive to successful outdoor farrowing in the spring and fall, the demand for naturally-raised pork is relatively constant throughout the year. Current farrowing schedules of natural pork create peaks in the supply of pigs during the fall and spring, leaving market demand unmet during other seasons particularly in summer when winter-born pigs are marketed. This lack of supply hampers the growth of the naturally-raised pork market. Without a constant supply of natural pork throughout the year, many vendors who would like to carry the product, are unable to do so. Some niche markets will only accept new growers that can farrow during the winter months. The continued growth of the naturally-raised pork industry is closely tied to producers' ability to market pigs throughout the year.

Currently the primary buyer of naturally-raised pigs in Iowa requires adherence to the Animal Welfare Institute's (AWI) Animal Welfare Standards. These standards prohibit the use of close confinement in farrowing crates for any length of time. Farrowing pens, or cubicles that allow free movement of the sow are encouraged. Farrowing pens with manure gutters are allowed as long as they provide a minimum of 54 square feet per sow and litter exclusive of the manure gutter. For a pen without a manure gutter, at least 64 square feet per sow and litter is also acceptable. Several producers have developed production systems that allow them to sell pigs to the natural pork market and to successfully farrow during the winter months. This paper highlights three unique bedded housing options in Iowa that fit the natural pork standards and have been successfully used through at least one winter season.

Materials and Methods

This report details the results of site visits and producer interviews conducted during the summer of 2003 on various Iowan farms. All individuals are using alternative winter farrowing systems, which allow them to capture the premiums offered by the natural pork market. Three unique systems, detailed in this report are free stalls in retrofitted buildings, the Swedish system, and greenhouse with radiant tube heater.

Results and Discussion

Free Stalls in Retrofitted Buildings

In 1998, in response to the very low price of hogs on the conventional market, one producer elected to modify his existing farrowing crate system to meet AWI standards. Originally constructed in the late 1930's or 1940's, his primary barn had farrowing crates on a concrete floor. Both mechanical and natural ventilation were utilized. Twice daily he allowed the sows out of the crates and into a common outdoor area for feeding. Modification of his system involved simply setting the backs of the 5 ft × 7 ft crates against a wall, removal of the fronts of the crates, and angling of the sides to create triangular areas for the piglets and a trapezoidal nesting space for the sow (figure 1). In

some of the free stalls he has placed one of the old farrowing crate doors to create a 2.5 ft wide front panel with a 2.5 ft doorway. If necessary to confine the sow for brief periods of time for vaccination or while processing pigs, a second crate door is placed in the open space. Several stalls in the barn have no front panel. Walls and ceiling of the building are insulated, forced air heaters are used to keep the entire building near 65°F. Heat lamps are used over the creep areas to create a warmer microclimate for the piglets. There are two rooms in the building, one with seven stalls, the other with nine. The stalls are semi-permanently set in place along one wall. An alley to the outside feeding floor is located at the front of the stalls. A 12–14 in. high barrier is set across the open front of the farrowing stalls to help keep newborn piglets in the correct stall. When the pigs start to jump over the barrier at 5–10 days of age, it is removed. Sows have access to the outdoor exercise area, where a self-feeder and frost-free water fountain are located. A mixture of oat straw and shredded paper bedding is added to the stalls as needed. In general the sows keep their individual stalls clean. The sows tend to dung in the alleyway on their way to the outdoor feeding floor. Alleys are cleaned daily by hand.

A second building built in the 1960's is similarly situated and managed (figure 2). Two rooms of six stalls were created using panels from farrowing crates already on hand. Sows are fed with a self-feeder located on an outside floor and water is provided using a frost-free water fountain. According to the original design one door for each room is located on the ends of the building. This tends to create an undesirable wind tunnel effect in the winter that is counteracted by sealing off one door during the extremely cold portions of winter and treating the building as one pen. Moving the doors to the center of the building would address the wind issue and allow for two separate rooms, but as of yet it has not been necessary. This building has a peaked ceiling with a maximum height of 6.7 ft sloping down to 4 ft sidewalls. The heat trapping effect of this low ceiling is a benefit in the winter, but can create uncomfortable temperatures in the summer. To address this, the producer manages his pig flow so that he does not farrow in this building during the hottest parts of the year.

