EFFECT OF CLAW TRIMMING ON STRESS REACTIONS IN CATTLE COMPARISON OF A TILT TABLE AND A WALK-IN CRUSH BY MEASURING FAECAL CORTISOL METABOLITES

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Introduction
The incidence of claw horn lesions associated with lameness is a major concern in managing modern intensive dairy herds. The resulting discomfort and pain were identified as an important animal welfare issue (Whay et al., 2003). Functional claw trimming is a simple, repeatable method for maintaining normal biomechanical function of the bovine digit and can avoid the onset of lameness in cattle, preventing claw horn lesions from evolving from a subclinical to the clinical stage (Shearer and van Amstel, 2001). Modern claw trimming requires proper restraint systems for cattle such as walk-in crush or tilt tables (Kloosterman, 1997; Shearer and van Amstel, 2001). That is particularly important when grinding discs are applied. Which system causes the greater stress or discomfort for the cow is the subject of frequent debate between walk-in crush and tilt table users (Shearer and van Amstel, 2001).

Under stress, glucocorticoids are secreted by the adrenal cortex. Their blood concentrations have been used to reflect the effects of various stressors. Sixt et al. (1997) investigated the effect of two different methods of claw trimming on plasma cortisol concentrations. However, as blood sampling itself may cause stress, non-invasive methods for evaluating adrenocortical activity may be more accurate for assessing stress reactions in animals (Möstl and Palme, 2002). To address this problem a 11-oxoaetiocholanolone enzyme immunoassay (EIA) has been successfully developed to measure faecal cortisol metabolites (FCM) in cattle non-invasively (Palme et al., 1999, 2000).

The objectives of the present study were to investigate the influence of claw trimming procedure and two different trimming devices on animal’s stress reactions.

Material and Methods
The effect of functional claw trimming comparing a tilt table and a mobile walk-in crush on faecal cortisol metabolites (FCM) in cattle was examined. Faecal cortisol metabolites were measured before and after claw trimming in 207 cattle. Other indirect measures of stress were determined, such as daily milk yield seven days before until 13 days after trimming and evasion movement scores. The daily milk yield was correlated with the FCM values and the evasion movement scores in each cattle. The design of the study lead to the classical analysis of longitudinal data using the linear mixed model.

Results
More time (P < 0.05) was needed to trim the cows’ feet using a mobile walk-in crush (15.9 min ± 4.4) compared to the tilt table (11.1 min ± 3.5). Peak concentrations of FCM were reached nine hours after trimming. Cows trimmed with the mobile walk-in crush had a higher median increase of FCM concentrations of 216 (mean: 292) nmol/kg compared to those trimmed with the tilt table (median: 141; mean: 218 nmol/kg; P < 0.05, Fig. 1). The milk yield was 0.6L lower on the day of claw trimming and the day after in both groups. No difference in daily milk yield was observed comparing the two types of claw trimming devices. Higher increases in FCM were not correlated with a greater reduction of daily milk yield. Cows trimmed with the mobile walk-in crush showed more evasion movements (P < 0.05) than those trimmed with the tilt table, but no correlation between the intensity of those movements and concentrations of FCM was observed.

Conclusions
1. This study showed that the increase of FCM was moderate in both groups.
2. However, it was significantly (P < 0.05) higher in cattle trimmed with the mobile walk-in crush.
3. Although claw trimming and associated handling causes stress reactions in cattle, regular trimming helps to keep the claws healthy and it is therefore an integral part of improving the welfare of cattle.
4. Our results indicate that claw trimming with a tilt table seems to be less disturbing for the cows.

EXAMINATION OF THE CLAWS OF BULLS OF DIFFERENT GENOTYPES USING DUAL ENERGY X-RAY ABSORPTIOMETRY (DXA)

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Introduction

In November 2000 we started this investigation using DXA as a new method to describe claw development and claw soundness in new born calves as well as in heifers and bulls. By the help of DXA it is possible to analyse body regions for the amount of fat tissue, lean tissue, bone mineral content and bone mineral density. Now we have finished all investigations and can present the results of a long term measurement program. Having presented the preliminary results already at the meeting in Maribor with a focus on the development of the claws in new born calves, we will focus now on the data of bulls.

