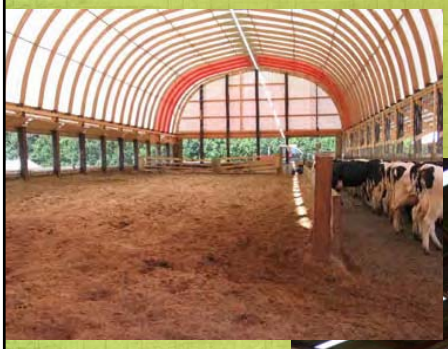
Composted Bedded Pack Barns

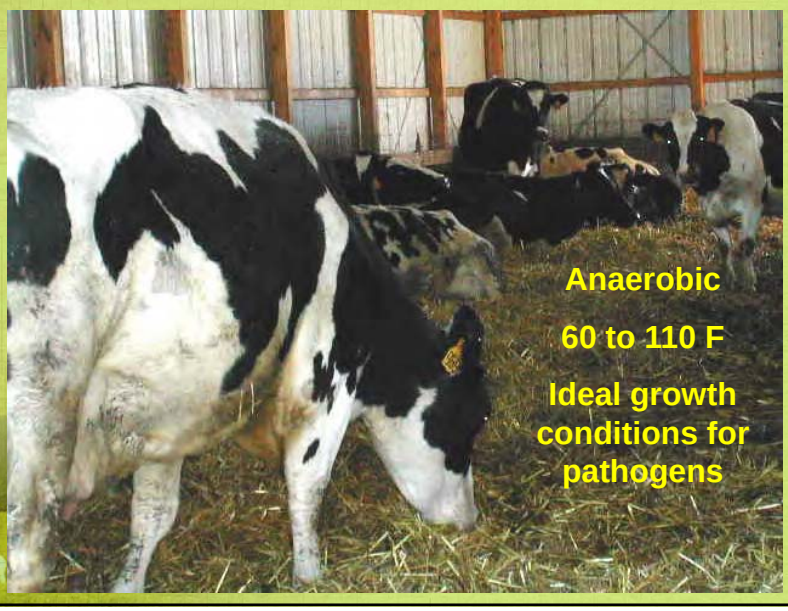


What is it?

- Manure is composted in place in a loose housing facility
- Sawdust and/or chopped straw is added periodically (~ 2 to 3 times a week) to control moisture content
- Animals use the composted manure as bedding
- Different than a conventional dry pack

Photo from UMN: **Compost Bedded Pack Barns for Dairy Cows**

Compost Bedded Pack Barns NOT a Conventional Dry Pack (as shown below)



Why this alternative is attractive to producers

- Reduces the volume needed for liquid waste storage
  - Only need liquid storage for material that is scraped from feed alley and parlor water
- Cow comfort
  - The bedded pack is fluffy and soft and conforms to cows bodies when laying down
  - Provides good footing
- Manure stored and animals housed in same facility

General Compost Recipe

- Floor of facility is either compacted clay or concrete (literature recommends compacted clay)
- Facility Sizing: need ~85 sq ft per animal
- Initial layer of 18 to 24” of sawdust before animals are brought into facility
- Till top 10-12” twice a day: dries out the material, adds oxygen, mixes material
- Add sawdust to control moisture content of pack (general rule: add sawdust when pack starts to stick to animals)
- Keep precipitation out of facility

