

Calf Notes.com

Calf Note #111 – Growth and health of calves housed on different bedding types

Introduction

Housing and bedding have important implications related to calf health and performance but have generally received little research attention in the past. Important questions, like “do bedding types affect growth of calves” have not been fully answered. Of course, the needs for housing and types of housing and bedding will vary, depending on climate and conditions. Calf housing requirements are different in south Florida compared to northern Minnesota in January. However, understanding the value of different types of housing and bedding in specific conditions may give us some insight into the value of these materials in all parts of the world.

In 2004, researchers from the University of Arkansas published a study in the Journal of Dairy Science comparing five different types of bedding on growth and health of young dairy calves. The bedding types included sand, rice hulls, wheat straw, wood shavings, and granite fines. Growth, health and bedding quality were determined.

The study

Holstein calves (n = 60) were assigned to be housed in individual pens (1.2 × 1.8 m) that had dirt floors. The dirt floors were covered with ground limestone and then covered with 5.1 cm of experimental bedding

- River sand; density = 1,352 kg/m³
- Granite fines (a by-product of the rock crushing industry in Arkansas); density = 1,605 kg/m³;
- Rice hulls; density = 92.9 kg/m³
- Long wheat straw; density = 69.7 kg/m³
- Wood shavings; density = 139.4 kg/m³

Calves were born, processed and fed a colostrum replacer product, then placed randomly into individual pens. They were then fed medicated milk replacer (20/20) containing oxytetracycline and neomycin at 4 L/day and calf starter and water for

Table 1. Performance of calves housed on different bedding types.

| Item | Fines | Sand | Rice hulls | Wheat straw | Wood Shavings | SE |
|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
| Initial BW, kg | 34.4 | 34.2 | 34.2 | 32.0 | 35.3 | 1.5 |
| Final BW, kg | 47.9 | 48.1 | 47.0 | 48.4 | 46.4 | 1.1 |
| ADG, g/d | 330 | 336 | 309 | 342 | 295 | 27 |
| DMI, g/d | 656 | 600 | 616 | 656 | 607 | 28 |
| CMR intake, g/d | 397 | 397 | 397 | 399 | 398 | 1 |
| Starter intake, g/d | 259 | 202 | 219 | 258 | 209 | 28 |
| Scour days | 4.0 | 2.9 | 2.1 | 0.5 | 1.7 | 0.1 |
| Fecal score | 1.61 ^a | 1.59 ^a | 1.58 ^a | 1.38 ^b | 1.38 ^b | 0.06 |

^{a,b}Means in the same row with different superscripts are different ($P < 0.05$).

ad libitum consumption.

Calves were kept in their pens until 6 weeks of age without removing any bedding. The researchers monitored growth rate, intake, fecal scores, some blood parameters in the calves and characteristics of the bedding such as amount used and chemical composition of the bedding during the trial.

So, what happened?

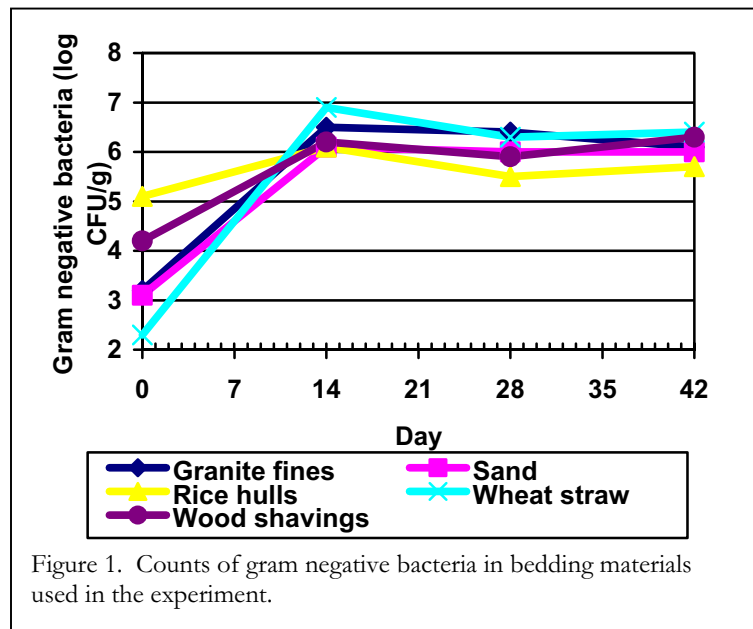
Scour days varied by age and the type of bedding. Calves housed on granite fines scoured more during the first few weeks of the trial than calves housed on other types of bedding. Calves on rice hulls, granite fines and sand had worse fecal scores than calves housed on wheat straw or wood shavings. Calves housed on sand looked more wet and those housed on granite fines were dirtiest. Rice hulls tended to stick to the calves, and they spent more time cleaning themselves off.

