

# Effect of flooring on the welfare of housed dairy cows

By Foong Lai Yee

## Introduction

Intensively housed dairy cattle often undergo a life of confinement in unnatural environments. This raises the sort of welfare concerns that have prompted recent studies of housed dairy cows. Specifically, lameness and discomfort in cows have been linked to the type of flooring used in freestall housing (Erb *et al.*, 2001). Following is a discussion of three papers on investigations into the welfare of freestall-housed Friesian cows on different types of flooring compared with conventional concrete. Indicators of welfare status, including hoof health, lameness scores and cow behaviour, were utilised.

## Discussion

Centoducati *et al.* (2006) studied the effect of different flooring materials on the comfort and hygiene of dairy cows under fluctuating temperature humidity index (THI) conditions. Two tests were performed concurrently over a three-month period: a preference test and an aversion test. In the preference test, eight cows were housed in a pen with 32 free-stalls with four different flooring materials: polyethylene vinyl acetate (EVA) mats, polypropylene vinyl acetate (PVA) mats, wood shavings and solid manure. In the aversion test, 32 cows were placed in four pens, each containing eight free-stalls. All eight free-stalls in each pen were floored with one of the aforementioned materials. In both tests, data loggers calculated THI every five minutes while cow behaviour was recorded on Day 35 and Day 55. Foot hygiene, udder hygiene, coliform counts and locomotion score of 1-4 (4 being severely lame) were assessed weekly.

The authors found that a high THI (>80) imposed more stress on cows, as indicated by increased standing and decreased lying down. However, the optimal flooring material was shown to alleviate discomfort caused by extreme environmental conditions (THI>80 and THI<74). It was observed that cows preferred organic flooring in high THI (>80), but switched to synthetic mats when THI was low (<74). This led to the conclusion that the merits of flooring materials varied according to microclimatic conditions within the barn. The type of flooring materials had no effect on hygiene parameters or coliform counts. However, cows on PVA mats displayed impaired locomotion, a finding that illustrates that not all synthetic alternatives are beneficial for cow welfare.

Another study (Berry *et al.*, 2006) aimed to assess the impact of rubber alley mats compared with concrete flooring on claw health. In the experiment, 84 cows were placed in the pen with rubber mats and 82 were placed on concrete flooring. Claw health was assessed by noting the occurrence of claw lesions, scoring locomotion on a scale of 1-5 (5 being lame), and measuring rate of hoof growth and wear. Only cows with locomotion scores 1-3 were included in the study; cows with locomotion scores of 1-2 were considered 'not lame' whereas locomotion scores of 3 were considered 'lame'. Hoof growth and wear were evaluated by marking the lateral claw of the right hind foot, 3cm below the periople, with a soldering iron. Individuals were evaluated three times during the study: during enrolment, between 74-94 DIM and 110-130 DIM respectively.

Flooring type played no role in ameliorating most existing claw lesions. However, cows with heel erosions housed on concrete failed to improve and were more likely to deteriorate. For the individuals already lame at enrolment, the type of flooring did not affect lameness. Cows housed on concrete were five times more likely to develop lameness at the end of the experiment. However, neither type of flooring improved locomotion scores. Greater rates of hoof growth and wear occurred in cows housed on concrete. This was evident from an increased mean distance between the solder mark and the distal periople at the end of the experiment. The study was slightly flawed in that its follow-up evaluation period was not long enough to allow significant

changes in recovery or development of claw lesions to be recorded. Hence, the long-term effect of flooring on claw health needs further investigation. That said, this study suggests that softer flooring surfaces, such as rubber, are beneficial for hoof health and lameness prevention in housed cows. However, not all synthetic alternatives can prevent lameness, as shown by Centoducati *et al.* (2006).

Campbell *et al.* (2006) investigated the effects of flooring surfaces in front of the feed bunk on ingestion and rest in cattle. Two experiments were conducted: experiment 1 evaluated the effects of sawdust versus concrete, while experiment 2 assessed the impact of soft rubber versus concrete. Experiment 1 was conducted on 12 pregnant cows and was divided into a 'preference' phase and a 'restriction' phase. Meanwhile, experiment 2 assessed the behaviour of two groups of 8 pregnant cows in non-choice situations whereby both groups underwent either rubber or concrete flooring treatment, and then switched. Cows were scored for their rate of standing or lying in feeding areas and in stalls, and for feeding activity.

Experiment 1 showed that, when given a choice, cows spent more time feeding and more time in total on sawdust flooring. In the restriction phase of the study, more hay was consumed on the sawdust surface than on concrete. In experiment 2, cows spent longer periods standing and lying on the rubber surface and less time elsewhere in the pen. The two different experimental designs emphasised the influence of flooring on cow comfort. Cows had such an absolute preference for non-concrete flooring that they spent more time on these alleys and less time in their stalls. This led to the suggestion that stall design may fail to provide adequate comfort for cows. The outcomes of both experiments concur with Berry *et al.* (2006), indicating that cows preferred softer flooring and that concrete flooring caused discomfort.

## Conclusion

Clearly, different types of flooring material used in housing for dairy cows have significant effects on cow comfort and soundness. Studies confirm that softer flooring surfaces are beneficial for cow comfort and for preventing lameness. Also, the type of flooring can assist in thermoregulation. Thus, environmental conditions and type of flooring should be considered in synchrony to safeguard the well-being of housed dairy cows.

## References

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