Impact of lameness in Iran's dairy herds

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Summary:

Lameness is one of the most important threats in dairy industry that cause major problems by consuming time and making expenses for dairy farmers. Lameness has the third position among economically important problems of dairy farming and located after mastitis and reproductive problems, however in developing countries probably nutritional and infectious problems are also preceding lameness. Dairy cattle industry lost are the result of direct expenses like veterinary costs, time, reduced milk production, discarding of milk after antibiotic medications, decrease of body condition and indirect expenses like increase of culling, decrease of reproductive performance, increase open days and increase the risk of mastitis.

Although lameness make intensive pain and discomfort for the animal but it doesn't have the proper position among notify diseases of dairy industry, as it showed reverse correlation between the true prevalence or incidence of lameness and knowledge of the dairy farmers about lameness.

One of the most important roles of veterinarians is clarifying the current status of the lameness in the herd and possible economical losses that helps the owner in understanding the situation and contributing in control programs. It is obvious that eradication of this condition in the herd is not possible. The only logical idea is controlling and reducing lameness incidence to reasonable rates. This needs a deep knowledge of lameness and its impact in the herd. This article review the major aspects of lameness and its control in the herd.

Introduction:

In a wider perspective, lameness could be assumed to be the most important production disease. This refers to both lameness incidences and the fact that lameness is a considerable animal welfare issue. Depending on detection rate, the lameness frequencies differ from herd to herd. The seasonal lameness prevalence from a Khorasan study was more than 17 % that was recorded less than 17% in Esfahan in the same study. The highest reported incidence comes from England where 55% of the animals were treated yearly for lameness. More than 90% of cases of lameness can be related to hoof lesions but far from all diseases causes lameness. However 1.2 times a year (120%) digital lesions recorded in Iran, although most of these lesions didn't make clinical lameness. Digital diseases are mainly categorized to either infectious diseases in the soft tissues (skin and interdigital tissue), diseases in the horn capsule related to laminitis (sole ulcer, sole hemorrhages, white line disease and double sole), or others (traumatic injuries, sandcracks etc). The most common lesions detected in acute lameness in dairy cows were: sole ulcer, white

line abscess, digital dermatitis (papillomatous digital dermatitis, hairy heel warts, Mortellaro disease) and interdigital phlegmon (foot rot, interdigital necrobacillosis). Interdigital dermatitis and heel horn erosion are, in most cases subclinical hoof lesions that are related to inferior hygiene and the presence of contagious agents. Subclinical laminitis is recognized as sole lesions, i.e. sole- and white line hemorrhages, double sole, and fissure of the white line.

Consequences of lameness

The health of hooves and legs is of crucial importance for dairy performance, longevity of the cows and for production economy. When lameness anytime appears among more than 10 % of the cows in the herd it could be considered to be a herd health problem.

Because of difficulties examining hooves for making a diagnosis, necessary measures will most often not be taken in time. Sprecher et al. studied a herd where the lameness problem had been neglected. Fertility was seriously affected, and the risk of premature culling was significantly higher among the lame cows. Sole ulcers also affected fertility significantly in the Kofot study. A lame cow loses her rank in the herd and changes her eating behavior, which could affect the performance. Manson found agonistic behavior, while eating, and feed consumption to be reduced in lame cows compared to healthy herd mates in a free stall system. A negative energy balance implies reduced milk production and body condition. Warnick found indications that the milk yield decreased already two weeks before the lameness was clinically observed. It has also been shown that lame cows are lying down more than healthy cows and thus have a higher risk for leg injuries. Other complications of lameness, such as teat tramps and mastitis contribute to the high cost of lameness. A single sole ulcer or white line abscess has been estimated to cost about $ 650, and the highest cost for lameness is from premature culling, 6000000 rials reported as the estimated loss due to a score 5 lameness in a milking period in Iran.

Risk factors

Compared to cows' natural environment when grazing, today's confined dairy systems hardly achieve requirements for comfortable lying, standing and walking; and hygiene is often poor. A higher risk for lameness and leg injuries is found in large and high producing herds especially when housed. There is no indication that production will decrease in the future and tomorrow's management systems must thus be planned for even higher demands than they are today. Many factors affect the hoof health, i.e. genetics, conformation, diet, management, hoof trimming, housing system, hygiene, contagious agents, and animal behavior.

Hoof trimming

Hoof trimming has two major objectives namely: to promote optimal conditions of hoof conformation and locomotion according to the conditions of the management system, and secondly to detect and treat hoof disorders before it develops to more serious problems and causes lameness. In contradiction, a common "strategy" in many

herds is to call for the hoof trimmer or veterinarian to treat cows when acute need of trimming is detected. Then many cows have already lost their performance and suffered for no reason. In the Kofot study half the numbers of the cows in each herd were randomly selected to be trimmed an extra time, four months before the yearly scheduled trimming.

When comparing the hoof disorders at the spring trimming, the animals with one trimming had 67 % more lameness and 57 % more sole ulcers than those trimmed twice. Acute treatments between trimmings were very rare in the group trimmed twice. Moreover, sole ulcers detected at the extra trimming, had a high recovery rate (80 %). For the infectious diseases the extra trimming did not have a significant preventative effect. Functional trimming is recommended but the quality of hoof trimming should be monitored. Hoof shape and posture adapt to physiological and environmental changes. Harsh surfaces disturb the balance between outer and inner digits of the rear feet, resulting in an asymmetry between them and disposition for hoof injuries and lameness. A correct foot trimming and soft foundation can equalize the weight distribution between the claws and restore the sole concavity by putting more weight on the hoof wall.

