



Limb health in rural conditions

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Lameness is one of the most important factors in cow health. Milk loss, fertility reduction and early culling are the most important outcomes of lameness. In rural area with improving breeding techniques and affinity of the owners to high producing cows, the importance of lameness was increased and needs more scientific works.

In current field study 2200 cows aged between 6 month to 13 years old were included. Data of age, breed, pregnancy, ratio, volume of concentrate, hoof trimmings were recorded in each cow. The above mentioned cows were kept in 400 rural farms in Lorestan province. Locomotion status of the cows (Back posture and leg scoring were evaluated.

Sixty percent of the cows over 5 parity had leg score 2 (deviation between 17-24) and were classified as moderately lame cows. Forty percent of the cows with parities between 2-5 were not normal and in the last group (cows between 6 month to two years) hoof deformities specially in the age less than 12 month were recorded.

Breeding techniques and changes of owners idea were affected on lameness status and may provide high financial loss. Lack of knowledge, lack of education and belief in this part can be corrected by intensive programs.

Study on annual and seasonal lameness prevalence in dairy

cattle herds of kermanshah province: the first comprehensive study

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Lameness is one of the most important causes of economic loses in dairy cattle industry around the world. Therefor having information about the incidence, prevalence and causes of lameness in each area is necessary to design therapeutic, controlling and preventive measures. Kermanshah province; in west of Iran, has a considerable numbers of industrial dairy farms with about 10000 Holstein cow population. There was no any comprehensive study which had been done on lameness prevalence in Kermanshah dairies; though, this study was planned to evaluate lameness prevalence in industrial diary cattle herds in this province. This survey was performed in one-year duration (4 seasons) during years 2014 -2015 in 12 herds with various population. Regarding the herds sizes they were divided into 4 groups (small herds, n:5, medium herds, n:3, relatively large herds, n:2 and large herds n:2). Locomotion scoring (LS) was done based on 5 point Sprecher method in each 4 separate seasons. Cows with LS 3-5 were considered having lameness. Total of the 12605 cows have been scored in all seasons and the average annual lameness prevalence was calculated as 37.4%. The total number



of cows that have been scored and seasonal lameness prevalence in spring, summer, autumn and winter, were 3170 cows (35.3% lame), 3179 cows (36% lame), 3051 cows (37.7% lame) and 3105 cows (40.6% lame) respectively. Average annual lameness prevalence in 4 groups of herds was 35.6% in small herds, 40.6% in medium herds, 43.4% in relatively large herds and 32.5% in large herds. There are large variations in present reports about the rate of lameness prevalence in different countries and herds around the world; so It has been reported from 5% to more than 50%. These variations may be due to several factors such as; housing system, herd management system, herd size, climate, season, breed, nutrition, amount of milk production, quantity and quality of hoof care programs, and etc. With regard to direct and indirect large economic losses due to lameness in dairy cattle herds, it is necessary that farmers, Managers, veterinarians and other related persons to take more attention to this problem.

Key Words: Kermanshah province, dairy cow, Lameness prevalence

Solar horn hardness in different digital zones of the cows

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Lameness is a crucial welfare issue in modern dairy husbandry that could result in serious economic losses to

dairy producers because of decreased milk yield, reduced fertility, and increased treatment costs and culling rates. Quality of the cow's claws, especially their hardness, may influence the likelihood that the cow will suffer from claw lesions. Although various factors (i.e., nutrition, genetics, etc.) affect claw quality, the environment in which the cow is housed is very important. Resistance of claw horn to environmental effects likely depends on its hardness because hardness influences rate of horn wear and erosion. Some researchers claim that this relationship puts cows with wet claws at a higher risk of developing claw problems because the horn resistance is diminished.

This current study was done in a dairy herd with total of 5800 dairy cows and 2780 milking cows. The average annual daily milk production of the farm recorded as 36 lit/day, cows milked three times a day and housed in free stall barns. Hoof care program were done on the following basis: monthly locomotion scoring, hoof bathing (3-4 days a week), regular hoof trimming at least two times a year by a professional veterinarian hoof trimmer, data recording and analysis.

