EVALUATION OF HOOF WEAR IN DAIRY CATTLE ON VARYING SURFACES - A Preliminary Report

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Introduction

Lameness is one of the most common and economically important health problem seen in the dairy industry and its significance is recognize worldwide.[1-4] Most lameness occurs because of disorders in the claw and it is the opinion of many that the majority of claw disorders are due to the subclinical laminitis syndrome.[5-7] Some of the predisposing herd factors associated with laminitis include systemic diseases, nutritional factors, the most important being excessive carbohydrate ingestion, and housing and flooring factors.[1,6,8,9] Individual cow risk factors for lameness include high body weight, lower body condition score and shallow rear lateral claw angle[9].

The objectives of this study were to determine the amount of wear on a fixed density foot surface under varying management and floor environments.

Materials and Methods

Cows used in the study were from 5 Florida dairies from 3 different geographical regions of the state. Farm 1 housed cows in loose housing with a deep pack of composted manure solids. Cows from Farms 2, 3 and 5 were housed on pasture with access to sheltered feed barns. Cows from Farm 4 were housed in a head-to-head freestall barn with stalls bedded with composted manure solids. Cows at all 5 farms were milked twice daily in a milking parlor. Only non-lame cows that were visibly normal were used in the study. Cows were selected by the manager at each farm. Blocks were applied to 7-10 cows at each site.

A 22.5 cm (7/8 in) thick hardrock maple foot block was glued to a predetermined lateral claw of one rear foot using methylmethacrylate resin. One Farms 1-3 wear was measured weekly for 4 weeks, however, because of poor correlation between measurements taken while the block was on the cow and measurements taken after block removal, the weekly measurements were discontinued for cows at Farms 4 and 5. Blocks were removed 28 days after application. Wear was measured at 4 predetermined sites on the block - front (or toe), middle of the outside wall, back (or heel) and middle of the inside wall (Figure 1). Wear at each site and proportion of block worn at each site and proportion of total block wear were determined using the formula:

Block wear (%) = 100 - [(final block thickness/initial block thickness)*100]

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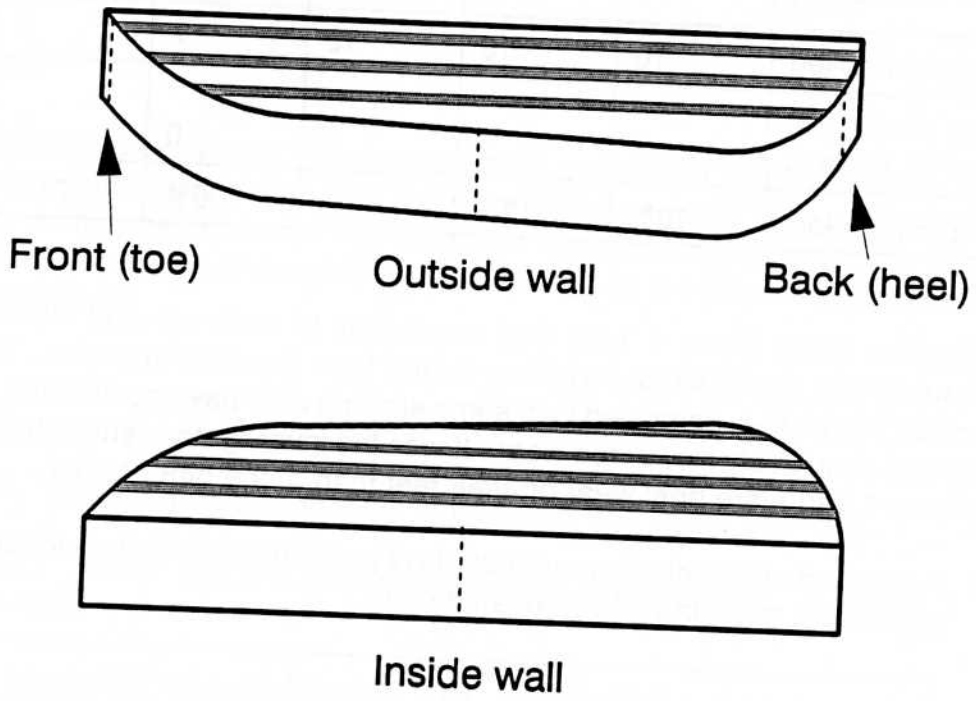
Figure 1 Sites of measurement of block wear on a wooden foot block applied to the lateral rear claw of a non-lame cow.



