Compost Barn Update

There has been a lot of interest from dairy producers in Minnesota and beyond about compost barns as an alternative housing system. The bedding surface in this system offers great traction and cushion.

There are a lot of questions about these barns. We decided that the first step was to learn more about compost barns by interviewing producers using the system, and collecting samples and cow observations. Follow-up studies are planned that will address some of the concerns raised during the survey we conducted.

The main objectives of our study are: 1) Characterize the compost bedded pack system; 2) Evaluate cow comfort under this system; 3) Investigate producers’ experience with the system.

We visited 12 compost barns that had been in operation for about a year or more. Producers were interviewed on various aspects related to this housing system, samples of bedding and milk were collected, cow behavior was evaluated, and cows were scored for locomotion, body condition, hygiene and hock lesions. Following is a prelim summary of the data.

Economics and general satisfaction about the system:

- The cost of building the barn ranged from $33,000 to $300,000.
- The main reasons for building this type of housing system were for improved cow comfort, cow health and longevity, and ease of completing daily chores.
- The largest concern was the cost and availability of bedding, especially as additional composting bedded pack barns are built. Cost can be as high as $.85/cow/day. All the farms we visited were using sawdust for bedding.
- All of the producers were generally satisfied with their decision to build a compost barn and believe that it was the right choice for housing their dairy herd.

Udder health related aspects:

- The average DHIA somatic cell count was 325,000 cells/mL with a range of 85,000 to 658,000 cells/mL.
- Bulk tank cultures were performed on a composite sample of four or five bulk tank pickups. Two out of 12 farms had a high level of Strep. agalactiae, one farm was found to have a high level of Staph. aureus, six farms had high levels of Non-ag Strep, and four farms had high levels of coliforms in the milk.
- Bacterial counts in bedding samples averaged 9,122,699 col/mL with a range of 2,035,563 to 22,562,604 col/mL. Therefore, milking prep procedures are very crucial.

Cow scoring averages:
On average, only 7.8% of the cows were clinically lame (score of 3 or greater for locomotion). A recent lameness prevalence study that we conducted in Minnesota estimated that approximately 25% of cows were lame in freestalls.

On average, 77.7% of the cows had no hock lesions, 22.3% showed mild lesions (hair loss) and only 0.97% of cows had severe lesions (swollen hocks plus hair loss).

The average body condition score was 3.04 with a range of 2.88 to 3.17.

Cow hygiene scores averaged 2.7 in a scale of 1 to 5 (1=clean; 5=dirty). That is similar to a freestall barn or slightly cleaner.

Some barn characteristics:

- The average lying space was 90.2 ft²/cow with a range of 38 to 154 ft²/cow. We recommend no less than 85 ft²/cow.
- Temperatures were taken at each of 12 locations across the pack twice, 1 week apart, at various depths (6, 12, 24 and 36 cm depending on pack depth). The average temperature across depths was 108°F, with a range of 76 to 138°F. Most of the locations (98%) tested were below 130°F, which is considered to be a minimum temperature for composting to take place. Therefore, the material is not really composting in the pack, but maybe the process is started, so it should take less time to finish composting once the material is removed from the barn (just a hypothesis, we have not tested it).

Alternative Stall Surfaces

Several recent studies show that dairy cows prefer stall surfaces that provide more cushion and traction, such as sand. However, handling sand laden manure cannot be used with many existing manure systems. Producers are looking for other alternative stall surfaces to traditional mattresses that might offer more cushion and traction. One option might be to replace mattresses with deep organic bedding. Some producers in Minnesota have made the change.

Following are the observations and results of one Minnesota producer who has replaced the mattresses with deep bedding in the middle two rows of stalls in a 6-row freestall barn in the fall of 2004. They are planning on replacing the outside stalls when time permits. We thank the producer for providing us with detailed information for this summary.

Remodeling details:

1. Removed all the freestall loops and mattresses.
2. Used a skidsteer loader to dig out the clay (they had clay under the mattresses).
3. Tore out brisket board and concrete between brisket boards.
4. Left back curb as it was with mattresses.
5. Packed tires half full of clay and placed them starting about 15 inches from the curb.
6. Top of tires in front of stall are nearly level with the back curb and gradually are buried deeper so that tires near the back of stalls are a couple of inches below the back curb.
7. Tires have stayed in place very well.
8. Cost of remodeling was mostly labor. If labor is valued at $10.00/hour the cost was approximately $6.40 per stall.
9. They may not use tires in the outside row of stalls.

Herd Production Parameters
1. Milk production increased about 2 lbs per cow per day.