Two groups of cows were selected. Group one on days in milk 120 and group two before drying were referred to trimming chute. Hardness recorded by shore D durometer. Data analyzed in each group and between the groups using two way ANOVA and p values under 0.05 consider significant. Hardness of the solar area in zones one and five (area of toe ulcers and necrosis), four (area of sole ulcer) and three (area of white line disease) were measured. The hardest area (mean \pm SD) of the hoof in group one was located in zone 5 (37.11 ± 6.18) that



was significantly harder than area 2-4. And the hardest area in group two was located in zone 5 (49.43 ± 4.94) that didn't show any significant difference with the other area of the sole. All area of the hooves were significantly harder in group II than group I ($P < 0.05$).

Days in milk plays an important role in hoof hardness that may be the reason for more claw horn lesions in 100 days after parturition. This may be a result of negative energy balance, peak production, less comfort, losing body condition score and so many other problems that may originate in transition period.

Evaluation of the culling rate in cows with interdigital necrobacillosis

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Culling in cows is a complicated condition. Many factors such as, age (parity), milk production, fertility, health, season, feed price, and other variables may influence severity of this condition. Infectious foot diseases are common in dairy herds, causing welfare reduction and financial losses. Interdigital Necrobacillosis (INB) which is a painful condition is one of the most important infectious causes of lameness. *Fusobacterium necrophorum* has been isolated from over 90% of clinical cases of INB in cattle. When the organism enters subcutaneous

tissue through interdigital skin after traumatic damage or the action of irritant agents in slurry this condition may happen. Lack of micronutrients, genetics and disturbances in the local immune system are known as predisposing factors. The overall incidence of INB is probably less than 5%, but in epidemic outbreaks the incidence of the disease can be as high as 20% of the milking cows in a herd.

This current study was done in a dairy herd with 910 productive cows (including milking and dry cows), during 12 month period started from March 2014 till February 2015. All cows housed in free stall barns and milk three times a day. The average production of the cows during this period recorded as 36.5 lit/day. Hoof care programs including regular hoof trimming by veterinary practitioners and skilled hoof trimmers was done as the cows at least trimmed two times a year and total 4 times including different inspections and treatments referred to hoof trimming chute. Days in milk (DIM), milk production, parity recorded in all cows in addition to the records of the diseases. The INB located in zone 0 of the hooves selected as treatment group and in addition to the above mentioned records culling rate in these animals in comparison to the control (the cows without any digital disorder 6 month before to 6 month after case occurrence) were recorded. In treatment group total of 94 (annual incidence of 10.32%) cases recorded and 40.42% of them were culled in average of 8.97 days after detection. This number were significantly higher than culling rate of the control group (23.3%)(Chi square test, $P = 0.009$). No significant difference between culling rate of the cows with lower production



(less than 30 Lit/day) and higher production (more than 30 lit/day) recorded ($P>0.05$). Thirteen cows were culled in treatment group (32.5%) with days in milk less than 150 days that did not show any significant difference with the culling rate in this group with days in milk over 150 days (49%) ($P>0.05$).

It seems that despite of a very intensive care of the affected animals still culling rate in INB animals is higher than normal cows that need special attention to control the hygiene and other predisposing factors. Days in milk and milk production record of the cows do not affect the culling rate following INB.

Sole ulcer occurrence cure rate in a dairy herd

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This 12 month current study were done in a dairy herd consisting of 1340 productive cows (Milking and dry cows) started March 2013- February 2014. Cows housed in loose stalls, milk three times a day. And receive total mixed ratio. The average milk production of the cows during this period recorded as 39.2 lit/day. Hoof care programs including regular hoof trimming by skilled hoof trimmers was done as the cows at least trimmed two times a year and total of 3.45 times including different inspections and

treatments referred to hoof trimming chute during the year. Data of days in milk (DIM), milk production and parity recorded in all cows in addition to the records of the digital disorders. Data recorded on a zonal basis (1-12) of the digits and any wounds in zone 4 recorded as sole ulcer and included in this current study. All wounded cows inspected on a 15 days basis and covering of the lesion with a film of horny tissue considered as cured wound. New cases selected based on new lesions at least 3 month after curing of the previous lesion or occurrence in another digit or zone.