Results

A total of 44 blocks were applied to cows on the 5 farms. Loss of block was a considerable problem on two farms (Table 1), both of which housed cows on pasture. Because of the high loss from Farm 5, its data could not be used for further analysis. The investigators could not have predicted that Farms 3 and 5 would have this problem. In fact, the conditions under which blocks were applied at Farm 1 were much worse (mud and wetness) than at Farms 3 and 5. It is also interesting that none of the blocks applied to cows in the freestall barn were lost before 28 days. It might concluded that muddy pasture conditions may contribute to block fall-off, similar to how muddy conditions tend to 'suck' the boot off of one's foot. In the freestall barn, the forces were absent. It also must be noted that further study must be undertaken before any firm conclusions on this can be made.

Foot block wear is presented in Table 2. Overall wear was worse in the freestall barn environment. The cows on this farm were seldom allowed out of the barn so the only time spent off concrete was when they were lying in their freestalls. I would subjectively evaluate the flooring in this barn to be smooth, not rough. Similarly, cows at farm 4 wore the front of the block significantly more than at Farm 1; Farms 2 and 3 had wear that was intermediate between Farms 1 and 4. Note also that were at the heel was greater at farm 1 than the other farms, although this difference was not significantly different. The one

Table 1 Foot block loss within 28 days of application

Farm	1	2	3	4	5	TOTAL
Foot blocks applied	10	10	10	7	7	44
Foot blocks lost prior to 28 days	1	1	6	0	5	14
Proportion lost	10%	10%	60%	0%	71%	32%

unique feature about Farm 1 was that cows had to walk up and down an incline (approximately 2% slope) when travelling to and from the milking parlor. The action of walking down this incline, combined with some slipping may have contributed to the faster heel wear and conversely slower toe wear. It was the investigator's subjective opinion that cows at Farm 1 had more heel wear on their feet than at the other farms.

Table 2 Proportion of foot block wear at 28 days post-application of a wooden foot block to a lateral rear claw of a non-lame cow.

	Farm	1	2	3	4
Position on Block	Front	50^{a}	71^{ab}	73^{ab}	100^{b}
	Side	66^{a}	44^{a}	63^{a}	69^{a}
	Back	69^{a}	43^{a}	45^{a}	56^{a}
	Inside	14^{a}	17^{a}	17^{b}	48^{b}
	TOTAL	48^{a}	41^{a}	47^{a}	67^{b}

^{ab} Values in the same row with different superscripts are significantly different ($P<0.05$)

Discussion

These preliminary results of foot block wear reveal some interesting data that need to be further investigated by collecting data on cows on more farms. Other researchers have found that housed cows have significantly more lameness attributable to claw problems than do pastured cows[5,6]. In this study, did the blocks wear faster in the freestall barn because of the flooring surface, or because the blocks tended to stay wet? And do wet blocks wear faster than dry blocks? I cannot answer those questions directly, but subjective assessment of the housing and environmental conditions during the study would indicate that the freestall housed cows did not have wetter blocks. Another question might

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be 'Does the block alter the gain of the cow enough so that wear of the block does not mimic normal claw wear?' This could be a problem, but that still does not explain the differences seen between farms because all cows should have had the same altered gait.

Conclusions

Housing type has a significant impact on wear of an artificial surface glued to the bottom of a cows foot and housing type may have an impact on wear of the horn of cow's feet. This makes it ultimately important for dairymen to maintain good quality of hoof horn by practicing best management procedures discussed in earlier papers, esp. in housing that promotes hoof wear.

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