Timings of hoof trimming, growth and wear pattern of the hooves and necessity for trimming were studied in different part of Iran, that its results presented in local in international meetings.

Housing systems

In dry lots and straw yards, comfort and normal behavior can be maintained but the hygiene and udder health can be impaired. Cubicle or free stall systems and tie stalls aim to be more efficient in management and economy but cow comfort and hygiene can be critical due to poor design and management. If the cow is not comfortable, the artificial confined environment predisposes to environmental diseases such as those of the udder, and feet and leg. Cows' behavior can influence lameness. Foot lesions are related to prolonged standing and walking if the lying area does not provide satisfactory comfort for the cow, or causes higher activity due to social interactions and overcrowding. Thus hoof injuries are dependent on too much exposure for hard abrasive and unhygienic floors. Leg injuries, on the other hand, are related to prolonged uncomfortable lying, which means too much exposure to hard, abrasive and unhygienic floors in the stalls. Recently, both experimental and epidemiological studies, revealed more lameness and more hoof disorders in free stall barns than in tie stall barns and more leg injuries in tie stall barns than in free stalls.

Cow comfort when lying

The cow comfort depends basically on two components, the softness of the ground surface and the restrictions for lying down and rising. Foot and leg injuries are frequently observed even in newly constructed, sub optimal, tie- and free stall barns. For example, dairy cows prefer to lie down when ruminating. If animals are found to stand with the rear part outside the cubicle or lying outside the cubicles, it is a sign of uncomfortable stalls. Longer standing time on hard floors increases loading and exposure for dirt, particularly of the rear feet. Poor design of free stall barns or

other resting area may reflect of higher hock scores of the cows that finally can affect its production and locomotion of the animals, this was the case in a number of studies in Iran.

Floor materials and properties

The quality of floors, in terms of shape, hardness, friction and hygiene is of great importance for the health of feet and legs. Larger groups, more frequent milking, longer feeding time and longer walking distance back and forth to the facilities on concrete floors can be contributing factors for excessive wear and overburdening of the hooves. Observing arched backs of the cows when they are walking and standing can make a quick survey of the hoof health in the herd and detecting lameness. A cow arching the back when both walking and standing, and showing lameness from her feet is likely to have a severe foot lesion. An ideal floor must be hygienic, comfortable to walk on and have an even, skid-resistant surface without being too abrasive. The floors must be cheap and simple to construct, durable, and easy to manage and maintain. Concrete has for a long time been the most common material for floors in confined animal systems, but softer and more resilient materials like rubber and modified mastic asphalt might be future alternatives. Management solutions that facilitate cow traffic and reduce excessive, involuntary standing and walking on uncomfortable, concrete floors must thus be encouraged.

Floors that are too harsh often exacerbate laminitis-related hoof disorders. An association has been found between concrete floors, sole horn lesions and lameness. Cows in commercial dairy herds tied in stalls equipped with rubber mats were shown to have significantly less severe sole hemorrhages than those tied in concrete stalls. Hard floors and management changes before calving seemed to be the most important factor in the development of subclinical laminitis.

Obviously, animals can adapt to harsh conditions if they get sufficient time for acclimatization. It is therefore recommended to make changes from softer to harder foundation either at least a month before calving or alternatively to keep animals on soft ground until a few weeks after calving, before introducing them to concrete floors. Rubber mats are recommended instead of concrete floors where applicable in high-risk herds.

Hygienic condition of the floors

Manure is an unfavorable environment for the hooves as it macerates digital skin and horn tissue and promotes contagious agents that have affinity for the hooves. Slatted floors normally stay cleaner then solid floors. Poor drainage of slatted floors can, however, occur when cow traffic is too low or when there is too much litter food on the floor. Scrapers on top of the slatted floor improve hygiene and become more popular.

In a Swedish study the prevalence and severity of heel horn erosions, associated with interdigital dermatitis, were significantly higher in the group with dirtier stalls without cow trainers. The moisture content of the sole horn was positively correlated to the severity of heel horn erosions, which is in accordance with a study from USA; where it was reported that the stall moisture was highly associated with lameness.

As an alternative to cow trainers in tie stalls, rubber-coated slatted flooring in the rear part of the stall was developed and studied. The incidence of heel horn erosion was significantly lower in cows on the rubber-slatted floor then in the matched control animals, which were on solid floors with rubber mats. Also epidemiological studies from France and California reveal that the most significant risk factor for heel horn erosion and papillomatous digital dermatitis, respectively, is unhygienic conditions. It is thus clearly documented that a more or less permanently, manure-contaminated environment predisposes for infectious foot diseases.

Most modern dairy management systems are compromises and need some artificial measures to prevent health problems. Footbaths have been used for long time and are even recommended in the animal welfare regulations. However, there are different methods and techniques in their management, and there are too few studies on footbaths on what is optimal. Footbaths are used for the cows to pass through either as a true bath or as a semi permeable foam-mat. The footbaths are used with different intervals and time. Foot spraying has during recent years been an alternative for traditional footbaths. The aim is to use expensive drugs and disinfectants more efficiently. Very few controlled studies have been made to clarify the typical strategy and the advantage for different topics. Dutch studies during the eighties showed formalin (40% water solution of formaldehyd) diluted to 4 %, to be efficient for infectious interdigital dermatitis and that the efficacy was improved with higher environmental temperature. However formalin is hazardous and is forbidden in many states and countries. Copper based solutions were probably the most common used bath solutions in the dairy industry worldwide although environmental issues make restrictions for its use today. There is, however, remarkably few studies on the efficacy of copper sulphate solutions. Several studies have been undertaken where different antibiotics have been tested on the recovery rate using both baths and spray. Also non-antibiotics have been tested effective in comparison to water.

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