Image from UMN publication: **Compost Bedded Pack Barns for Dairy Cows**

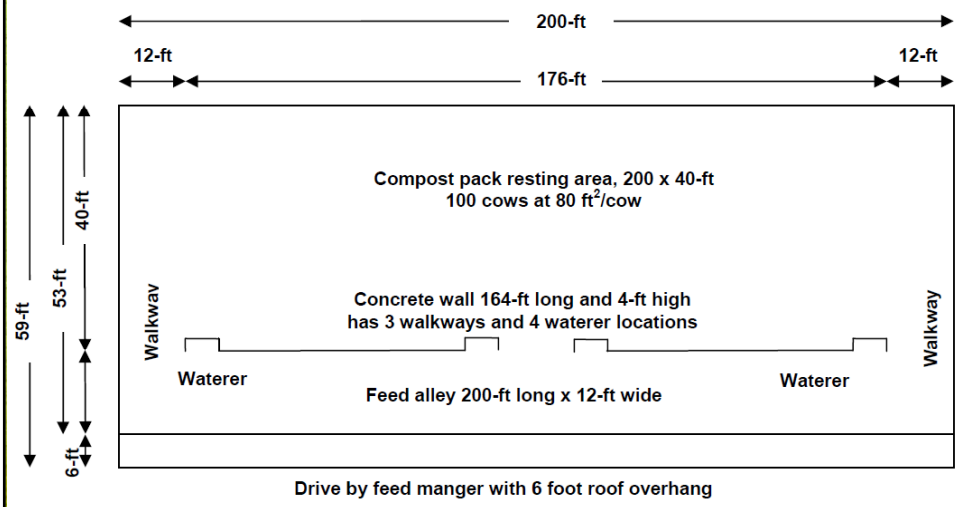


Figure 2. Compost barn layout for 100 cows with three walkways to access the pack, drive-by feeding and 6-ft overhang. Waterers are against the concrete wall separating the bedded pack from the feed alley and are accessed from the feed alley only. Not drawn to scale.

Addressing Resource Concerns

- Water Quality
  - minimizing liquid storage reduces risk of water quality contamination
- Air Quality
  - compost has less foul odors compared to a liquid storage tank
- Energy
  - Reduces the need for handling large amounts of liquid waste
    - reduced costs for pumping liquid and applying or hauling liquid waste
    - Lessens need for agitation in liquid storage
    - No need for mechanical separation of liquid/solid waste

Case Study from Tillamook Dairy

- Greatly reduce the need for liquid storage
- Increase cow comfort has lead to healthier cows
- The pack gets 4’ to 5’ high
- Concrete walls on 2 sides contain compost
- Shape compost to create ramps for animals and equipment to get on and off pack
- Reduced injury incidents of animals
- Higher milk production from healthier/ happy cows
- Similar energy requirements of scraping alleys
- Empty facility once a year (took 14 hours)
- When sawdust is not available, chopped straw is a good second choice but only when sawdust can still be mixed in periodically

Other Uses for Composted Bedded Packs

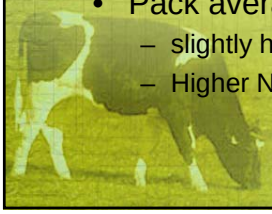
- Hog facilities: Swedish deep-bedded swine finishing system
- Beef facilities: Hoop Barns

Studies

- Ohio State University: Evaluating the Effectiveness of Dairy Bedded Pack Systems in Ohio (December 2009)
- University of Minnesota: Characteristics and Nitrogen Value of Stratified Bedded Pack Dairy Manure (July 2009)
- Cornell University: Bedded Pack Management System Case Study (September 2009)

Study Results

- System is found to: improve health of cow, minimize manure handling costs, reduce potential env impacts
- Gas measurements reveal that all gas concentrations (CO_2, NH_3, H_2S) were well below suggested indoor air quality thresholds
- pH ranged from 7.9 – 9.6 (indicating aerobic conditions)
- Lower N values observed at the 12”-18” depth suggesting minimal downward movement of N from upper layers
- Pack average 17.5, 7, 14 of N, P_2O_5, K_2O per wet ton
  - slightly higher than book values for dairy waste
  - Higher N but lower P and K compared to composted dairy waste



Study Results (cont)

- A good reliable source of sawdust is recommend. Chopped straw versus long straw can be a second alternative when alternated with sawdust
- 14’ to 16’ curtain wall above the concrete wall provides good ventilation
- Locate waterers off of the pack
- C:N ratio varied depending on where sample was taken in the pack but generally ranged from 11.2 to 20.9 (higher than 15 can cause immobilization of N for initial periods of time)

Questions?