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# Hoop Structures for Beef - adaptation from website

Leopold Center for Sustainable Agriculture

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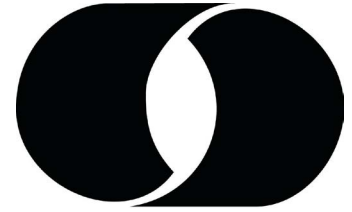
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# HOOP STRUCTURES *for beef*

*(Adapted from Leopold Center webpage)*



LEOPOLD CENTER  
FOR SUSTAINABLE AGRICULTURE

Hoop barns or hoop shelters can be used successfully for finishing of cattle, though they have traditionally been used for swine. 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. Hoop structures can be an option for beef production that can help to avoid some pollution control issues while providing a suitable environment for efficient growth. A roofed structure eliminates runoff and increases control over manure. The main design considerations include animal density, manure handling, feeding, animal handling, ventilation and cost.

The following images highlight some of the key features that make hoop structures innovative and technologically sound. These pictures come from the ISU Armstrong Research and Demonstration Farm near Lewis, Iowa. A portion of the funds to build the barn came from a Leopold Center special project grant.



*Hoop barns are constructed using steel arches mounted on wood or concrete sidewalls.*



*The steel arches are securely fastened to the sidewall to transmit the wind forces to the sidewalls and the ground.*



*A feed bunk is placed outside of the wall to eliminate the expense of an interior drive alley. An overhang is added to reduce the rainwater entering the bunk. It is calculated for one foot of feed bunk per head.*



*A polyethylene/PVC fabric tarp is stretched over the steel framing to form the roof.*



*Tarps are designed to reflect solar radiation to prevent heat stress. White tarps tend to make the interior less dark.*



*A rain gutter is added to the overhang to channel rainwater away from the feed bunk.*



*Frost-free waterers are used near the bunks.*



*Concrete is sloped 1/2 inch per foot away from the bunk to help work manure away from the feed bunk.*



*Limestone screenings packed over geotextile materials can serve as a portion of the floor which will be scraped less and bedded more heavily.*



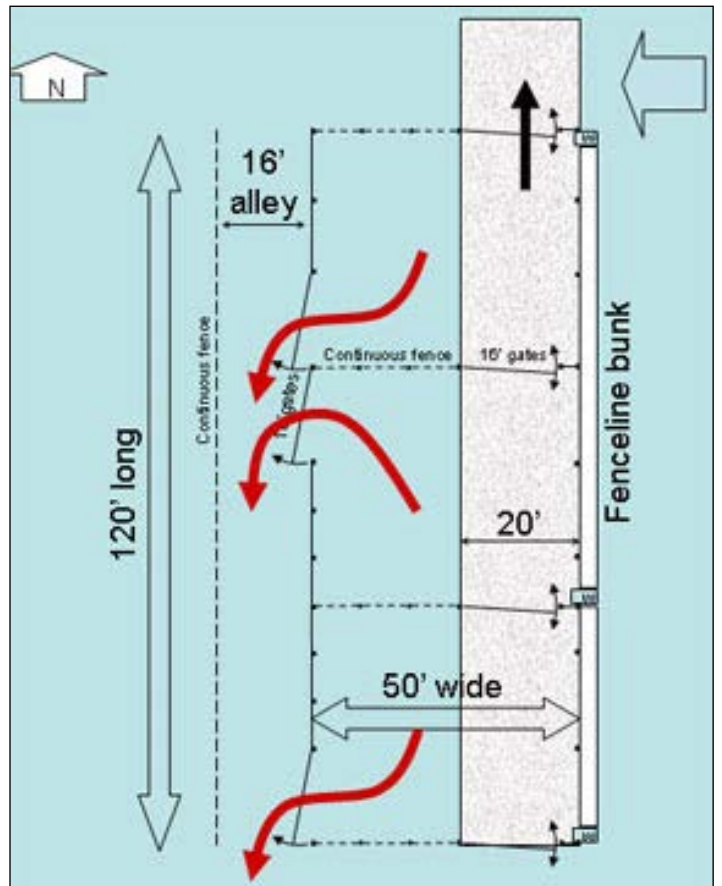
To prevent the afternoon sun from penetrating deep into the building and causing heat stress, the west wall is enclosed.



When the building length is more than three times its width, a ridge vent in the hoop structure helps to promote good airflow, reducing humidity during the winter and removing excess heat in the summer.



Lighting is sometimes used in hoops where animal care or inspection might occur after dark.



This diagram illustrates the cattle flow in the ISU research facility. Most farms would use one large pen instead of dividing it into three individual pens. This configuration allowed for moving cattle out of the way during cleaning and movement to a central processing area for normal management procedures.

## Comparisons

Hoop buildings can provide significant advantages over open lot facilities for finishing beef in terms of animal environment and environmental protection. The table below gives some comparisons between bedded hoop buildings and open feedlots.

	<b>Bedded Hoop Building</b>	<b>Open Earthen Lot</b>
<b>Space/Head</b>	40 sq. ft. per head	250-500 sq. ft. per head
<b>Initial Cost</b>	\$400-500 per head	\$175-250 per head
<b>Bedding Needs</b>	Continuous bedding (stalks, straw, etc.)	Some winter bedding as dictated by weather
<b>Manure Control</b>	Manure remains in building or storage structure until application	Manure runs out of pens to settling/storage basins for storage until application
<b>Animal Environment</b>	Same temperature as outdoors, but protected from rain, snow, and wind	Same temperature as outdoors, plus exposure to rain/snow and some wind
<b>Animal Performance</b>	More consistent. May have 3-4% improved ADG and FE compared to average open lots in the upper Midwest.*	Varies some by season and lot conditions
*based on preliminary indications from research at South Dakota State University		

More detailed comparisons can be found in the Beef Feedlot Systems Manual (ISU Extension, 2006).

