

Texas Dairy Matters

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Compost bedded barns as an alternative housing option for lactating cows

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Introduction

Compost bedded pack barns have become more prevalent in the last few years. This barn style started in the 1980's in Virginia¹, and the idea is to improve cow comfort and longevity². Eliminating stalls and curbs allows cows to move freely^{1,3}. The barns have a concrete feed alley and open natural ventilation with a 4 ft. fence all the way around⁴. The cows lay in the bedding when not being milked or eating (Figure 1).

Is compact bedding pack right for you?

Compost barns may require more upkeep than other barns and climate should be considered. Central and east Texas has a longer hot season and are more humid than other regions in the U.S. causing more microbial action so extra upkeep and extra bedding might be necessary⁵.

Barn Design Considerations

A common barn style has a feed alley on one side with a concrete wall and a 4 ft. fence around the other three sides. Sixteen foot walls are also best for ventilation, and machinery entering the feed alley. The roof should overhang 3 ft., except the feed alley should be 6 ft, to avoid runoff into feed. Adding gutters to your barn will also help with runoff. Having open side walls is good for ventilation to remove moisture and heat⁸.



Figure 1. Example of a compost bedded pack. Picture from: <https://www.progressivedairy.com/topics/barns-equipment/a-global-perspective-on-compost-bedded-pack-barns>

What is composting?

The goal of composting is to produce heat, moisture, and carbon dioxide through microbial breakdown of organic matter. Optimum moisture for a compost barn is 40 to 60%. The best temperature range of the compost is a constant 110 to 140°F measured 6-12 inches below the bedding surface. If the temperature is below 110°F, the microbial activity is too slow and vice versa for above 150°F. The nutrients in a bedded pack (carbon, nitrogen, moisture, and microorganisms) come from the bedding, feces, and urine of the cows while the bedding encourages the microbial activity⁶.

Bedding material options

Kiln dried sawdust is the best option to stimulate the biological activity of the compost because it has the best carbon to nitrogen ratio (30:1)⁸. Another good option is wood shavings because they encourage microbial activity. However, cedar shavings do not allow for microbial growth; therefore, are not a good option. Conversely, hay is not an ideal option as the absorption rate cannot maintain an ideal moisture level. Lime and sand are poor options as well because of their low absorption rate and inorganic properties; limiting microbial activity⁹.

Potential benefits

The main benefit of a compost bedded pack barn is cow comfort. An open facility design without curbs and side rails allow for easy movement, especially for lame or transition cows. Well managed compost barns might also result in a reduction of SCC and subsequently an increase in milk production¹. There is also more flexibility to house different breeds in one barn

compared to barns with stalls designed to a specific size suitable for only one breed. Another benefit is the two-in-one manure management. With a compost barn, the manure and bedding are managed in one place.

Challenges

One downside of a compost barn is the increased area per cow needed. In a free stall barn the area per cow is about 80 square feet whereas in a compost barn it is at least 130-140 square feet per cow^{5,8}. Additionally, bedding may be expensive or even hard to find at times making management of your compost difficult. Another downfall is the upkeep of the bedding. Tilling the bedded pack is necessary at least twice daily.

Upkeep

A new bedding should start 4-6 weeks prior to temperatures reaching below 50°F because the compost may not be able to keep heat production up⁶.

To start, you need 1-2 feet of bedding. The biggest factor in upkeep is tilling 2-3 times daily at a 10-12 inch depth to expose oxygen using a rototiller (Figure 2) or modified skid steer attachment (Figure 3)^{3,5}. Tilling is crucial because oxygen is needed for aerobic fermentation for suitable composting. Air and moisture affect oxygen as well. Cows are using the compost as a bed and compacting it down, taking out the oxygen^{4,5}. If moisture is above 70%, more compaction will occur reducing oxygen in the bedding. Moreover, cows will become dirty as the compost begins to stick to the cows.



Figure 2: Example of a rototiller



Figure 3: Example of a skid steer attachment

Depending on your geographical location and the season, bedding may be needed more often because of moisture. Lastly, the compost bedded pack should be completely cleaned out 1-2 times a year⁴. In conclusion, deciding if a compost barn is right for you is a personal decision. If you have extra time and space for the upkeep but want longevity and cow comfort, a compost barn may fit your needs².

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