

## Herd investigation of lameness in cattle

A.R. Mohamadnia<sup>1</sup>, F. Naderi<sup>2</sup>, A. Khaghani<sup>3</sup>

<sup>1</sup>Department of Clinical Sciences, College of Veterinary Medicine, University of Ferdowsi, Mashad, Iran. <sup>2</sup>Pishro dairy farming consultant group, Esfhan, Iran. <sup>3</sup>Behboud Dam Sepahan Co., Esfhan, Iran.

### Summary

Understanding herd level of lameness needs deep understanding of dairy farming with special concern on management factors. Lameness is a multifactorial condition, that sometimes make very good situation for controlling the condition and in other hand sometime its understanding because of interactions between different factors is very difficult and may lead to misinterpretation. For understanding herd level of lameness a two phase approach is designed. At the first phase understanding the risk factors of the conditions is essential. Deep knowledge and assessment of the effects of production, reproduction, resting and bedding, heat stress, concurrent diseases, culling, hygienic status and BCS can provide some clues for better understanding the situation. In phase two getting direct information from the hooves (hoof trimming) and locomotion will provide informative data for assessing the situation. In this part these information can get from recorded data or by sampling from the herd. This current study will focus on the above mentioned program and its implication in dairy herds.

### Introduction

Lameness in dairy cows is a major concern for producers. Lameness tends to exhibit reduced productivity and lower fertility, which have economic implications for dairy producers. Lameness can be culled from the herd at younger ages than their sound counterparts, thus shortening their lifespan. Lameness has the third place in economic losses after infertility and mastitis; however, in developing countries possibly infectious diseases and malnutrition precede lameness.

Lameness, despite of its economical losses, pain and discomfort, does not notified in dairy industries and published reports usually show lower incidence of the disease. In a study prevalence of the lameness has a reverse correlation with the knowledge, training and awareness of the farmers. British farmers estimate prevalence of the disease as 5% but its real prevalence was 22%. Incidence of the lameness in last 40 years have been increased that maybe a result of increase milk production, herd size, modified management indices and breed.

The causes of lameness are many and have not been fully elucidated. The presence of lesions or joint pain can be influenced by a multitude of factors including increased standing time, dietary level and type of concentrates, dietary levels of crude protein, flooring type, reproductive stage, and physical conformation and genetics. Given this wide range of factors, it is difficult to isolate a specific factor or set of factors contributing to lameness in a single cow. As the tough tissue of cattle hooves contains a large amount of keratin, a lack of this substance will compromise the integrity of the hoof, predisposing the sole to ulceration.

By early detection as with many physical problems, lameness can best be corrected. Despite the significant negative consequences of lameness in a dairy herd, methods of successful early detection have yet to be developed and implemented on the scale of modern commercial dairy farms. Single observation, the most obvious method of lameness detection, is time-consuming and requires great skill on the part of the herdsman, who may have to observe several hundred animals per day.

In herd investigation of lameness maybe the first question is does our herd suffer from lameness? If yes what is the severity of the condition? And finally what should we do?. Finding answers to these questions needs the herd to be investigated for lameness. Herd investigation of lameness may achieved in two phases. Most parts of this manuscript are personal experience of the author in different dairy herds around Iran.

### Phase One: Overall Status of the herd

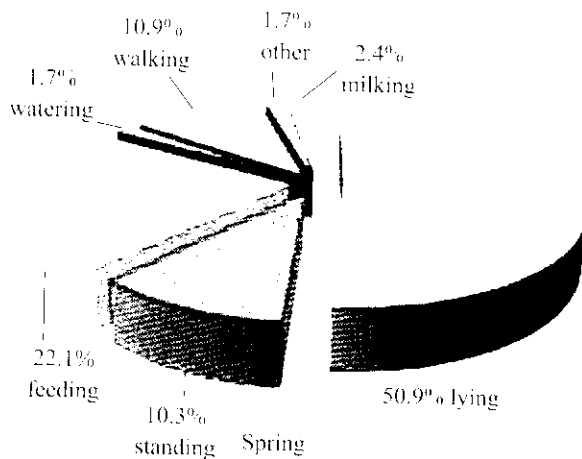
Multifactorial nature of lameness makes a variety of predisposing factors, so understanding the presence of predisposing factors and its severity is essential for diagnosis of lameness. The following list are the most important risk factors in Iran's dairy herds:

**Production:** High producer dairy cows needs higher amount of concentrate and this higher amount may produce more acidotic condition in cow's rumen that possibly could play a role in pathogenesis of subclinical laminitis (SCL) and afterward other claw horn problems. Higher amount of dry matter intake and total intake needs longer time for feeding resulted in higher stress on the animal's digits and higher SCL. Cows with higher production and above mentioned

conditions may have lower feces score and also the amount of feces are higher in these cows, this higher amount also may play a role in corrosive effect of manure on the hooves that may play a role in pathogenesis of the digital conditions. Regarding current situation of dairy farming in Iran most producers are thinking about higher productions with the same old facilities that beside higher production increase the risk of lameness. Understanding the feces score of the herd besides understanding cleaning procedures is essential.

**Reproduction:** Herds with reproduction problems may reflect a higher days in milk (DIM), since cows with higher DIM do not included in a trimming program, will change the weight bearing patterns and its regular consequences. Higher DIM maybe a reflection of reproduction problems, other indices like Days open (DO), Service per conception (S/C), Days to first service (DFS) and overall conception rate (CR) of the herd also maybe other reflections of the problem that all can lead to the above mentioned problem. Parturition status of the herd also can be an index of predisposing factors for lameness, for example seasonal pattern of parturition in some area may lead to a fluctuant DIM through the year that needs different type of hoof care management. Herds with lower DIM and with the seasonal pattern of parturition may be good candidates for digital dermatitis and some other infectious diseases of the digits. Reproductive problems in modern dairy cows maybe a consequence of high level of milk production that is a risk factor for lameness by itself.

**Resting and beddings:** Overall resting management of the herd has a major concern in management of lameness in the herds. It is obvious that conditions like poor bedding, design of the free stalls, walking areas and also poor design of feeding area all can result in more standing cows, that beside other nutritional and management factors can result in more pressure on the hooves and increase in claw horn lesions. Finding time budget of the cows could give us a very good clue for finding possible problems.



**Heat stress:** Heat stress happens in most part of Iran. Management of heat stress is one of the most difficult parts of dairy farming in our country, as in some area owners leave this condition and accept its normal consequences like less CR and more claw horn lesions following hot and humid month of the year. Using devices for controlling heat stress in many areas are a normal work in dairy farming but proper usage of such a devices beside good design of resting areas mostly doesn't work properly. In heat stress drooling of the saliva, lowering the buffering capacity of the saliva, lower resting of the animals, resting in poor bedded areas all can lead to a subclinical acidosis that followed by a SCL, this latter predispose the animal to many hoof pathologies, that are out of scope of this paper.

**Concurrent diseases:** Incidence of some infectious and metabolic disorders in the herd maybe an indicator of what is going on the herd. It is obvious that conditions like abomasal disorders, fat cow syndrome, downer cows, septic metritis and septic mastitis are not only a reason for economic loss, but also are tip of iceberg for knowing metabolic and overall management condition of the herds.

**Culling rate and causes:** Culling rate in herd and distribution of its causative factors, may be a clue for management of the lameness. Normally the highest rate of culling should record in obstetrical problems following by mastitis and lameness. Higher rate of culling specially in new calved cows is a very important factor in economical losses of the herd. In this part the main causes of culling in newly calved cows are parturition events, uterine infections, metabolic disorders, mastitis and lameness. All other causes except than lameness can lead to lameness as well, it means that in such a herd you may solve different apparent causative etiological factors of lameness but other non apparent causes like metabolic disorders, infectious conditions can lead to long term lameness.

**Hygienic status of the stalls:** Cleanliness of the resting area may play a significant role specially in the herds that are susceptible for infectious conditions like digital dermatitis. Daily removing of manures and in high producing barns, removing of manures in each milking time can lead to better condition. It is obvious that just removing manure is not the clue for better hygienic condition. the bedding area should be disinfected with different available commercial products or by firing the area several times a day. In some modern systems scrapers were used for getting more efficient results. Usage of scrapers can lead to more clean walking areas but its normal subsequence is the trauma to the feet.