Total of 57 sole ulcers were detected. Most ulcers occurred in hind feet (51, 89.47%) and just 6 ulcers (10.52%) occurred in forelimbs. Twenty three ulcers in right hindlimb (40.35) and twenty ulcer occurred in left hindlimb (35.08%). In twelve cows (21%) sole ulcer detected in two digits. Sole ulcers (mean \pm SEM) cured in 82.66 ± 7.95 days, started from 15 days to 364 days after its occurrence.

Although the ulcers cured longer when the cow affected in DIM less than 100 (87.65 ± 8.15) than higher DIM (82.66 ± 7.95) but the difference was not significant ($P>0.05$). Cows with milk production less than 30 lit /day and higher production didn't show significant changes in duration of treatment ($P>0.05$). Although cows with low body condition scores (less than 3.2) were treated faster (82.66 ± 7.95) than cows with higher body condition scores (more than 3.2, 92.35 ± 8.48) but the difference were not significant ($P>0.05$).

Days in mil, milk production and BCS at the time of sole ulcer occurrence does not affect duration of treatment.



Evaluation of mastitis as a cause of lameness and digital lesions in dairy cows

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Lameness and mastitis beside infertility are major health concern and economic loss in dairy herds that affect animal health and reduce productivity and comfort of the cows.

Regards to occurrence of lameness after infectious and endotoxemic conditions and back to causative agents in mastitis and scattered reports, the main objective of this current study was establishing possible correlation between lameness and infectious conditions like mastitis.

This current study was done in a large dairy herd during a 9 month period. Cows were housed in loose housing system and fed by total mixed ratio. Mastitis recorded as a three point scale that in score one, milk clots in fore milking considered as the most important finding, in score two in addition to milk clots general conditions of inflammation was obvious in the udder but no general sings recorded and in score three in addition to the above findings cows express general illness including fever, anorexia. Hoof care and lameness management were done in the herd and in addition to hoof trimming by professional hoof trimmers and veterinary practitioner, hoof bathing, bedding management, heat stress control were done and data recorded.

Five hundred forty six cows affected with different mastitis scores were selected during 9 month started March 2014 - January 2015. Hoof lesions recorded up to three month after mastitis occurrence. The same number of cows selected randomly from negative mastitis cows as control group and all lameness data recorded in this group as well. Lameness compared between two groups and $P < 0.05$ considered as significant. Locomotion scores of the cows also recorded based on a five point scale monthly and compared from three month before mastitis till three month after mastitis.

Results showed that overall lameness were not different between groups ($P > 0.05$). New cases of noninfectious lameness were significantly higher in mastitis than control group ($P < 0.05$).

Sole ulcer, White line disease, toe ulcers were higher in mastitis group but didn't show significant difference with control group. In contrast digital dermatitis were significantly lower in mastitis group ($P < 0.05$).

It seems that mastitis can play a role in increasing incidence of noninfectious lameness. However since some causative factors in both conditions maybe the same, lameness and mastitis may be a result of a same causative agent that needs further study. Lower rate of digital dermatitis in mastitis group maybe a result of antibiotic treatment.

Incidence of hoof lesions in dairy farms in Iran

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Lameness have known as the most important problem in dairy cattle welfare and economic losses and got the third place after infertility and mastitis. Different incidence of lameness has been reported base to different production, climatic, management conditions. Knowing the overall incidence of different lesions that resulted in lameness can play an important role in understanding current situation and making targets for control and management of the conditions.

