Bedded Pack Barns

Brett Pettigrew, PE January 31, 2012

Hoop Barn

Hoop Barn

Hoop Barn

Mono-Slope Barn

Mono-Slope Barn

Manure Storage Bay

Outline

- NRCS Standards (367 and 313)
- Bedded Pack Barn Technical Note
- Bedded Pack Barns Fact Sheet
- SD NRCS Bedded Pack Barn Design Worksheet
- Worksheet Examples

Roofs and Covers (367)

- Structural Design Criteria
- Animal Space Requirements

Waste Storage Facility (313)

- Additional Criteria For Solid Manure Storage Facilities
  - 5 Choices of Floor requirements
  - Design Storage Requirements
    - Manure/Bedding
    - Runoff (if not under a roof)
    - No residual storage or freeboard required for solid manure storage facility

Barn Technical Note

- The technical note describes the different bedding and manure management practices used by producers. It also explains how to size a facility, in order to meet the manure storage requirements.
- ftp://ftp-fc.sc.egov.usda.gov/SD/www/Technical/Engineering/Design_Technical_Note_SD2011-1.pdf

Barn Technical Note

- Section 1 – Planning: A good read for designers and planners.
- Section 2 – Site Visits: A summary of some of the sites we visited to develop the design procedure.
- Section 3 – Barn Design: If you are doing design, you should read this section. Not that important for planners.

Barn Technical Note

- Section 3 – Barn Design:
- Old Equation: Total volume required = manure volume + half of the bedding volume
- New Equation: Total volume required = (weight of the solid portion of the manure + weight of the solid portion of the bedding) / (1 – bedded pack moisture content) / (bedded pack density)

Barn Technical Note

- Section 4 – Design Spreadsheet: If you are doing design, read this section or read the instructions within the spreadsheet file.
- Section 5 – Additional Information: If you are doing design, read this section. There are links to papers, websites, and a webcast.
- Appendix B and C: SDSU Opportunities Farm data

Bedded Pack Barns Fact Sheet

United States Department of Agriculture

NRCS Natural Resources Conservation Service

Bedded Pack Barns
Alternative Feeding Operations for Beef and Dairy Cattle

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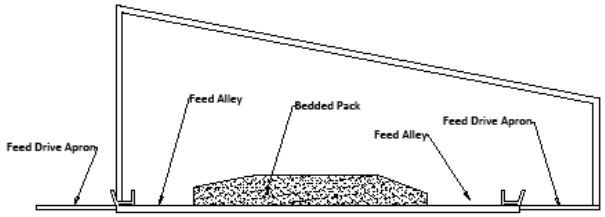
October 2011

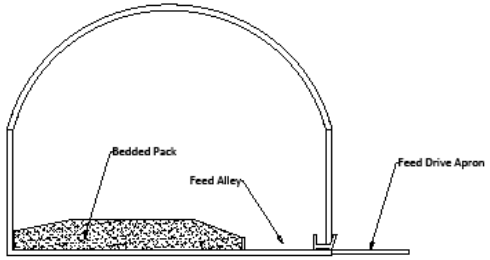
What is a Bedded Pack Barn?

A bedded pack barn is an alternative for livestock producers in South Dakota. Producers are increasingly utilizing this type of animal housing for beef cattle feeding and dairy operations in this region. There are different variations of bedded pack barns, which include different types of buildings, different types of bedding and different types of bedded pack management.

The two most common types of bedded pack buildings are hoop structures and mono-slope structures. Hoop structures are generally constructed with wood or concrete sidewalls, tubular steel truss system, and a woven polyethylene fabric cover. Mono-slope structures have been typically constructed with concrete walls, steel frame, and steel roof.



Typical Mono-Slope Barn



Typical Hoop Barn

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Bedded Pack Barns
Alternative Feeding Operations for Beef and Dairy Cattle

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From a manure management standpoint, bedded pack barns provide two distinct differences from traditional open lots. The first is that the bedding in the barns absorbs the water in the manure and the second is that the roof keeps precipitation out of the cattle feeding area. This eliminates runoff from the feeding operation and the need for runoff collection, storage, and treatment measures. For facilities with geotechnical conditions not conducive to constructing runoff storage ponds, this can make a barn the preferred option to feed cattle at the location.

Advantages of a bedded pack barn versus a traditional open lot:

- Required animal density is lower, so the overall space required for the cattle feeding area is smaller.
- Collection, storage and application of open lot runoff are eliminated.
- Manure storage and application is more predictable and consistent than open lot runoff. Open lot runoff is dependent on variable precipitation, not on manure and bedding accumulation.
- Lower chance of a catastrophic manure spill since manure is stored and handled as a solid.
- There is a somewhat controlled environment inside of the barn for the animals and the producer.
- In locations with high ground water where a holding pond is not feasible, a barn may provide an option to feed cattle.

Disadvantages of a bedded pack barn versus a traditional open lot:

- Higher initial investment.
- Adequate bedding and an area to store the bedding are necessary.
- Ventilation of the facility must be managed.
- More regular maintenance to add bedding and remove manure and bedded pack from the barn.

