

Muscle activity and locomotion changes in dairy cows walking on standard concrete floors and floors covered with slurry

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Lameness in dairy cattle is a major welfare concern that also affects production. The type of flooring in dairy cattle housing is a main contributor for lameness in cattle. Concrete floors are widely used in dairy cattle barns, even though it has been identified as a risk factor for lameness. In addition, accumulation of slurry on the floor is common issue in modern dairy housing and it could inhibit normal locomotion of a cow. Electromyography is an electro-diagnostic medical technique for evaluating and recording the electrical activity produced by skeletal muscles. The objective of this study was to investigate muscle activity and locomotion changes in dairy cows walking on standard concrete floors and floors covered with slurry. Dairy cows walking on standard concrete floors and shallow (5 cm) and deep (10 cm) slurry-covered floors were tested. Nine Holstein Friesian cows (four sound and five lame) were tested according to a walking schedule with treatments balanced among animals.

Surface electromyograms (SEMG) were used to evaluate the total muscle activity of the biceps femoris and middle gluteal muscles. Behavioural measures including average time/step, stride length and joint angles (stifle angle, floor-foot angle and body angle) at straight and turning positions of walking pathways were also determined in each treatment. The total muscle activity of the middle gluteal muscle was significantly higher ($P < 0.05$) when compared with the biceps femoris muscle, irrespective of lameness condition or treatments. The maximum amplitude of the biceps femoris muscles tended to be reduced ($P = 0.059$) in cows with lameness. The time/step was significantly ($P = 0.005$) increased when walking on floors covered with 10 cm of slurry. The average floor-foot angle was significantly higher ($P = 0.0001$) in concrete floors than on floors covered with slurry. The interaction between treatment and lameness was non-significant. The variability of the stride length was higher in concrete floors than on slurry-covered floors indicating cows are more careful on surfaces covered with slurry. This study shows the potential of using muscle activity to better understand lameness in cattle kept on different types of floors.

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