There were no consistent results in terms of intake of milk replacer, starter, growth or efficiency. Early in the study, calves housed on shavings tended to eat less starter, but that difference was not seen by the end of the 42 days. There were no significant effects on blood variables that indicate stress (cortisol and α_1 -acid glycoprotein) and both were within normal ranges. This suggests that calves on all these different bedding types were able to adapt to the bedding and one bedding type was no more stressful than another.

As far as the bedding materials themselves, sand and fines were drier than other bedding types, but they also were least able to absorb moisture. Wheat straw could absorb the most moisture, followed by rice hulls and wood shavings, which were about the same. Long wheat straw was warmest, and rice hulls and wood shavings were intermediate. Granite fines and sand provided the least warmth.

As you can see from Figure 1, the number of gram negative bacteria increased from the start of the trial to 14 days. There were no consistent differences among the treatments after 14 days.

An interesting observation made by the researchers was that pH increased in the bedding materials during the study. Initially, the organic materials (shavings, straw, hulls) had lower pH than the mineral based materials (sand, granite fines). With use, the pH of all bedding materials except granite fines increased with use (Figure 2). This was probably due to the absorption of ammonia by the bedding materials. The pH was adequate for growth of gram negative bacteria and coliforms.



The researchers added bedding during the study to keep the calves comfortable and reasonably dry. The total amount used was 239, 220, 13, 10 and 22 kg for granite fines, sand, rice hulls, wheat straw and wood shavings, respectively. It's clear that the amount of bedding added was much greater for the sand and fines, which were inherently heavier products. Differences between amounts of straw, shavings or rice hulls added were not significant.

What about cost? Usually, the best bedding is that type that is effective AND economical. The total cost of using the bedding in this experiment (including adding material during the study) were \$0.53, \$0.97, \$0.07, \$1.01, and \$0.24 for granite fines, sand, rice hulls, wheat straw and wood shavings, respectively. Of course, your actual costs will depend on access to a ready supply and availability in your area.

Summary

Bedding is an important way to keep calves healthy and growing well during the first few weeks of life. This study looked at five different types to see which performed better. Each had different characteristics. As far as calf performance, there were few major differences, but calves housed on straw or shavings had better fecal scores and fewer treatments. The physiological responses (indices of stress) suggested the bedding types used in the study were not inherently stressful. However, based on the treatment data, relative warmth and absorbency, straw and shavings appeared to be optimal bedding types.

Reference

Panivivat, R., E. B. Kegley, J. A. Pennington, D. W. Kellogg, and S. L. Krumpelman. 2004. Growth performance and health of dairy calves bedded with different types of materials. *J. Dairy Sci.* 87:3736–3745.

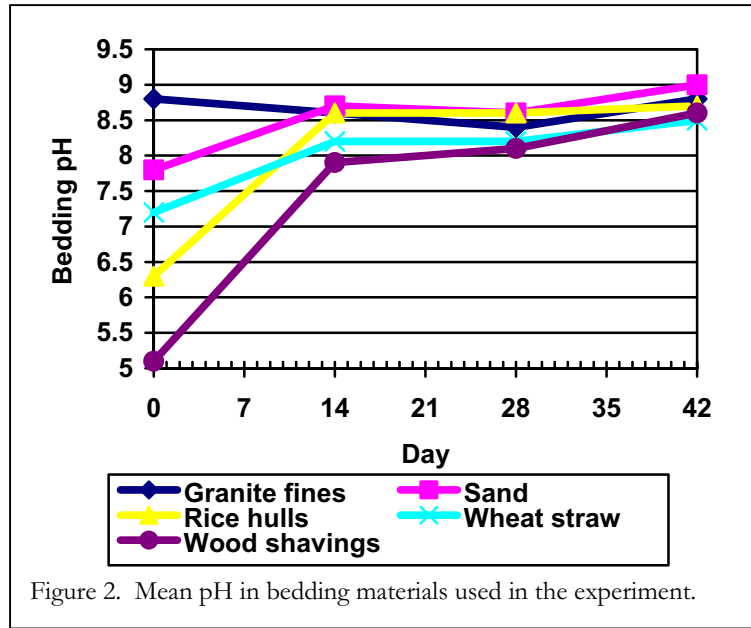


Figure 2. Mean pH in bedding materials used in the experiment.

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