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Bedded Pack Barns Fact Sheet

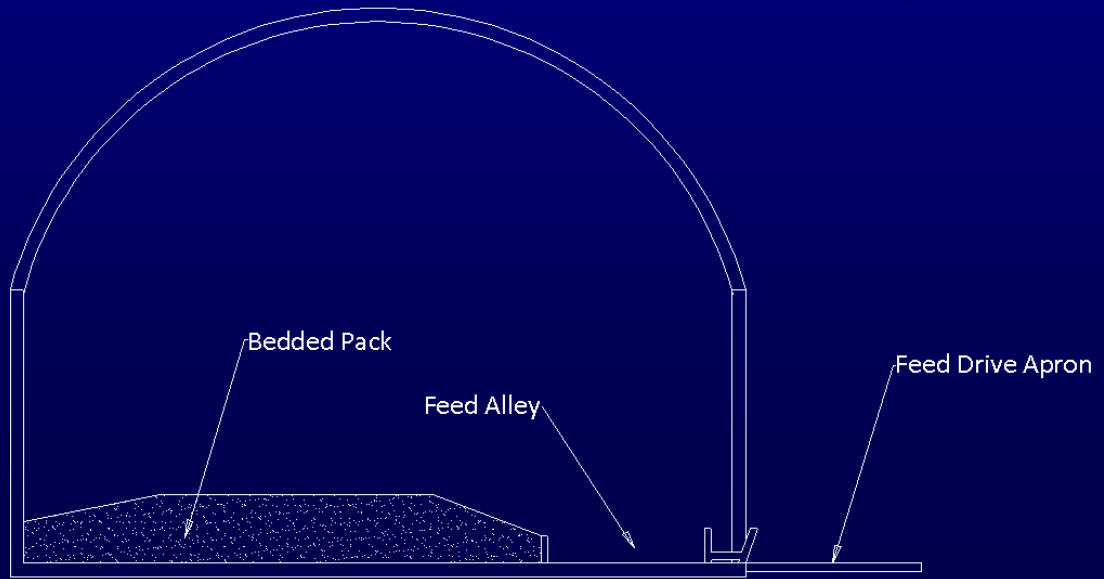
- ftp://ftp-fc.sc.egov.usda.gov/SD/www/News/FactSheets/SD-FS-76_Bedded_Pack_Barn.doc

SD NRCS Bedded Pack Barn Design Worksheet

- Instructions
- Reference Documents
- Data
- Facility Info
- Scenarios 1, 2, 3, 4
- ftp://ftp-fc.sc.egov.usda.gov/SD/www/Technical/Engineering/Bedded_Pack_Barn_Design_Worksheet_Version_1_0_10-2011.xlsx

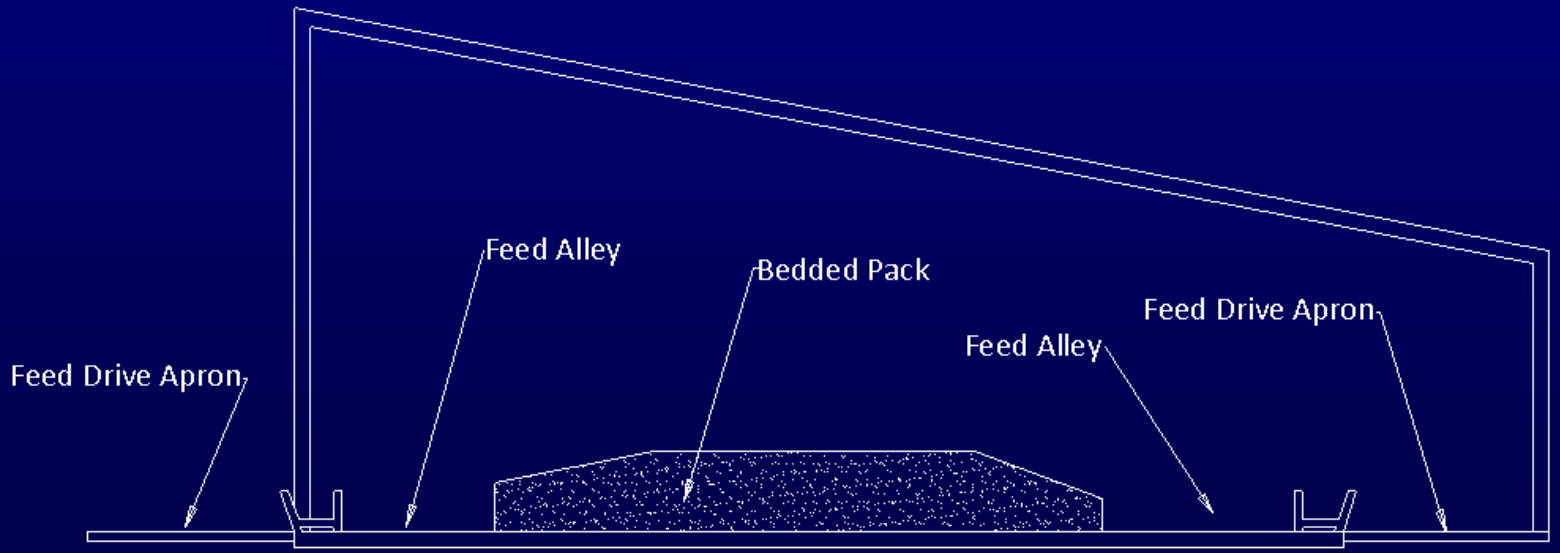
SD NRCS Bedded Pack Barn Design Worksheet