Material and methods

60 Bulls with different genotypes coming out of our experimental group went to the slaughterhouse at an age of two years. These genotypes (gt) were German Fleckvieh (FV), German Holsteins (GH), F1 crossbreds of these two breeds (FV-GH) and two back crossed lines GH75 with mainly German Holsteins blood or FV75 with mainly German Fleckvieh blood.

The present data were measured at the digital organs of the bulls after culling. X-ray scans were analysed by the help of the LUNAR DPX-IQ software. A region of interest was defined to analyse the data from the tip of the claw up to the fetlock joint. All data have been analysed using a variance analysis by considering the effects position of the claw, genotype and body weight at the final investigation.

Results

The position of the claw has no significant effect on bone mineral content (BMC) or bone mineral density (BMD). Mineralised area is bigger in fore than in hind claws. Fore medial claws and hind lateral claws have bigger mineralised areas than their partner claws, this effect is not significant. The amounts of fat and lean tissue in the region of interest differ in diverse patterns but rarely significant. Fore claws seem to have more lean tissue than hind claws. (Tab.1).

Genotype has an influence on bone mineral content. Crossbreds between Fleckvieh and Holsteins have significantly larger amounts than pure breeds (Fig. 1): Bone mineral density does not
differ significantly. All genotypes reach the same level (Fig.2). The weight of the carcass of all bulls in this investigation varied from 350 to 500 kg. Dividing all bulls in three weight classes showed, that all scan-parameters with a slight exception of BMC were on the same level. (Tab.2).

**Table 2: Scan parameters in different weight classes (Least Squares Mean Standard Error of Estimation*)**

<table>
<thead>
<tr>
<th>Weight class</th>
<th>BMC</th>
<th>GMS</th>
<th>R</th>
<th>Fat (%)</th>
<th>Lean tissue (%)</th>
<th>Bone mineral content</th>
<th>Bone mineral density</th>
</tr>
</thead>
<tbody>
<tr>
<td>(350-400 kg)</td>
<td>109.94</td>
<td>11.40</td>
<td>1.20</td>
<td>0.01</td>
<td>0.01</td>
<td>2.15</td>
<td>2.95</td>
</tr>
<tr>
<td>(400-450 kg)</td>
<td>107.94</td>
<td>10.40</td>
<td>1.10</td>
<td>0.01</td>
<td>0.01</td>
<td>2.15</td>
<td>2.95</td>
</tr>
<tr>
<td>(450-500 kg)</td>
<td>109.04</td>
<td>10.90</td>
<td>1.10</td>
<td>0.01</td>
<td>0.01</td>
<td>2.15</td>
<td>2.95</td>
</tr>
</tbody>
</table>

* Least Squares Means with different letters are significantly different (p 0.05)

**Conclusion**

In addition to linear measurements, DXA provides data on the mineralised and soft tissue composition of the digital organ. This investigation in bulls of different genotypes shows, that there is in fact no severe difference in the amount of mineralised and not mineralised tissue between fore and hind, lateral and medial claws. The effect of breeding line influences bone mineral content, but not bone mineral density. Similar results in weight classes may be seen as a sign for claw maturity. All bulls were culled at the same age but had different carcass weights depending on genotype and body constitution. Nevertheless, all scan parameters in our region of interest, the digital organ, were on the same level. So claw development may have reached its end leading to those clear results.

Within bulls of different genotypes, DXA scans give clear answers to claw development. From this base we have to concentrate now on the relations to claw health.
MORPHOMETRIC STUDY OF DISTAL SESAMOID BONE OF ABNORMAL DIGITS IN CATTLE
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There is no available any document about morphometry of distal sesamoid bone of cattle. This study was carried out for morphometry of distal sesamoid bone of abnormal claws in cattle. 20 digits with overgrown hoof (hind limbs and forelimbs) and 10 normal digits as control were collected from Shiraz slaughterhouse, Shiraz, Iran. Those cattle were chosen that had hoof abnormality so that weight bearing surface of the hoof was mainly on the heel. At first the specimens were dissected for determining the anatomical position of the distal sesamoid. For morphometric study, the distal sesamoids of digits were removed, and then the dimensions of them including length, width and thickness were measured.