This current study was done to detect the incidence of hoof lesions in Iran. Four industrial dairy herds were selected in different parts of Iran. With 933 to 4490 productive cows (milking and dry) cows, in different climates from very cold to hot and low to high humid weather. Cows were milked three times a day and received total mix ratio. Cows were housed in loose stall to free stall barns. Hoof care program (by a veterinarian) started at least 5 years before start of the study. Hoof trimming was done on the following basis; each cow was trimmed two times a year as one time is immediately before drying and the other is around 100 days after parturition. In addition to normal hoof trimmings cattle with locomotion scores 4 and 5 on a five point scale, repeat breeders and referral cows also referred to trimming for detection of any possible lesion in the hoof.

Data were recorded in a hoof trimming record sheet, and finalized in excel sheet and management software of the farms. Injuries recorded by its affected zones (1-12). Sole Ulcer (SU), toe ulcer (TU), white Line disease (WLD),

digital dermatitis (DD) and interdigital necrobacillosis (INB) were notified in this current study. Information recorded from March 2012 to February 2014 (two years). The annual incidence of each lesion and overall incidence of the lesions were reported. Total of 20000 cows were evaluated with 132000 times of inspection in this period. The overall incidence of the lesions was different between farms (14.34 – 61.89%). The most prevalent lesion was sole ulcer among non infectious causes and digital dermatitis among infectious causes. The most prevalent lesion was digital dermatitis in three out of four farms. The overall annual incidence of lesions recorded as 31.75%. The annual incidence of each lesion in Iran recorded as 9.70% for SU, 1.53% for TU, 5.75% for WLD, 11.66% for DD and 3.00% for INB.

Toe ulcer incidence and cure rate in a dairy herd

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Lameness is a multifactorial condition. Primary causes include infectious agents (e.g., foot rot), laminitis, conformational or other lesions (e.g., corkscrew claw, leg injury); and claw lesions such as white line disease, thin sole-induced toe ulcers, sole ulcers, heel ulcers, toe ulcers, sole punctures, and thin soles. Compression of the corium between the sole and third



phalange can result from over trimming or inflammation and rotation of the phalange due to laminitis. This compression can cause the formation of ulcers in the apical region of the sole. These lesions are typically found in the apical portion of the sole adjacent to the abaxial white line in zones 1 and 5 of the sole.

This current study was done in a dairy herd with 890 productive cows (including milking and dry cows). The study was done during 32 month period started from June 2013 till January 2016. All cows housed in free stall barns and milk three times a day. The average production of the cows during this period recorded as 39.3 lit/day. Hoof care programs including regular hoof trimming by veterinary practitioners and skilled hoof trimmers was done as the cows at least trimmed two times a year and total 4 times including different inspections and treatments referred to hoof trimming chute. Data of days in milk, milk production, parity recorded in all cows in addition to the records of the diseases. The toe ulcer (TU) located in zones 5 and 1 of the hooves selected. Total of 91 cases of TU were recorded with an annual incidence of 6.74%. The average milk production in the affected cows recorded as 32.95 ± 10.82 that were not different from the average production of the herd during the same period. Cows affected with this condition (mean \pm SEM) were in days in milk 216.77 ± 17 that varied from 9-666 days. The average healing time in treated cows recorded as 90.3 ± 7.56 that varied from 14-503 days and 1.94 ± 0.12 blocks were used for treatment. The average cure rate in cows with days in milk (DIM) less than 100, between 100-200 and more than 200 days recorded as $102.54 \pm$

21.26 , 80.85 ± 9.41 and 89.52 ± 9.83 respectively. Occurrence of the toe ulcer in different days in milk did not affect its cure rate significantly ($P > 0.05$).

Using metabolic profile test as a predictor of lameness indices and hoof lesions in dairy cows

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Lameness is the third most important factor affecting economic losses after mastitis and infertility in dairy herds. Lameness plays an important role in increasing culling rate, mastitis and decreasing reproduction performance. One of the most important factors, causing non-infectious lameness, are metabolic disorders, which are more important around parturition and peak of lactation. Some of these disorders can be assessed through metabolic profile test (MPT). MPT by measuring energy, protein, and mineral indices, aids in diagnosis and prediction of such disorders.

