

# Long term effects of different floor types on gait and claw health in dairy cows

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The aim of the study was to examine cow gait within different free-stall walkway designs. The data on gait characteristics and claw health were collected in 77 lactating Swedish Holstein cows kept in free-stall barn with three different types of floor at the walkways: solid rubber, solid mastic-asphalt and slatted concrete. The gait was assessed under the field conditions, within the walkways where cows were normally housed, by using trackway measurements. The cows were forced to have the same speed range (average speed 1.2 m/c for all the groups) during gathering the gait data. The slipperiness of the floors was characterised by measurements of static and dynamic coefficients of friction under the field conditions at the sites with different level of soiling. Rubber mats showed highest friction than asphalt or concrete slatted floor. The variation in friction across different sites of the walkways was highest in asphalt (Coefficient of Variation (CV) 29-31%) while variation on the runner mats or slatted concrete was of similar magnitude (CV: 9-5%). The slippery spots on asphalt were results of interaction of the rough floor surface and the frequently use of scraper with rubber blades, which resulted in building layers of dried manure and feed residuals on the floor. The rubber mats showed highest friction coefficients, but the friction of rubber floor was also dependent on vertical load exerted to the surface. After increasing the vertical force from 309 to 1682 N the dynamic coefficient of friction increased by 13%. The gait parameters of the cows kept on the asphalt floors did not differ from those on the concrete slatted floor. Cows kept on the rubber mats had significantly longer strides, lower stride frequency and better tracking than cows kept on two other types of walkways. There were no significant differences in claw health across different flooring systems, but cows with more claw horn disruptions had shorter strides ( $P=0.03$ ) and less tracking ( $P=0.04$ ). In addition, cows with smaller base of support were characterised with more claw horn disruption lesions ( $P=0.02$ ). It was concluded that the uneven frictional parameters across the surface results in developing restricted movements while posture alterations due to a slippery surface could be a contributing factor for development of claw lesions.