In morphometric study, there was a significant difference (p<0.05) in length of distal sesamoid of 3rd digit (medial digit) of hind limb in comparison to normal digits, whereas no significant difference was observed in width and thickness. There was also a significant difference (p<0.05) in length of distal sesamoid of 4th digit (lateral digit) of hind limb in comparison to normal digits, whereas no significant difference was observed in width and thickness. There was no significant difference in length, width and thickness of the distal sesamoid bone of 3rd digit and 4th digit of forelimb, in comparison to normal digits. This study showed the distal sesamoid bone of hind limb in overgrown hoof claws has been affected morphometrically.

A VISUAL GUIDE TO SCORING LESIONS OF THE CLAW USING A MODIFIED ABC LESION SCORING SYSTEM
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The abc hoof lesion scoring system has been recommended by the Hoof-Trimmers Association for use by trimmers in North America to record hoof lesions by limb (left rear, right rear, left front and right front) during routine trimming of dairy cattle.

In order to reduce confusion with regard to lesion recognition and severity grading a picture guide of a variety of hoof lesions at each severity grade (mild, moderate and severe) was prepared. The original abc system was modified to suit the needs of the dairy industry in North America to include the following lesions:

A=abscess (white line), B=bruise (white line hemorrhage), C=corn (interdigital hyperplasia), D=digital dermatitis (heel wart), E=erosion (heel horn), F=fissure (white line), G=digital sepsis, H=hemorrhage of the sole, I=imbalance, P=phlegmon (foot rot), R=rotated (cork screw), S=sole fracture (heel ulcer), T=toe ulcer, U=ulcer (sole), V=vertical fissure, Y=horizontal fissure, Z=thin soles.

In addition to lesions, treatments were coded with a circle around the treated lesion and the letter K was used to signify the fitting of a hoof block. An X was used to identify a lame cow.

Along with each lesion picture at each severity grade, a brief description is also provided.
In the modern husbandry it is important to find objective methods for detecting lameness. Lameness scoring system is broadly used, but it is still subjective. In our project scale plates for weight measurement of individual legs were designed and installed under milking robot to help lameness scoring of farms. Cows were looked independently by locomotion scoring system and compared to data.

Over 12,000 milkings from 72 different cows was recorded during 5 months. Cows which kept less weight on a leg or showed a lot of movement during milking were checked first with locomotion scoring systems and if they still showed any marks, also in hoof trimming. First we wanted to find out every possible lame cow and used strict criterion, so the false alarm rate was 40%, with detection rate 94.4%. A less sensitive criterion gave detection rate of 72.2%, but it gave false alarms only in 23.6% of cases. After development and in further studies we have had even better preliminary results. Indication of hoof problems was in some cases seen from the data before acute lameness appeared, but not before the disease could be seen during hoof trimming.

Some major problems remain. Force sensors are broken too often and animals with sole ulcer or white line disease have the problem usually in both hind legs, so the detection is difficult. However, force sensors and technological methods are promising means to detect lameness, although further development is needed.
MEASURING LAMENESS IN DAIRY CATTLE USING FORCE SENSORS

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As the level of automation increases, time that the cattle keeper uses for monitoring animals often decreases. This has created a need for systems for automatically monitoring the health for farm animals. Lameness in dairy cows is a crucial welfare issue and causes significant annual losses in the dairy industry. Yet only a few technological means for lameness detection exist. The aim of this study was to develop a method for measuring lameness from cow’s gait using force sensors. The goal was to explore the possibility to develop an observer independent automated lameness detection system. Two parallel thin film ferro-electret force sensors (Emfit) were used to measure the step forces of lame and healthy cows. The sensors were placed in parallel and protected by sealing them between two 15 mm thick rubber carpets. Total of 40 cows were walked individually over the sensors and 5 times during 2 months and the data was recorded on a computer. Lameness scoring of the cows was made by a vet. The measurements were also recorded with a digital video camera. The step force of each leg was identified from the measurement data. The measurements gave evidence that lameness can be seen by measuring the step forces of each leg during walking. Lameness was seen from the data as asymmetric step forces between affected and healthy legs as well as changes in step duration. The system can be used to identify lameness based on the step forces. Several features can be extracted from the data, like the step duration and the speed of lifting a leg. More measurements are needed to see whether the system can be used for automatic lameness monitoring.

