

# Calf Notes.com

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## *Calf Note #131 – Bedding in cold weather barns*

### **Introduction**

There are many housing options for young, preweaned calves – hutches, barns (heated and unheated), greenhouses, etc. There are many bedding options, as well, including shavings, straw, sand, etc. The value of these various management options will depend on the location of the farm, environmental temperature, prevailing winds, solar radiation and needs for labor efficiency and disease control. One 2004 study compared several types of bedding on calf health and growth. Calf Note #111 (<http://www.calfnotes.com/pdf/CN111.pdf>) is available and summarized some of the results of that study.

Individual housing for preweaned calves has been shown to reduce the risk of disease and death loss. In places where the temperature drops below freezing, there are several management strategies that producers can employ to maintain the welfare, growth and health of calves. For example, supplemental heat can maintain a more comfortable environmental temperature for calves. However, several research studies have shown that supplemental heat can also maintain temperatures conducive to microbial growth, thereby increasing the risk of disease.

Researchers at Akey, Inc., Lewisburg Ohio, (Hill et al., 2007) conducted three separate experiments to evaluate the effects of feeding different amounts and quality of calf milk replacer (CMR) and bedding on growth of young calves. It is well documented that calves require additional energy when the outside temperature drops below the lower critical temperature (for more information, See Calf Notes #121 (<http://www.calfnotes.com/pdf/CN121.pdf>) and #122 (<http://www.calfnotes.com/pdf/CN122.pdf>)). However, for the purposes of this Calf Note, only the data regarding differences in bedding type will be presented.

In trial 3, all calves were housed in the same bedding (straw); therefore, data from trial 3 will not be presented in this Calf Note.

Calves were housed in a naturally ventilated barn with curtain sides from d 0 to 56 in all trials. The barn had a clear roof, so bright sun would increase the temperature in the barn. Environmental temperatures for each of the three studies conducted is shown in Table 1. These temperatures were averages of temperatures measured hourly at calf level.

### **Trial 1**

In the first trial, 48 calves were assigned randomly to receive one CMR (26% CP, 17% fat) at various amounts (see Table 2) to weaning at 42 days. Calves were housed

Table 1. Environmental temperatures (°C) during studies conducted by Hill et al. (2007).

	Study 1			Study 2		
	Avg	Min	Max	Avg	Min	Max
d 0-21	-5	-8	11	-8	-15	5
d 22-42	-9	-14	11	-1	-12	21
d 43-56	2	-7	22	3	-2	23

Table 2. CMR feeding rates for trial 1 (g/d).

	Trt 1	Trt 2	Trt 3
d 0-7	681	681	681
d 8-14	681	794	794
d 15-39	681	794	908
d 40-42	340	397	454

All CMR was fed in two feedings/day.

in individual pens, half of which were bedded with hardwood shavings and the other half with wheat straw. Calf starter and water were available at all times. The researchers measured intakes, growth rates, fecal scores and feed efficiency to d 56.

Calves housed on straw bedding grew faster than calves housed on shavings in this study (Table 3). Intake of starter was generally not affected, but feed efficiency was better when calves were housed on straw during the first 21 d of the study. Intake of CMR was not different between bedding groups and averaged 741 g/d for d 0-42.

There was no effect of bedding type on fecal scores.

These data suggest that calves housed on straw in this barn utilized ingested energy and protein more efficiently than calves housed on shavings. This makes sense, as straw provides additional insulation to calves compared to straw and other bedding types. The average environmental temperatures in this trial were -5 and -9°C during d 0-21 and 22-42, respectively. This value is generally below the lower critical temperature for milk-fed calves; therefore, these calves would be expected to be using additional energy to maintain their body temperature. Therefore, this trial showed that the difference in bedding type and insulation provided by that bedding can be measured in improved performance under certain conditions.

## Trial 2

In this trial, calves were fed a “traditional” 20/20 CMR at 454, 568 or 681 g/d from d 0-39 and then at half rate to weaning on d 42. As in trial 1, half of the calves were housed on shavings and the other half on wheat straw. The calves were monitored for the first 56 d and growth, intake and efficiency was measured. As can be seen in Table 4, calves bedded with straw grew faster during the periods d 0-42, 42-56 and 0-56. Also, starter intake was greater for calves bedded with straw during these time periods, also. Again, no differences in fecal scores was observed between the two bedding types.

## Overall

The authors reported that bedding calves with wheat straw versus shavings increased body weight gain by 5 to 12%. This is an impressive rate of increase in growth. It does, of course, depend on the conditions of the experiment. This study was conducted in Ohio in the winter and temperatures were

Table 3. Performance of calves in trial 1 (least squares means).

	Straw	Shavings	SE	P
n	24	24	...	...
BW gain, g/d				
d 0-21	535	480	24	0.05
d 0-42	597	567	16	0.05
d 42-56	1,102	1,044	36	NS
d 0-56	724	686	14	0.05
Starter, g/d				
d 0-21	87	80	10	NS
d 0-42	344	318	26	NS
d 42-56	2,218	2,106	65	NS
d 0-56	813	765	33	NS
G:F, g/kg				
d 0-21	627	565	25	0.05
d 0-42	561	547	13	NS
d 42-56	535	527	9	NS
d 0-56	502	497	11	NS

Table 4. Performance of calves in trial 2 (least squares means).

	Straw	Shavings	SE	P
n	24	24	...	...
BW gain, g/d				
d 0-21	288	264	16	NS
d 0-42	532	482	19	0.05
d 42-56	1,069	925	45	0.05
d 0-56	666	593	19	0.05
Starter, g/d				
d 0-21	148	118	14	NS
d 0-42	489	420	27	0.05
d 42-56	2,361	2,077	82	0.05
d 0-56	957	834	40	0.05
G:F, g/kg				
d 0-21	399	381	18	NS
d 0-42	509	494	11	NS
d 42-56	454	450	23	NS
d 0-56	485	477	9	NS

often below freezing (see Table 1). This is an important consideration if your operation is in a location with temperatures that differ markedly from those in Table 1.

An important take home message from these studies is that housing and bedding are critical to the comfort, health and performance of calves. Wheat straw, which carries greater insulative capacity compared to hardwood shavings, allowed the calves to better maintain body heat, thereby improving performance. It's interesting that efficiency of feed utilization was not markedly improved, although G:F was improved on d 0-21 in trial 1. Improved feed efficiency which would suggest that less energy was being used for heat production. Further research would be necessary to understand this apparent discrepancy.

The value of straw versus shavings may differ in other times of the year. As pointed out in Calf Note #25 (<http://www.calfnotes.com/pdf/CN025.pdf>), using straw as bedding during summer months can dramatically increase fly populations compared to other bedding options, which can make straw less desirable during those periods of the year.

### **Summary**

These interesting trials conducted by Hill and coworkers shows clearly that simple management practices such as bedding calves with straw can have a positive impact on intake and growth of calves that are housed in cold, naturally ventilated barns and exposed to low environmental temperatures. It's important to keep in mind all these aspects of calf housing management to ensure happy, healthy calves.

### **References**

Hill, T. M, H. G. Bateman II, J. M. Aldrich, and R. L. Schlotterbeck. 2007. Effects of Feeding Rate of Milk Replacers and Bedding Material for Calves in a Cold, Naturally Ventilated Nursery. *The Professional Animal Scientist* 23:656–664.

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