Piglets are processed in a variety of ways depending upon sow temperament. With some it is safe to process piglets with the sow in the stall, if necessary sows can be locked out of the stalls or locked out of the building to insure worker safety. Piglets are weaned at 5–6 weeks of age by removing the sows. The baby pigs then remain in their farrowing room for an additional 2–4 weeks depending upon availability of space in nearby hoop barns used for finishing and pending demands for farrowing stalls.

A farrowing room is available for five cycles per year. This producer has farrowed in his facilities for over twenty years and started with the current management in 1999. Overall, he is satisfied with his buildings and their labor needs. Admittedly he would make minor changes if he had the option of building new facilities, but overall he is happy with his system.

In one winter, each room is turned twice, producing 56 litters during the winter months. In 2002 this producer weaned 86% of the pigs born alive/litter, or 7.4 pigs/litter. In the winter of 2002/2003, approximately 700 gallons of LP gas were used between both buildings. Estimated heating cost/pig in 2002/2003 for these buildings is $1.52/pig weaned.

A Swedish System in a New Building

In 1996, a northern Iowa pork producer decided to build a farrowing facility replicating the deep-bedded Swedish system demonstrated at the ISU Armstrong Research and Demonstration Farm near Lewis, IA. It consists of a 102 ft × 52 ft building with four 24 ft × 48 ft rooms. The building is mechanically heated and ventilated with insulated concrete walls and concrete floor. Rooms are orientated north to south, with an alley, self-feeders for sows, and creep area for young pigs at the north end of each room. Drinking cups and a floor drain are located in one of the southern corners of each room. A large insulated sliding door in the south wall allows access to the room for moving pigs and for cleaning the building. Along the east and west walls of each room 6 ft × 8 ft removable farrowing pens are located. A total of 11 pens are able to fit in each room (figure 3). The pens are constructed of 3 ft high wooden panels connecting to the wall and each other by using metal U-loops and rods. Each front panel has a 3 ft wide open door with roller to keep piglets in the pen.

Piglets are processed in the farrowing pens or can be carried to the alley at the north end of the building if sow temperament requires it. The rollers are removed as pigs begin to jump over them, fronts are then removed when pigs reach 5 to 7 days of age. The remaining panels are removed by the time the pigs are 10 days old to facilitate group lactation. At 5 weeks of age, pigs are weaned by removing the sows. Piglets remain in their given room until they are 10 weeks old. No guardrails or heat lamps are used in this system. The producer has considered creating a protected area for the piglets in a corner of each farrowing pen, but currently he is satisfied with his weaning rates and cannot justify the additional labor or storage space.

The building is used year round. When pigs reach ten weeks of age they are moved to a finishing unit. Following each group, the bedding pack is removed and the walls and floors are swept and limed. Cleaning and resetting the room generally takes about 5 hours. Each room is annually power washed to help control disease, washing adds about 3 hours to the time needed to prepare a room. Each room is turned five times in a given year. Sows come out of the farrowing room in excellent condition and are immediately bred back. Close attention is paid to the breeding program so that all sows in a given room farrow within 5 days, and the entire building farrows within two weeks of each other. This insures the best growing conditions for piglets in a given

room and is the most efficient use of available labor and facilities.

Temperature of the room is maintained at 60–65ºF year round with forced air heaters and ventilation fans. In a typical year 1,500 gallons of LP gas is used. The heating cost/weaned pig for this building is about $0.72/pig. Typically 8–9 pigs/litter are weaned from the system year round. The largest obstacle in this system is the initial cost of the building. In 1996 it cost $90,000, or nearly $2,050/farrowing space, to build the building. While the producer is very happy with the facility, he would consider a more economical design if he had the opportunity to begin again.