In this study ability of MPT findings in predicting lameness and non-infectious wounds in hooves were evaluated. The study took place in a dairy farm with 4200 milking cows and MPT was performed 8 times through 2 years.

Five groups of cows were selected for sampling: fresh cows in second parity and higher, fresh heifers, high producers, moderate producers, and close-up cows. The following metabolites were measured in Sera of



cows: glucose, blood urea nitrogen (BUN), cholesterol, total protein, albumin, globulin, calcium, phosphorus, magnesium, sodium, potassium, AST, beta-hydroxy butyric acid (BHBA), and non-esterified fatty acids (NEFA). Hoof trimming records were used in this study. Hoof trimming were done on the following basis: Cows in 100 – 120 days in milk, repeat breeders, high locomotion scored cows, dry cows and referred cows due to lameness. All new lameness and diseases occurrence were recorded. Sole ulcers in zone 4 and white line disease in zone 3, were evaluated from 3 month before to 3 month after MPT. All data were analyzed by ANCOVA in SAS software.

Results showed that serum albumin and protein reduced significantly before occurrence of sole ulcer and hemorrhages in sole. AST significantly increased in cows with hemorrhage and sole ulcer. NEFA increased significantly before occurrence of hemorrhage and / or sole ulcer. High-scored and referred cows due to lameness had negative correlation with serum cholesterol concentrations. Cows with sole ulcer and hemorrhages showed higher level of calcium before injury ($P < 0.05$).

Although, there are some significant relationships between hoof disorders and serum biochemistry, but it remains to be elucidated whether MPT can play a major role as a predictor tool in these conditions. More studies need to be done to draw a practical conclusion. The present experiment as a preliminary study indicated that MPT has potential to act such a role.

Longitudinal observation of hoof lesions causing lameness at herd level

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Lameness in all animals known as infirmity or abnormality in both normal and natural walk and always describes as one of the most important problems in dairy cow herds that infectious and non-infectious agents brings about it, therefore lameness in dairy cow describes as a multifactorial disease. Appearance of epidemic lameness takes third place in order of prevalence after mastitis and reproductive disease in dairy cow herds. It can import many economical failures on animal husbandry society such as reducing of milk yield, progressive body weight loss, infertility and eventually early cull of lame cows. This observation was carried out at a dairy herd in the vicinity of Tehran during the two years period in a total of 830 cows. In each observation all of the lame cows were assessed using Sprecher 1-5 scoring lameness after the hoof inspection at the trimming box. Results of this study showed that from 171 lame cow, 50 cases had digital dermatitis, 34 cases had white line issues, 9 cases had heel disorders, 47 cases had sole injuries, 31 cases had toe problems, 2 cases were observed with double sole and one case of thin sole is confirmed. Suggestions were made for pain relief and wound healing for all cases. These suggestions include a wide range of treatments from application of local



bandage to installation of a wooden block on the sole of the sound digit which removes the pain during weight gain; aforementioned treatments continue until rehabilitation.

Key word: Longitudinal observation, Lamé cow, Hoof lesions.

Chromium methionin can affect comfort and feeding behaviour of growing beef steers

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Chromium (Cr) is required for insulin metabolism and, thus, for optimum essential nutrients uptake by peripheral cells. It amplifies insulin signaling and facilitates cell glucose entry. Previous researches indicate that increased dietary Cr supply can benefit post-weaning insulin and glucose and affect rectal temperature. Current experiment was conducted to determine the effects of feeding chromium methionin (Cr-Met) to growing beef steers on performance traits, blood metabolites, rectal temperature as an index of comfort and feeding behavior. Twenty-six growing Holstein dairy calves were randomly divided in two groups to fed 0 (first BW=160±12 kg) and 0.9 ppm Cr-Met supplement (first BW=148±10 kg). Two group of calves were fed and kept in two different common pens in farm close to Saveh city (central Iran). Before beginning of feeding experimental diets, calves in each pen fed with basal diet (forage to