LABOUR-SPARING HOOF TREATMENT MANAGEMENT

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Foot-bathing is commonly used by dairy producers to reduce hoof diseases and maintain hoof integrity. A major problem is that the foot bath could quickly become contaminated with manure and soil which in turn could compromise the efficacy of the anti-microbial agents present in the bath. Therefore, effective management with frequent changing of the solution is a necessary ingredient for treatment. This study summarizesthe ground occurred over a region that started at the heel of the lateral claw and progressed to the toe of the medial claw. The ground contact phase lasted 35 milliseconds (SD = 10 milliseconds) in the hind limb, but could not be determined exactly in the forelimb.

Discussion and conclusion
The results of the present study showed that the ground contact pattern of the claws of lactating cows is similar to that of heifers (Meyer et al., 2004) and is not influenced by a large udder. In lactating cows and heifers, the heel of the lateral claw usually contacts the ground first. We conclude that the heel of the lateral claw absorbs most of the vertical impact force during initial contact with the ground. This may contribute to the development of sole haemorrhages and subsequently claw diseases in the lateral claws of cattle, especially in animals housed on hard surfaces.
VARIANCE IN SCORING OF THE MOST COMMON HIND CLAW DISORDERS BY TRAINED CLAW-TRIMMERS IN DUTCH DAIRY HERDS.

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Introduction
According to Weaver (1997) and Borsberry et al. (1999) recording of lesions should be an integral part of the claw-trimming routine. Interpretation of these recordings by the veterinarian should be a part of the pivot of modern herd health and production management (Noordhuizen, 2003). For the correct use, it is essential that the findings, mostly made by the claw-trimmers, are based on uniform and correct scored diagnosis.

The objective of this study was to quantify the variance explained by the recorders (claw-trimmers in this case) when scoring different claw lesions in a herd and to relate this to the variance explained by the herds.

Material and Methods
To determine the variance in scoring hind claw disorders by claw-trimmers, data were used of a cross-sectional study, which was conducted to estimate the prevalence of the 7 most common claw disorders and their associations.

After a training to achieve uniform assessment and diagnoses, 15 professional claw-trimmers recorded the presence (yes/no) of hind claw disorders during the regular trimming of all dairy cows of the herd. In the period between July 2002 and December 2003, complete information of 21.153 animals from 361 herds was recorded. The diagnoses was made, based on the trimmers perception when claw-trimming all dairy cows in a herd.

Results
In total, 67% of the cows had claw disorders on at least one of the rear claws, and 12.8% of the investigated cows had 3 or more disorders. The prevalence data for each disorder were analysed with a hierarchical model that was corrected for clustering at the claw-trimmer and herd level. The results showed a large variance explained by the claw-trimmer, especially for the diagnosis of sole haemorrhage, interdigital dermatitis/heel erosion, white line disease (14.9 38.0%). For the diagnosis digital dermatitis, interdigital hyperplasia and sole ulcer these variances were a lot lower (4.9 7.6%).

For the correct use of the data as a tool to monitor claw disorders within herds, it is essential that the variance in diagnosis explained by the claw-trimmer is smaller than the variance explained by the herd. When the records obtained at the regular claw-trimming are based on a more uniform and correct diagnosis, these data can both be used for herd monitoring or/and for further epidemiological analyses.

References
HISTOPATHOLOGICAL STUDY OF WOUND HEALING PROCESS OF SOLE ULCERS, FOLLOWING TREATMENT BY WOODEN BLOCK IN COWS.