Greenhouse with Radiant Tube Heater

In 2001, a producer with pasture farrowing experience was looking for a way to use his existing equipment and farrow in the winter. He elected to build a 32 ft × 54 ft hoop-style greenhouse building covered by air-insulated, translucent plastic. The 5 ft high sidewalls were erected in the pattern of a typical hoop barn. The building is oriented east to west with self-engineered solid ends and 16 ft sliding doors used during cleanout. On top of the sidewalls, arched trusses were set. A manufactured double layer of translucent plastic was set over the trusses. A small fan is used to maintain a 2–4 inch air layer between the two plastic sheets. The hoops, cover, and necessary fans were purchased from a greenhouse supply company. The translucent plastic allows solar energy to heat the building and the air layer acts as insulation. Building costs for this building, including labor was less than $10,600. A radiant heater tube was installed along the center ridge of the building to supplement the solar gain of the building. Total cost for the heater including installation was less than $1,400. Total cost/sow space including the pasture huts used was just under $1,350.

Two rows of six, plywood modified A-frame huts (7 ft × 7.5 ft) designed for pasture farrowing are set along the north and south walls with backs of the huts in contact with sidewalls of the building. This leaves a 17 ft wide common area between the two rows of huts. Feeding and watering is done using a self-feeder and a watering tank set on 12 ft × 12 ft platforms at the east end of the building (figure 4). The same huts, feeding, and watering equipment used for pasture farrowing in the spring, summer, and fall are utilized in this building during the winter. A 12–14 in. high barrier, either a roller or lumber is set across the door of each hut. The entire building is bedded to eliminate any potential problems with mud or frozen ground. The temperature difference between the huts and the open common area is such that the sows will go to the huts for farrowing during the winter. When piglets reach 5–10 days of age, the barriers are removed and group lactation occurs. The sloped roof of the huts allow a person to walk along the back roof of the structures, open a rear access panel, and easily process piglets without creating stress on the sows or workers (figure 5). Pigs are weaned at 5 weeks of age by removing the sows. Young pigs remain in the greenhouse until they are approximately 9 weeks old. They are then moved to one of several finishing units. Huts remain in the building until young pigs are removed. Approximately 8 hours are spent removing huts, cleaning out the bedding pack, and resetting the huts for the next group of sows.

A building temperature of at least 60ºF is maintained. Typically, the solar gain from the translucent plastic is adequate between the hours of 8:00 am to 4:00 pm to heat the building, particularly once the bedded pack becomes established and begins to heat. Temperatures inside the huts are typically 10–15ºF warmer than the room temperature. Temperatures in composting portions of the bedding pack that the piglets can easily burrow in have been measured at 110–120ºF. The radiant tube heater generally runs when outside temperatures dip below 10ºF, with the bulk of the usage coming between 4:00 pm and 8:00 am during the months of December, January, and February. The large drive-in doors of the buildings are kept closed during the winter, but two doors for ventilation measuring 2 ft × 4ft are located at the top of each end and are opened as necessary during the warmer parts of the day.

Health problems in this system are few, perhaps due to the disinfecting properties of sunlight and the extremely high temperatures that occur in the summer when the building is not in use. Installing a shade cloth over the hoop may allow using it for farrowing in the summer months, but this producer prefers to farrow on pasture during the summer and allow the building to sit idle.

While it would be possible to turn the building three times during the colder months of the year, this producer farrows twice per year in the greenhouse and plans his other farrowings to fit the pasture system. Approximately 400 gallons of LP is used by this building in a year at an average cost of $1.76/pig weaned. Currently the building has a dirt floor. One improvement that is being considered is pouring concrete to make cleaning the building easier. No heat lamps are used, and weaning rates are 8–8.5 pigs/litter at 5 weeks of age.

