

## Small Scale Hoop Structures for Market Swine

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#### Introduction

In the mid-1990s, amid concerns and realities surrounding the shift to large industrial-style swine confinement production units in Iowa, an alternative swine production system was introduced to the Midwest from Canada—hoop structures or hoops. Hoops are large tentlike structures that are deep bedded with cornstalks or straw. The pigs are kept in the hoop usually as one large group (>150 head). The hoop is naturally ventilated. Bedding is added as the pigs grow. The hoop is cleaned after the pigs are marketed. Typical size for hoops is 30 ft × 84 ft for 200 market pigs. Wider hoops with steel truss arches are now on the market. Wider and longer hoops often have ridge vents to improve ventilation. Several companies are now marketing small-scale hoops of widths less than 20 ft. These are often called utility shelters. The objective of this project was to demonstrate a small-scale hoop structure for swine. Low cost, small scale, versatility and quasi-temporary status were emphasized.

#### Methods

*Structure.* During fall 1998, an area was selected for a small-scale hoop at the ISU Allee Demonstration Farm, Newell, IA. The area was covered with straw to prevent the ground from freezing. In January 1999 a 14 ft × 30 ft hoop structure was erected on the site. Large square bales of straw were used for the foundation for the hoop. The bales measured 2.5 ft × 3 ft × 7.5 ft and were set on edge, end-to-end to form a rectangle that was long north to south (one layer of bales). The south end of the straw rectangle was left open. There were four bales end-to-end on each side and two bales across the north end. The hoop pipe frame was erected on top of the straw foundation. Steel T-posts were driven through each bale until about 1 ft of the post stuck above the bales. A hole was cut through the top of each post and a short length of chain and bolt was used to fasten the post to the horizontal base pipe of the hoop. The tarp was pulled over the hoop arches and attached to the base pipe per manufacturer's directions. The north end was closed with an end tarp kit.

The south end was kept open. A wooden platform (9 ft × 12 ft) was placed on the south end and allowed to stick out of the hoop about 4 ft. An 80-gal portable waterer and a small self-feeder were placed on the platform. The south end was closed with a 12-ft steel hog panel. The interior of the bale foundation was lined with uncut 4 ft × 8 ft

sheets of 3/8-in. plywood. These were fastened to steel T-posts driven inside the bale foundation.

The plywood liner was used to keep the pigs from chewing through the straw foundation. The straw foundation was 2.5 ft thick and the hoop was centered on it. Therefore, about 1 ft around the perimeter of the hoop was lost to the straw foundation. Thus, the interior of the hoop was 12 × 29 ft or 348 sq ft. The available space for pigs, including the outside area on the platform, was 12 × 32 ft or 384 sq ft. The hoop was 8 ft high plus 3 ft of bales or 11 ft total that allowed a tractor (with cab) and loader to be driven into the hoop (Figures 1 and 2). Total cost of the small-scale hoop including platform, feeder, waterer, and straw bales was \$2,200 and it took about 10 hours to erect.

On March 17, 1999, twenty-one 138-lb pigs were placed in the small-scale hoop. Straw was used as bedding. This hoop had space for 21–25 pigs inside. The outside platform was not considered in calculating pig space. The feeder was positioned on the platform outside of the hoop for ease of filling with an auger. The pigs were moved in March because that is when the waterer would not freeze. The pigs were fed to market weight in the hoop.

#### Results and Discussion

Oat straw was used as bedding first. Then soybean straw was used as bedding to stop the pigs from rooting for stray oat grain. Once compost of the pack began, oat straw was used until market.

The small-scale hoop structure and base withstood high wind gusts of 60 mph. Winds caused wear on chains at the base of the structure and on the horizontal base pipe. Small (0.5 in.) holes in the tarp appeared on the top arch hoops because the carriage bolt heads rubbed on the tarp during the natural flexing of the structure in wind. There was probably more flexing of the structure because it was mounted on a straw foundation.

Wear points should be closely monitored and protective wear pads of used tarp or carpet used if possible. A smooth arch, without protrusions would also minimize tarp wear. The straw bale foundation maintained its integrity for about 6 months. It would last longer during drier months, cooler winter months or in a drier climate. The small-scale hoop could be mounted directly on the ground, but then it would have a lower roofline, which would make cleaning more difficult and reduce ventilation during hot weather.

The pigs performed well in the hoop. They consumed an average of 6.4 lb of feed per day for 64 days. They were marketed at 259 lb average liveweight on May 20, 1999. The average daily gain was 1.89 lb/day with a feed efficiency of 3.4 lb of feed per pound of liveweight gain. Bedding use was 102 lb of bedding per pig for the period. These values are consistent with performance of pigs of this weight in other housing facilities.