<https://store.extension.iastate.edu/Product/Beef-Feedlot-Systems-Manual>

## Keys to Success

Like all undertakings, investing in hoop structures requires careful consideration of several critical factors. Research, along with producer experience, suggest the following keys for success in managing hoop structures.

- **Bedding, bedding, and more bedding.** Dry bedding is the main key to success. Finishing cattle in hoops requires an average of approximately 5-6 lbs of corn stalk (or other dry) bedding per head per day. Bedding use is fairly consistent throughout the year and is more influenced by humidity and cattle size (manure production) than by season. Manure management is achieved solely with bedding addition. Be prepared to add dry bedding as necessary to maintain good floor conditions and prevent carrying manure tag on the cattle.
- **Cleaning.** Frequent (weekly or more often) cleaning of the apron along the feed bunk will be required. Away from the feed bunk, the bedding pack may be allowed to accumulate through the finishing period. Note that as confinement buildings, no discharge of manure or outdoor stockpiling of manure is allowed by Iowa rules. Check other confinement manure rules at the Iowa DNR website.
- **Keen observation.** Observing individual animals can be more difficult with animals grouped in the smaller confined space. Walking through the cattle may be necessary for daily monitoring.
- **Water.** Waterers need to be equipped to handle sub-freezing temperatures. Indoor temperature will be within a couple degrees of outdoor temperature.
- **Fresh air.** Hoop structures are naturally ventilated, unheated facilities. Closing the building too tightly will result in high humidity and poor air quality. Provide wind break protection from prevailing winter wind, but do not try to hold heat in the building. Open the building completely for maximum ventilation in the summer.

## Publications

**Hoop Barns for Beef Cattle** – This 15-page publication is available as a PDF from the MidWest Plan Service.

<https://www-mwps.sws.iastate.edu/catalog/livestock-categories/beef-operations/hoop-barns-beef-cattle-pdf>

**Beef Feedlot Systems Manual** – This 28-page manual is available from the ISU Extension Store. It describes and evaluates five feedlot designs at three different size levels. (2006).

<https://store.extension.iastate.edu/Product/Beef-Feedlot-Systems-Manual>

**Bedded Hoop Barns for Beef Cattle** – This is a general fact sheet developed by the Iowa Beef Center about the beef hoop barn project at the ISU Armstrong Research and Demonstration Farm (2009). It is available at the ISU Digital Repository:

[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1183&context=leopold\\_pubs](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1183&context=leopold_pubs)

## 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 stocking density on steer performance and carcass traits in bedded hoop barns**, M. Honeyman, D. Maxwell, D. Busby and S. Shouse, 2012. ASL-R2697. Animal Industry Report AS-658, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1735&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1735&context=ans_air)
- **Effects of stocking density on steer performance and carcass characteristics in bedded hoop and open front confinement facilities: Progress report**, M. Honeyman, D. Maxwell, D. Busby and S. Shouse, 2010. ASL-R2509. Animal Industry Report AS-656, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1548&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1548&context=ans_air)
- **Nutrient retention performance of a crushed limestone floor surface in a bedded hoop barn with confined beef cattle**, S. Shouse, M. Honeyman, D. Maxwell and D. Busby, 2009. ASL-R2434. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1474&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1474&context=ans_air)
- **Beef cattle feeding in a bedded hoop barn: Three year summary**, M. Honeyman, J. Harmon, D. Maxwell, D. Busby and S. Shouse, 2009. ASL-R2403. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1443&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1443&context=ans_air)
- **Finishing steers in a deep-bedded hoop barn and a conventional feedlot: Effects on behavior and temperament during summer in Iowa**, R. Baker, A. Johnson, K. Stalder, M. Honeyman and D. Busby, 2009. ASL-R2404. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1444&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1444&context=ans_air)
- **Finishing steers in a deep bedded hoop barn and a conventional feedlot: Effects of performance and carcass characteristics during winter in Iowa**, R. Baker, A. Johnson, S. Lonergan, M. Honeyman and D. Busby, 2009. ASL-R2405. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1445&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1445&context=ans_air)
- **Finishing steers in a deep bedded hoop barn and a conventional feedlot: Effects of performance and carcass characteristics during summer in Iowa**, R. Baker, A. Johnston, S. Lonergan, M. Honeyman and D. Busby, 2009. ASL-R2406. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1446&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1446&context=ans_air)
- **Finishing steers in a deep bedded hoop barn and a conventional feedlot: Effects on behavior and temperament during winter in Iowa**, R. Baker, A. Johnson, K. Stalder, M. Honeyman and D. Busby, 2009. ASL-R2407. Animal Industry Report AS-655, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1447&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1447&context=ans_air)
- **Beef cattle feeding in a deep bedded hoop barn: Year two**, D. Busby, S. Shouse, M. Honeyman, D. Loy, J. Harmon and D. Maxwell, 2008. ASL-R2281. Animal Industry Report AS-654, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1320&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1320&context=ans_air)
- **Beef cattle feeding in a deep bedded hoop barn: Year one**, D. Busby, S. Shouse, M. Honeyman, D. Loy, J. Harmon and D. Maxwell, 2007. ASL-R2189. Animal Industry Report AS-653, ISU Extension Service, Ames, Iowa.  
[http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1227&context=ans\\_air](http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1227&context=ans_air)