concentrate ratio of 50:50; crude protein=15% of dry matter and Metabolizable energy=2.34 Mcal/kg of dry matter) for ten days. Group dry matter intake during six days and body weight of each calf at the end of this period was measured and used as covariate in final statistical model. After the commencement of experiment, for calves in Cr-Met group one gram of Availa Cr added per kg of DM of basal diet which finally resulted to 0.9 ppm of supplement Cr-Met. This study performed in two different periods of 28 days with 21 days' adaptation to diets and later 7 days' sample collection within each period. Calves fed with basal diets without adding Cr-Met for two weeks between two experimental periods. Data was analyzed with proc mixed SAS and least significant difference (LSD) test used to compare means. Results showed that final weight, dry matter intake and feed efficiency were not affected by Cr-Met supplement ($P>0.05$). Eating, rumination and resting times were similar between two groups of growing steers ($P>0.05$). Steers fed with Cr-Met had lower rectal temperature (38.74 versus 39.62, SEM=0.139; $P=0.0004$) and tended to have lower standing time (346.2 vs. 399.5 min, SEM=13.2; $P=0.09$). Blood glucose, insulin, insulin to glucose ratio, total protein and urea were similar between two groups ($P>0.05$). The average of temperature humidity index (THI) during this study was 64.3 (SD=7.7) indicating no thermal stress. It is well documented that increased rectal temperature indicates an abnormal health status. Higher rectal temperature in calves fed with no Cr-Met supplementation diet still was in normal range for steer. In cattle more standing behavior indicates lower



comfort. In this study no illness signs were observed. These data indicate that Cr-Met affects body core temperature and standing behavior although blood metabolites and performance traits did not change. Cr-Met have been shown to decrease rectal temperature in several studies. Data on the effects of Cr-Met on animal behavior is rare and more researches are required.

Key Words: Chromium methionin, growing steers, rectal temperature, standing behavior

Body condition score, is it a risk factor for lameness?

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Lameness is one of the most significant challenges in the dairy industry. Extensive effects of lameness on herd performance are reported includes milk loss, impaired reproductive performance and finally lameness. Locomotion Scoring system have been used to distinguish the degree of lameness. Cows categorize into 1 to 5 from normal to severely lame.

Energy reserves in the form of fat and muscle (a.k.a. body condition) are extremely important for reproduction success. Body Condition Score (BCS) range from 1 “very thin cows” to 5 “severely over conditioned cows”. Ideal condition scores fall in the range

of 3 to 4 at dry off and calving and 2.5 to 3.5 at peak lactation.

This current study was done in a dairy herd with average of 4700 productive (Milking and dry) cows from March 2013- February 2014. Cows housed in free stall barns bedded with sand, milk three times a day and feed by total mixed ratio. The average annual milk production recorded as 40.47 lit/day. Body condition scoring was done on monthly basis by a 5 point scale by a single observer. BCS was done to accomplish management processes. Locomotion scoring also was done on a monthly basis on a five point scale that cows with score 1 known as sound and cows with score 5 known as severely lame cows by a single veterinarian. Locomotion scores 1-3 considered as non-lame and locomotion scores 4 and 5 consider as lame in data analysis.

Total of 49754 cows scored during 12 month (average 4146.16 ± 244.54). 6.64% scored 2 and less, 30.65% scored 2-3 and 62.69% scored more than 3 during this study.

Group 1 consist of cows with BCS 2 and less, group two consist of cows with BCS between two and three and cows with 3 and higher BCS assigned in group three. Kruskal-Wallis test showed a significant difference between lameness occurrence in different groups under study, as cows in groups one and three showed more lameness than group two ($P < 0.05$). Lameness maybe a result of high body condition score and also maybe a cause for low body condition scores cows that need further investigation.