**Body condition score (BCS):** BCS plays a significant role in partitioning of the cows. Since BCS like some other scorings is a subjective method, in some farms sometimes dry cows got higher or lower BCS. Each one can play a role in metabolic pathways after parturition. Since each BCS number is about 75 -100 kg body weight, higher BCS can predispose the animals to higher rate of lameness. Evaluation of the BCS status of

the animals can give a clue for possible more pressure on the feet that may lead to hemorrhages and claw horn lesions in the feet.

**Phase two: Special criteria related to hooves**

After getting enough records about predisposing factors, now we have an estimation that is our target herd prone to lameness? Now if we find the answer yes, then we should get more precise criteria for estimation of the condition.

Hoof trimming: Hoof trimming program and its accuracy maybe the most important part in management of the hoof health. In most herds the concept of hoof trimming did not completely described, as the owner doesn't know how many times a year have to trim the cows or which cows should be trimmed. Also good trimming techniques may result in healthier hooves. In some herds the main cause of lameness is improper technique of hoof trimming that should be taught. Different trimming programs were done in different herds based on time, season, age and some other criteria. Lack of educated hoof trimmers is one of the most important problems in this field. In Hoof trimming beside good trimming technique, the most important factor is good report of what was done in trimming chute. Data of hoof trimming are very important for understanding what happened in the herd in past time. The first step is to know what was done in the herd, is there any recorded data? Are people in the herd have proper knowledge of digital disorders? Do they know when these disorders happens? Do they know the extent of the lesions? If there is any recorded data, it should be analyzed, otherwise some animals in different stages of lactation and ages should be evaluated for possible lesions. For getting reasonable analysis at least ten cows in each of the following categories should be evaluated:

- Ten fresh first parity cows with DIM less than 50
- Ten fresh older than 2 parity cows with DIM less than 50
- Ten cows with DIM between 120-150
- Ten cows with DIM more than 300

The results can give some clues about the possibility of infectious and non infectious lesions in the herd. However, A reasonable sampling strategy may be to observe up to 100 cows from the middle of the milking order. Also, presence of severely lame cows at the end of milking may be useful for identifying lame farms. An example of a herd with recording system appeared in table 1, that shows exact findings in the herd. In this kind of data recording, data recorded in a separate sheet on excel software on daily basis and its total outcome easily extracted from recorded data. Since in some herds, diagnosis of the lesions as white line disease or sole ulcers may controversial, the data recorded on a

zonary basis that hooves divided into 12 zones.

Locomotion scoring (LS): is another way to investigate what is going on the herd. A five point scale LS system used normally in our herds, other systems also based on the experience and the size of the herd can be used. In locomotion scoring all cows of the herd including dry cows should be scored on a flat surface, since the outcome of the scoring may change between different persons, it should be done by a same observer. Analysis of the scored cows in according to DIM, parity, age, milk production and pens also can make some clues for possible pathogenesis of the lameness in the herd and finding proper interactions.

Foot score: This system generally used by Dutch trimmers, as cows with high scores have the toes with more outward roation. Measuring this rotation from a line parallel to vertebral coloumn make a 3 point scoring system. In former reports it was a general believe that herds with higher scores (More outward rotation of the feet) needs trimming. In some other reports the correlation of feet outward rotation with hoof overgrowth was rejected, anyway in a recent study in Iran it seems that this outward rotation is different in right and left digits and also mostly affected by conception status of the cow. It seems that usage of this scoring system in cows with the same DIM can differ long toed and short toes cows.

**Table 1:** Result of hoof trimming recordings in different month of the year

	June	July	August	September	October	November	December
Monthly working days	19	16	14	15	21	17	15
No. trimmed cows	578	503	452	358	577	421	361
120 DIM	103	88	132	98	131	139	89
Dry	108	106	61	89	74	69	95
Delayed Reproduction	59	21	28	31	27	21	6
Misc	11	72	21	57	68	47	55
New lamenesses	27	94	91	68	86	48	50
Sole Ulcer	20	23	26	27	26	24	19
White Line Disorder	17	8	10	9	9	0	3
Digital Dermatitis	37	32	45	18	16	6	9
Intercigital Phlegmone	3	4	11	10	4	3	3
Heel Erosion	2	4	12	2	6	1	0
Toe Ulcer	4	6	0	1	0	1	1
Wooden Blocks	48	35	43	72	34	40	49

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