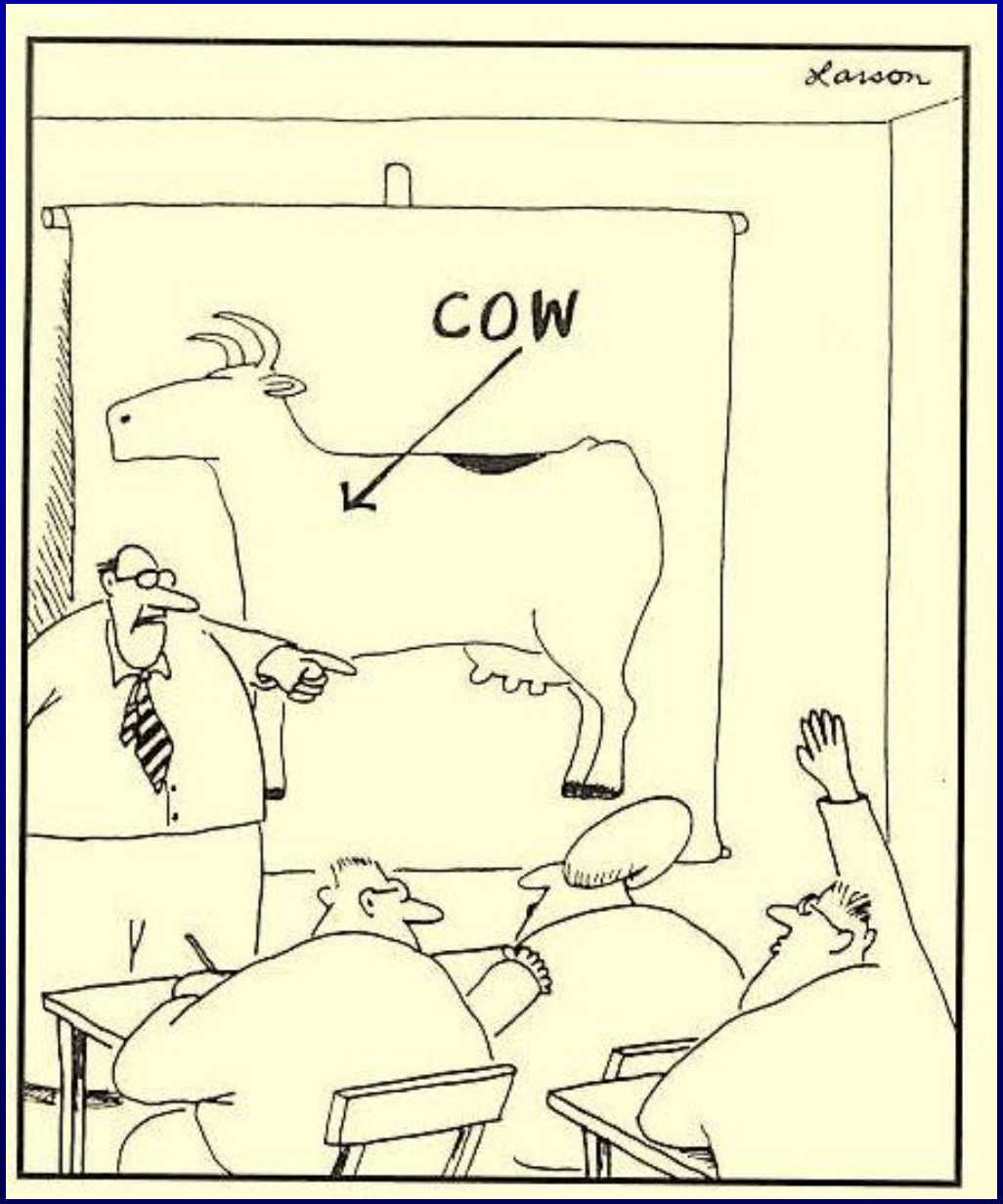
- Site 1: The facility will consist of one 200’ x 50’ hoop barn for 200 finishing beef cattle. The bedded pack is not aerated, and the feed alley and excess bedded pack will be put in an outside manure stacking facility.



SD NRCS Bedded Pack Barn Design Worksheet

- Site 2: A 100’ x 500’ mono-slope facility with 1,000 finishing beef cattle. The bedded pack is not aerated. Producer wants a stacking bay one end of the building for feed alley manure and excess bedded pack.





"Yes...I believe there's a question there in the back."