2. Somatic cell count comparison.
   - 2004 – Average 275,000
   - 2005 – Average 226,000, low of 167,000
   - Milking routine was also changed slightly in 2005
   - They had an outbreak of Klebsiella in summer of 2005. They started adding 10% lime with organic bedding and the problem greatly decreased.

3. Hoof health comparison.

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2005</th>
<th>Savings/mo</th>
<th>Savings/yr</th>
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</thead>
<tbody>
<tr>
<td>Cow numbers</td>
<td>319</td>
<td>330</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trimming cost, cost/mo</td>
<td>$728.00</td>
<td>$701.45</td>
<td>$26.55</td>
<td>$318.55</td>
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<tr>
<td>Sole ulcer, wrap cost/mo</td>
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<tr>
<td>Abscess, wrap cost/mo</td>
<td>$24.17</td>
<td>$8.18</td>
<td>$15.98</td>
<td>$191.82</td>
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<tr>
<td>Blocks, cost/mo</td>
<td>$3.75</td>
<td>$1.36</td>
<td>$2.39</td>
<td>$28.64</td>
</tr>
</tbody>
</table>

   **Total savings per year:** $616.73

   - Decrease in percent of cows wrapped, 41.85%
   - Decrease in percent of cows lame, 39.92%

4. Cull and death rate comparison.

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2005</th>
<th>Savings/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow numbers</td>
<td>319</td>
<td>330</td>
<td></td>
</tr>
<tr>
<td>Cows culled</td>
<td>98</td>
<td>82</td>
<td>$11,412.80$^1</td>
</tr>
<tr>
<td>Cows died</td>
<td>28</td>
<td>19</td>
<td>$22,800.00$^2</td>
</tr>
</tbody>
</table>

   **Total savings:** $34,212.80

   $^1$ Average cost/cull cow $713.30
   $^2$ Average cost/head for deaths $1200.00

   - 2004 – Cull rate, 39.48%
   - 2005 – Cull rate, 27.58%
5. Cow comfort quotient\(^1\)

<table>
<thead>
<tr>
<th>Item</th>
<th>2004</th>
<th>2005</th>
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</thead>
<tbody>
<tr>
<td>Heifers</td>
<td>63</td>
<td>73</td>
</tr>
<tr>
<td>Mature cows</td>
<td>48</td>
<td>69</td>
</tr>
<tr>
<td>Mature cows</td>
<td>78</td>
<td>97</td>
</tr>
<tr>
<td>High SCC</td>
<td>74</td>
<td>90</td>
</tr>
<tr>
<td>Fresh</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>63</td>
<td>82</td>
</tr>
</tbody>
</table>

\(^1\) Percent of cows lying in stalls divided by number of cows in stalls.

6. Bedding cost increased 60% with deep bedding.

**Bedding Management**

1. Herd owners believe that bedding management is the key to success in a deep organic bedded freestall system.
2. Currently use a “dairy blend” bedding (oat hulls, shavings and sawdust) mixed with approximately 10% coarse ag lime. Lime and organic bedding is mixed in the TMR mixer.
3. Stalls are bedded every three days.
4. Soiled bedding is cleaned out of stalls and fresh bedding is raked over back of stalls with a landscape rake every milking.

**Herd Managers Observations**

1. Deep bedded stalls are greatly preferred by cows over stalls with mattresses. Cows will wait in line to lie down in deep-bedded stalls.
2. Great decrease in swollen hocks and leg injuries.
3. Cows standing in stalls less - they are spending more time lying in stalls.
4. Footing is better because of lime in stalls; it is dragged into alleys and provides grit.
5. They believe that part of the reason SCC is lower is that cows lying on the deep bedded stalls leak less milk and thus the udder stays cleaner and dryer.
6. Cows are cleaner than before remodeling.
7. Cows are much more mobile with a decrease in stiffness of joints.
8. Cows are easier to chase to holding area due to increased mobility and ease if rising.
9. Cows are remaining youthful longer. This may be due to a decrease in injuries and swollen joints, and more time spent in lying in stalls vs. standing on concrete.

Another option for using deep organic bedding in freestalls would be to install recessed mattresses (about 2 inches below curb) and fill with bedding on top of the mattress. A permeable type of mattress cover should be used to allow for drainage.

**Conclusions**

Compost barns and deep bedded stalls can be soft organic bedding alternatives for housing dairy cows. Like any system, they require optimum management to work properly. Special attention should be given to milking prep procedures to avoid high levels of somatic cell counts.