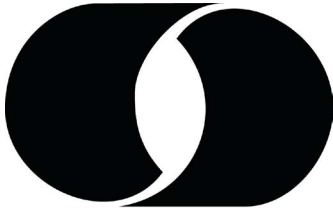# HOOP STRUCTURES *for swine*

(Adapted from Leopold Center webpage)

LEOPOLD CENTER
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Pork producers in the United States who are looking for lower cost structures for raising pigs have shown a great deal of interest in hoop barns or hoop shelters as facilities for housing swine. Hoop barns can be used successfully for gestation and finishing of swine, and increasingly for other livestock as well. In order to implement hoop designs successfully, producers need to be aware of the advantages and disadvantages of this type of housing weighed against those of traditional facilities.

Basics

Hoop design represents a union between purpose and functionality. The following images highlight some of the key features that make hoop structures innovative and technologically sound.

Hoop structures are naturally-ventilated with a polyethylene/PVC fabric roof. Sidewalls are wooden or concrete and are either 4 or 6 ft. tall.

Reflective tarps are used to reflect solar radiation to prevent over-heating.

Most hoops use a steel truss system that is engineered to withstand appropriate loads. Narrow hoops sometimes use a simple pipe system for support.

Tarps are held in place by ropes or winches using seat belt-like material.

Various ends are available. It is beneficial to be able to close the north end during winter or both ends on occasion. Some fabric ends close much like garage doors...

...while others are like barn doors. Care should be taken to not inhibit proper ventilation.

Many hoop structures provide ventilation by leaving the end walls open. Longer hoop buildings add ventilation curtrains to the sidewalls that can be adjusted.

Lighting can be added to the hoop structures if needed.

Comparisons

The biggest selling point for hoop structures is their benefits over traditional livestock housing systems. The following tables describe the advantages of hoops over more traditional finishing and gestation facilities.

Table 1. Comparison of hoops to traditional enclosed finishing facilities.

	Hoops	**Traditional**
Space	12 sq. ft. per pig	8 sq. ft. per pig
Initial Cost	$50-60 per pig	$150-180 per pig
Manure System	Bedding (corn stalks, bean straw, etc.)	Liquid system slatted floor
Typical Size	150-200 pigs	200+ pigs, usually about 100
Animal Environment	Naturally ventilated Unheated Bedding pack (provides heat)	Mechanical/naturally ventilated Heated Concrete slatted flooring
Biosecurity	Washing of feeders/waterers; parasite awareness	Washing of everything
Pig Handling	Requires sorting gates	Individual pens and alley in place

Table 2. Comparison of hoops to traditional enclosed gestation facilities.

	Hoops	**Traditional**
Space	24-27 sq. ft. per sow	
Initial Cost	$120-250 per sow	
Manure System	Bedding (corn stalks, bean straw, etc.)	
Typical Size	50-100 sows	200+ sows
Animal Environment	Naturally ventilated Unheated Bedding pack (provides heat)	Mechanical/naturally ventilated Heated Concrete slatted flooring

Keys to Success

Like all undertakings, investing in hoop structures requires careful consideration of several critical factors. Research, as well as common sense, dictate the following keys for success in managing hoop structures.

- **Bedding, bedding, and more bedding.** Dry bedding is the main key to success. Most animals tolerate cool environments but humidity or ammonia can cause respiratory diseases. Finishing of pigs in hoops requires an average of approximately 200 lbs of corn stalk bedding per finished pig, with more in winter and less in summer. About 1 ton of bedding per year per gestating sow space is required.

- **Keen observation.** Finding sick animals in a group of 150 to 200 is a challenge. Walking through the animals and watching them for warning signs is important daily routine.

- **Start-up after construction.** Placing animals in hoops once the ground has frozen can result in mortalities from piling and slow growth due to thermal discomfort. Place bedding on the ground to prevent freezing, even if it means bedding weeks in advance of pig placement.

- **Handling facilities.** Sorting animals for sale or treatment from a large group is a challenge and generally requires more than one person. Give forethought to how sorting will occur.

- **Water.** Waterers need to be frost-free. Buildings will sometimes reach below-freezing temperatures. Additional waterers may be needed in the summer.

- **Feeder space.** Traditional recommendations are one feeder hole per 4 or 5 pigs. Observations indicate that this may be increased to 5 or 6 pigs per space. Pig observations will dictate the proper level.

- **Fresh air.** Hoop structures are naturally ventilated, unheated facilities. Closing the ends too tightly during winter will result in high humidity and poorer air quality. General practice in Iowa is to close the north end during the winter, leaving the south end open. During the summer, both ends are open for maximum air flow.

Extension Reports

All links below go to the ISU Digital Repository PDF files of summaries of research conducted on ISU Research and Demonstration Farms.

- **Effects of bedding on pig performance,** M. Honeyman and J. Patience, 2012. RFR-A1182. Western Research and Demonstration Farm Annual Progress Reports ISRF11-10, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1127&context=farms_reports

- **Effects of bedding on pig performance and feed digestibility: Progress Report**, M. Honeyman and J. Patience, 2011. ASL-R2615. Animal Industry Report AS-657, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1654&context=ans_air

- **A university-wide compost facility: Start-up and operation**, M. Honeyman, T. Goode, S. Jonas, M. Huss and K. Arora, 2010. ASL-R2528. Animal Industry Report AS-656, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1567&context=ans_air

- **The university-wide compost facility: Second year summary,** M. Honeyman, T. Goode, S. Jonas and K. Arora, 2011. RFR-A10114. Ag Engineering/Agronomy, Central Iowa, and BioCentury Research Farms Annual Progress Reports ISRF-10-16, 30, ISU Extension Service, Ames, Iowa
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1655&context=ans_air

- **Maximizing DDGs for finishing pigs in bedded hoop barns**, M. Honeyman, D. Stender, W. Roush and D. Hummel, 2010. ASL-R2542. Animal Industry Report AS-656, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1581&context=ans_air

- **Optimizing energy use in pig production: An examination of Iowa systems**, P. Lammers, M. Honeyman, J. Kliebenstein, J. Harmon and M. Helmers, 2010. ASL-R2543. Animal Industry Report AS-656, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1582&context=ans_air

- **Construction resource use of different types and scales of swine production facilities**, P. Lammers, M. Honeyman, J. Harmon, J. Kliiebenstein and M. Helmers, 2009. ASL-R2471. Animal Industry Report AS-655. ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1510&context=ans_air

- **A comparison of alternative winter farrowing systems**, M. Honeyman, R. Breach and L. Rossiter, 2008. ASL-R2345. Animal Industry Report AS-654, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1384&context=ans_air

- **Impact of gestation housing system on weaned pig production cost,** P. Lammers, M. Honeyman, J. Kliebenstein and J. Harmon, 2007. ASL-R2235. Animal Industry Report AS-653, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1273&context=ans_air

- **Sow and litter performance for individual crate and group hoop barn gestation housing systems: Project summary**, P. Lammers, M. Honeyman, J. Mabry and J. Harmon, 2007. ASL-R2236. Animal Industry Report AS-653, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1274&context=ans_air

- **Triticale fed to finishing pigs in hoop barns,** Z. Sullivan and M. Honeyman, 2007. ASL-R2229. Animal Industry Report AS-653, ISU Extension Service, Ames, Iowa.
  http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1267&context=ans_air