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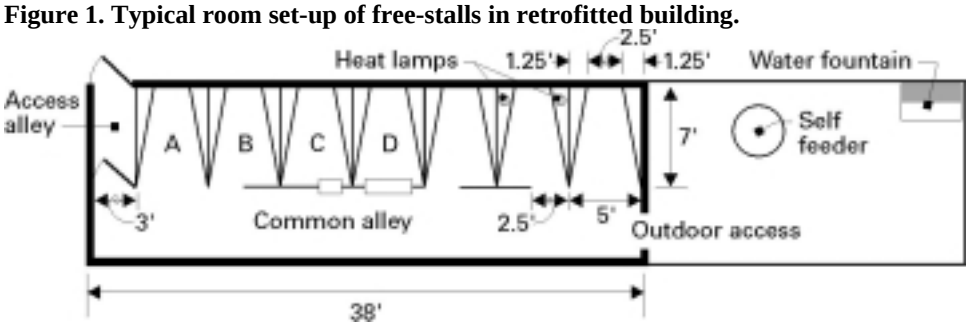
Table 1. Alternative Systems for Winter Farrowing.

Winter Farrowing System	Average No. pigs weaned/litter	Heating Cost/ pig weaned	Labor Required	Piglet protection from crushing
Free Stalls in Retrofitted Facilities	7.4	$1.52	High	High
Swedish System	8–9.0	$0.72	Medium	Low
Greenhouse with Radiant Tube Heater	8–8.5	$1.76	Low	Medium

Figure 1. Typical room set-up of free-stalls in retrofitted building.



A: Basic free stall set-up *B: Free-stall with partial front*
C: Free-stall with partial front and roller *D: Free-stall with roller and no partial front*

Figure 2. Retrofitted 1960's style farrowing barn.

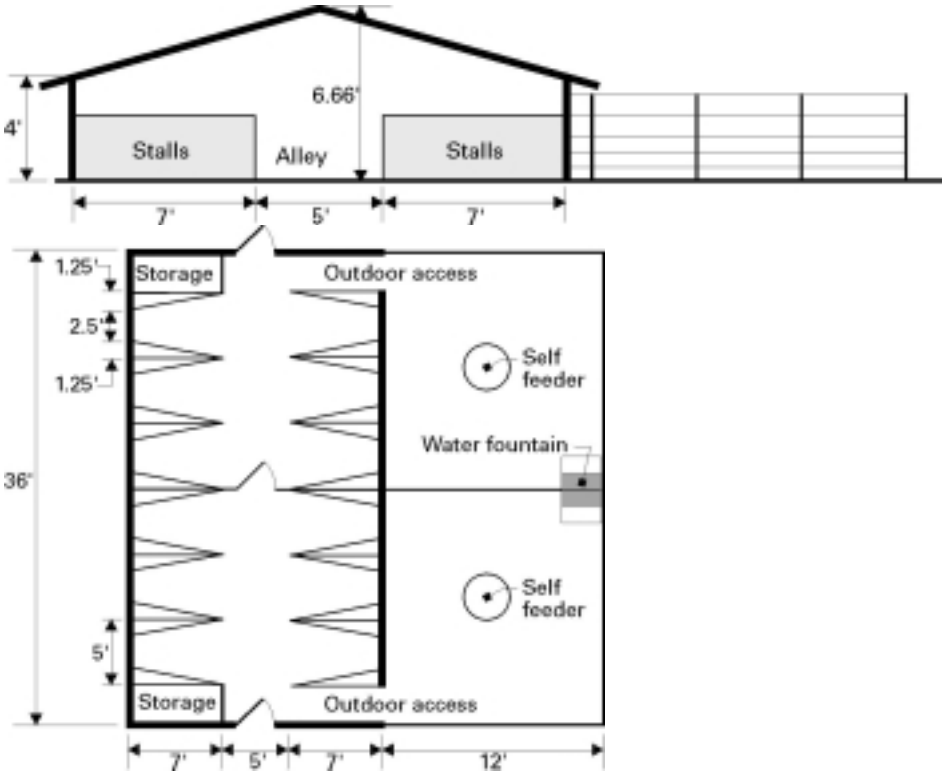


Figure 3. A Swedish System.

