USDA-ARS-MWA Livestock Behavior Research Unit

Dairy Cow Welfare Fact Sheet

FALL 2010

Lameness Impact on Welfare of Dairy Cattle

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Prevalence and Persistence: Dairy lameness is a very visible well-being issue as well as a production and economic issue. Estimates of the percentage of cows that will be affected by lameness during their time in the herd vary from 10 to over 50%. These estimates do not include sub-clinical cases that may be affecting cow comfort, behavior, reproduction, or production in more subtle, undetected ways. Lameness continues to be a common problem across many types of housing. It has many etiologies and is multi-faceted, making it difficult to study. Recently an abundance of literature has focused on this problem. Although some preventative measures and treatments have evolved, the problem persists and prevention remains elusive.

Conditions Associated with Lameness: Epidemiological studies in the U.S. have shown that lactation number, body condition score, hoof trimming frequency, and stall surface and comfort are associated with lameness. Contrary to popular opinion, some research has shown that high levels of milk production do not affect lameness. Lameness frequently occurs within 60 days after calving. As the periparturient hormone and nutritional allocations shift, hooves become more susceptible to disease. Joint and hip problems are more frequent because of the hormone shifts that loosen the ligaments and tendons for calving. Add to this the large dietary and consumption changes, and other problems arise as a consequence of lameness. Recent studies have suggested that enhanced growth rate and earlier calving are linked with greater incidence of laminitis and first-lactation foot problems. In contrast, previous work found little evidence for an effect of age at first calving, but differences were observed for calving season. Recent studies have shown greater incidence of lameness during heat stress, typically in August. Seasonality of treatments for lameness caused by white-line disease is more common August through October than are sole ulcers. But, grazing systems have fewer lameness incidences than do zero-grazing systems and cows housed in straw yards have fewer injuries compared with free stall systems.

Flooring Solutions: Remedies already viewed as good dairy practice include the use of foot bathes for infectious conditions, frequent hoof trimming, reducing damp environments, properly fitted stalls, and earlier recognition of problems with the use of technology such as accelerometers. Housing dairy cows on concrete flooring has been shown to be instrumental in the development of lameness; and it has been demonstrated as a risk factor for development of sole hemorrhages. In addition, concrete flooring may not provide the friction necessary for cows to walk in a natural manner. Studies have shown that cows prefer to stand and walk on soft flooring such as soft, textured rubber compared with concrete and will stand in bedded cubicles to obtain relief from concrete passageways. Rubber flooring in alleys is another suggested housing change to increase cow comfort and reduce incidence of lameness. Rubber flooring of housing accommodations has been associated with reduced lameness or risk of lameness for dairy cows. This is important as lameness is considered one of the most serious welfare issues for dairy cows, and its consequences present a significant cost to the dairy industry.

Genetic Indicators of Pain and Tissue Repair: Exciting molecular research is focused on changes in pain and tissue repair genes that are associated with clinical and sub-clinical lameness as early indicators. Some peripheral immune cell responses seem to have indicators of both pain and the repair process. Recent data from our laboratory shows that a pain-related gene and as well as a gene involved in cartilage tissue repair changed around parturition for cows that had been housed on rubber rather than concrete. Additionally, immune cell numbers were greater for cows housed on concrete, particularly in their second lactation suggesting an on-going chronic inflammation. Molecular studies of those cells revealed increased inflammatory signals for cows housed on concrete and less of some anti-inflammatory signals, supporting that hypothesis.

Conclusions and Recommendations: While many preventative measures have been developed and embraced as good dairy practices, subclinical lameness continues to affect cow comfort, health, and production. Rubber flooring may be part of the solution. As we further elucidate the impact of pain on the overall functioning of the cow and new lameness detection devices and strategies are tested, we may be able to intervene sooner and reduce incidence or severity of lameness in dairy cattle.

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The mission of the LBRU is to develop scientific measures of animal well-being, through the study of animal behavior, stress physiology, immunology, neurophysiology, and cognition, that will allow an objective evaluation of animal agricultural practices. This method of study will allow the improvement of existing practices and invention of new practices that can enhance animal well-being and increase animal productivity. In addition, this unit will use and develop its knowledge of stress physiology and animal behavior to address concerns of pathogen contamination of livestock carcasses due to the stress of handling and transportation. The optimization of animal well-being will assist in improving animal health, increasing productivity and decreasing human exposure to dangerous pathogens.

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