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The effect of rubber versus concrete passageways in cubicle housing on claw health and reproduction of pluriparous dairy cows

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Abstract

The effect of covering the passageways and feed face of a cubicle house with rubber flooring was compared to concrete in terms of claw health, behaviour and reproductive performance of dairy cows from a grass-based milk production system. Sixty-two, autumn calving, pluriparous Holstein–Friesian cows were introduced to the housing treatments prior to calving. Foot lesions were scored at housing, 1, 7, 12 and 16 weeks post-partum. The behaviour (activity, posture, and location) of all cows was recorded by instantaneous scan sampling over 24 h once per week from ca. 3 weeks pre-partum to 12 weeks post-partum. Estrous activity was recorded by visual observation three times daily using tail-paint and continuously by radiotelemetry from 1 week after calving until the end of the breeding season.

The rubber flooring had a negligible beneficial effect on heel erosion but no effect on haemorrhage or dermatitis scores and no effect on the proportion of cows affected by severe lesions. Furthermore, there were no benefits for estrous expression or subsequent reproductive performance. There were no differences between treatments in time spent standing by cows, but cows on concrete stood more in the cubicles, while cows on the rubber flooring stood more at the feed face. This suggests that cows prefer to stand on comfortable surfaces while not feeding and that they can use well-bedded, comfortable cubicles for standing to get relief for their feet from concrete floors. This also explains the lack of a difference between treatments in claw health.

Keywords: Dairy cows; Flooring; Claw health; Behaviour; Reproduction; Estrous

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1. Introduction

Housing of dairy cows during the winter months is a common component of Irish grass-based milk production systems. This facilitates feeding when grass supply is limited and the ground is wet. Cubicle houses with fully slatted concrete or solid concrete floors are common. However, such systems can have adverse effects on dairy cow welfare (Fregonesi and Leaver, 2001) and reproductive performance (Lucy, 2001).

Lameness is one of the most important welfare issues for dairy cows and it has significant economic implications. Lameness is a multifactorial condition. However, prolonged standing on concrete is an important predisposing factor (Bergsten and Frank, 1996). Furthermore, falling on slippery concrete floors is responsible for most upper leg lameness (Philipot et al., 1994). Cows' feet are especially sensitive to damage at parturition and in early lactation (Webster, 2002). Minimising external stresses on the feet at this time, i.e. by housing on straw, reduced the severity of sole haemorrhages in heifers (Webster, 2001). Vermunt and Greenough (1994) recommend that cows being kept on hard surfaces for long periods of time should be given access to areas covered with a softer surface to relieve their feet and help reduce the prevalence and incidence of lameness. Indeed, there is ample evidence from the literature that simply providing cows with mats or bedding in the cubicles goes some way towards reducing cases of foot lesions (e.g. Leonard et al., 1994). Anecdotal evidence suggests that the use of cushioned flooring in the feed alleys of new cubicle houses, or retro-fitting it in existing barns is becoming common. However, research data to support its benefits are lacking and often contradictory. For example, Jungbluth et al. (2003) found that sole haemorrhages in dairy cows were less severe on rubber floors compared to concrete. In contrast, Vokey et al. (2001) found no differences in the severity of sole lesions or incidence of clinical lameness between cattle housed with access to rubber or concrete alleyways over a 16-week period.

As cattle are able to distinguish between walking surfaces that differ in traction it is likely that the flooring surface can modify their behaviour. Indeed, the gait of dairy cows is affected by floor surface, with softer and more slip resistant flooring reducing various measures of gait abnormality (Jungbluth et al., 2003; Telezhenko and Bergsten, 2005). Softness is one of the most important properties of a floor for dairy cows (Irps, 1983) and they prefer to walk and stand on soft flooring instead of on concrete (Telezhenko et al., 2004). Tucker et al. (2006) reported that cows preferred to use sawdust covered flooring compared to concrete. This preference was apparent in the amount of time spent eating, amount of feed consumed and time spent standing on the sawdust but not eating. Nevertheless, neither Tucker et al. (2006) nor Fregonesi et al. (2004) found an effect on time spent eating of providing rubber flooring in front of the feed face. Hence the effect of flooring on feed intake is variable. In both of the former studies, cows spent longer standing at or near the feed face without eating when it was covered with rubber flooring.

Estrus detection plays a major role in the reproductive success of dairy cattle. However, a comparison of estrous events in Irish dairy cows over the last two decades shows a reduction in the intensity of estrus (Mee, 2004). This problem is compounded by housing cows on concrete which reduces estrous expression when compared to dirt surfaces (De Silva et al., 1981; Britt et al., 1986; Vailes and Britt, 1990; Rodtian et al., 1996). The reasons suggested for this reduction in estrous expression include hesitancy by cows to mount on a concrete surface, particularly where they have foot problems and temporary inhibition of mounting activity after cows fall due to slippery flooring. Recently it was shown that cows' claws slip twice as far on slurry-covered concrete compared to dry concrete (Van Der Tol et al., 2005). These authors considered cows mounting each other during estrus as a risky behaviour with high potential risk of slipping. Where milk is produced from grass, the majority of cows calve in the spring, but in a proportion of herds