**Conclusion**

The small-scale hoop worked well for the one group of pigs. When the pigs got close to market weight the hoop seemed somewhat crowded. The standard 12 sq ft per pig in full-sized hoops may not be adequate in small-scale hoops. In a small area, space taken by the waterer and feeder is a larger percentage of the total area. Also, dimensions are smaller between feeder, water, sleeping, and dunging areas so congestion appears to be more of a problem. An area of 14 to 16 sq ft per pig is probably a better guide for the small-scale hoop. Also the ratio of width to depth of the hoop should be approximately 1:2, or the hoop will be too shallow and will not provide enough protection for the pigs.

The small-scale hoop structure offers a low cost system for pig production. Cost of the structure is comparable to larger hoops, depending on the life of the hoop. The small-scale hoop is easy to construct and can be made quasi-temporary with large straw bales as the foundation. The hoop could be disassembled and relocated to a new foundation every year or so.

The small-scale hoop has application for swine isolation units, small farms, or youth swine projects, e.g. 4-H or FFA. The small-scale hoops also may have application in research projects as a model for larger hoop structures.

**Figure 1. Diagram of straw foundation of small scale hoop for pigs.**

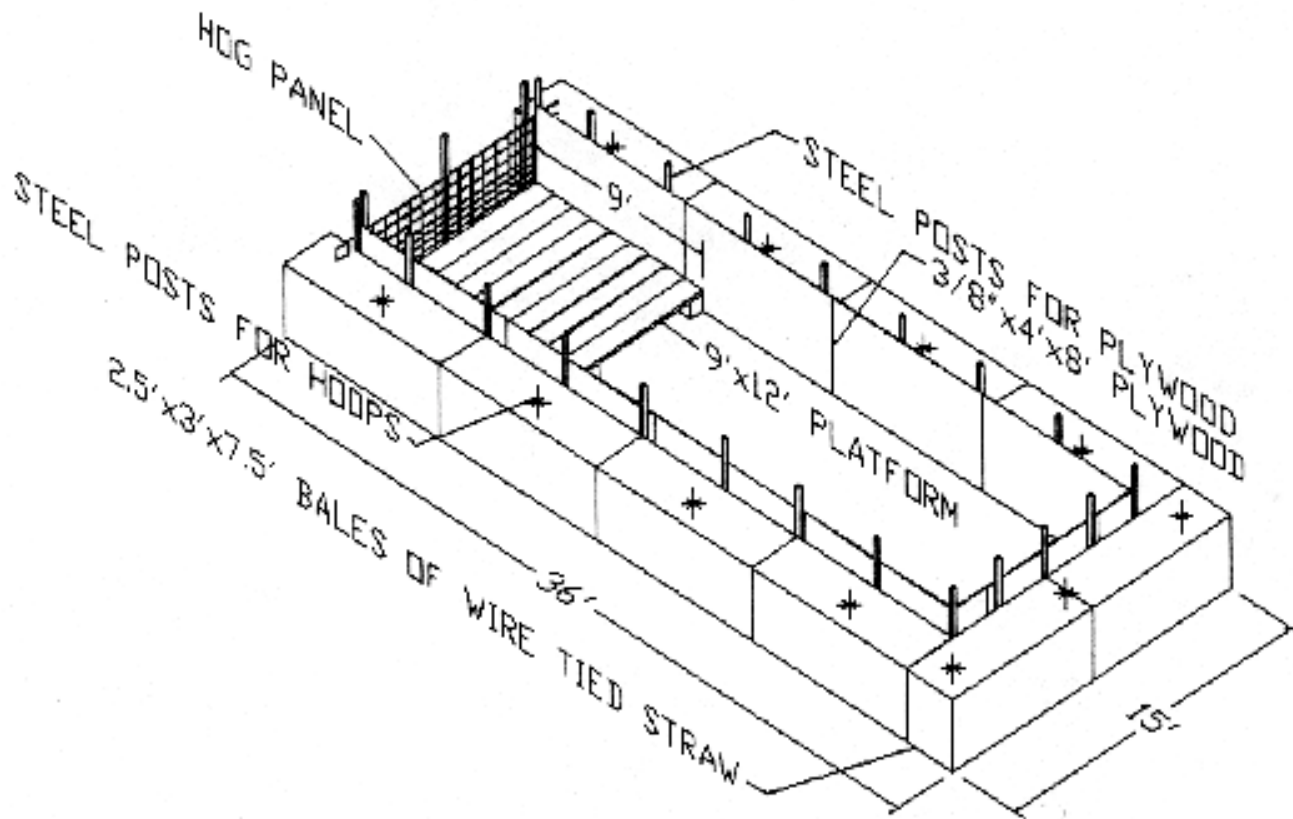


Figure 2. Diagram of small-scale hoop on straw foundation.