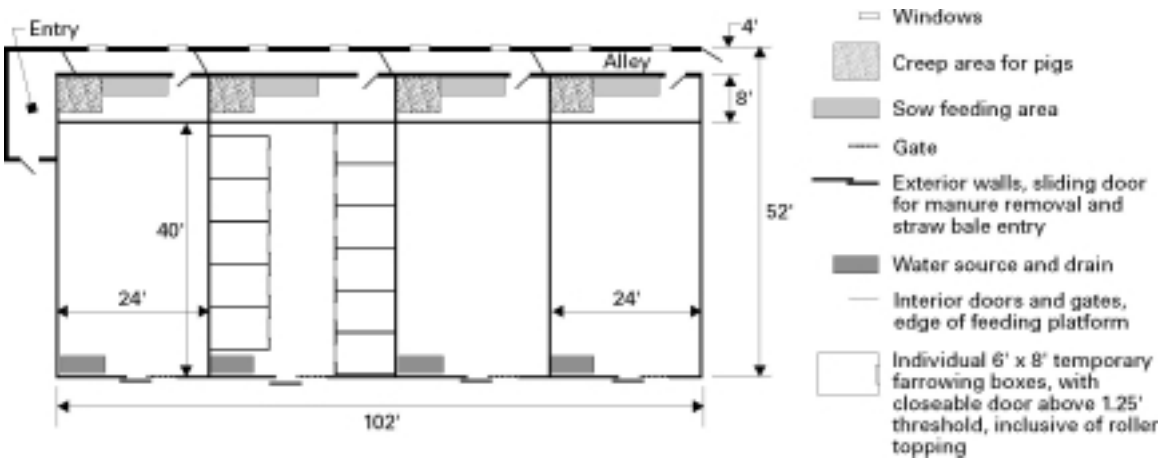


Figure 4. Greenhouse with radiant tube heater.

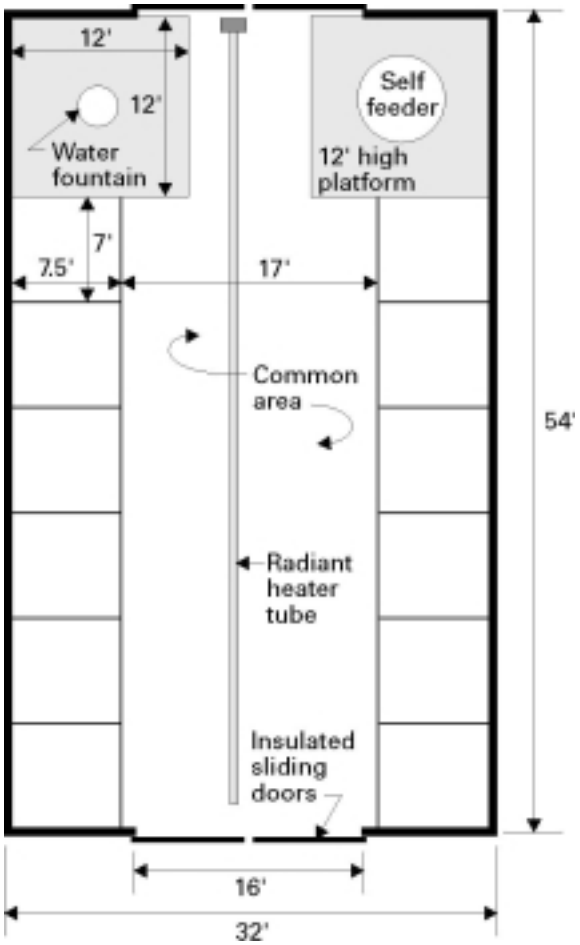


Figure 5. Typical dimensions of a modified A-frame farrowing hut.