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A broad and very detailed histopathological Knowledge on cutaneous wound healing particularly in human skin is available in literatures, but few studies have documented this event in bovine claw sole ulcers. It seems the mechanism of wound healing might be basically the same followed by second intention healing which is finished in a period of time by formation of granulation tissue in damaged corium and subsequently completed by keratinized epidermis. This study was aimed for more histopathological information when wooden block is applied as a treatment device for sole ulcers. Sixteen milking cows (age 2-5 years) from a farm in the vicinity of Tehran were considered. In all cases lameness score was 3 (1-5 ordinal scale), lesion score was assessed 4 (1-4, ordinal scale) and the mean lesion size was 16x9 mm. Sixteen sole ulcers in lateral claw of left rear foot were examined histopathologically. The sampling sites were settled at cranio-lateral part of the ulcer site and the corium and the part of the epidermis were collected in three time intervals 1,10, 30 days respectively. Samples were fixed in 10% formalin and embedded in paraffin and the section 3-5 mm thick were stained with Hematoxylin and Eosin. Inflammatory changes were evident on day 1 because of disruption of the superficial dermis vessels. The living epidermis next to the wound margin shows dyskeratotic changes in some areas and in the horn layer of wound margin the small clefts which continued to the stratum spinosum layer were considered remarkable. In day 10, the progressive epidermal regeneration were seen. The wound surface is covered by a thin layer of softy cornified cells. Proliferation in connective tissue is accompanied by the formation of new dermal vessels. The vascularization in the dermis was completed on day 30. reteridge formation in epidermis with acothosis and parakeratotic hyperkeratosis were seen, but there were found some areas with dyskeratosis. From these histopathological changes which is occurred during these stages of healing, it seems that manipulation of wounds surgically or exposed corium with astringent agents will be resulted in sever necrosis and retard healing process with anticipated recurrence.

INNOVATIVE PREVENTION STRATEGIES FOR OCCUPATIONAL ASTHMA CAUSED BY CATTLE ALLERGENS

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In several population-based studies on occupational asthma in Europe, farmers were among the occupations with the highest risk. Especially animal proteins such as cow allergens can be very potent causes. One of the occupations with the closest contact to cattle in everyday work is claw trimming. The diagnosis of an occupational asthma has grave economic and occupational consequences for the affected worker. In spite of the high public health relevance of obstructive airways diseases, effective prevention strategies for occupational asthma are rare. The aim of this study was to evaluate innovative strategies of primary prevention for occupationally related allergic airways diseases in exposed non-symptomatic claw trimmers. 96 claw trimmers took part in training courses for occupational safety and health according to the current state of scientific knowledge. They were instructed that the most important measure to reduce the exposition to occupational allergens lies in the strict separation of workplaces and living quarters to avoid the transmission of workplace aerosols such as cattle allergens. Allergens adhere to work clothes, skin and hair. Therefore, it is necessary to consistently change clothes as well as to wash skin and hair after work. While working in dust-exposed areas, respiratory protection should be used. In addition, workers with allergic predisposition should wear respiratory protectors and skin- and hair-covering working clothes at any time when close to cattle. Moreover, the participants were trained to easily identify allergic symptoms at an early stage. Early detection examinations in 70 claw trimmers (1 female, 69 male, aged between 20 and 59, mean 38 years) were performed. We identified 7 persons (10 %) with a history of an increased allergy risk. 16 persons (23 %) showed symptoms such as cough, asthma, rhinitis or skin itching, three persons had slight lung function limitations (4 %). Our results underline the necessity of
CLINICAL FIELD TRIALS OF FOUR TREATMENT METHODS FOR “RUSTERHOLZ” LESIONS IN DAIRY COWS

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This study was designed as a longitudinal clinical trials and was conducted during a period of 6 months beginning 21st March, 2005, in five commercial dairies in the vicinity of Tehran. With 2300 lactating cows.

A total number of 64 cows were drawn from 243 lame cows and considered eligible for inclusion in the trial only when lameness score was 3 and lesion score was 4.

Allocation to a treatment group were random and 16 cows were considered in each.

Four treatment methods were considered to be trialed as follows:
1) Dressing wounds with hoof gel and Bandage.
2) Application of wooden block to the healthy claw alone.
3) Application of wooden block to the healthy claw, dressing wound with hoof gel.
4) Application of wooden block + hoof gel and bandage.

The lesion size was determined with two measurement at 90 angles, using a plastic ruler, pain score was established by fingers pressure at first examination and in repeated at seven day intervals until the defect was covered with a thin layer of horn.

The progressive reduction in lesion size was compared between 4 treatment methods regards time intervals by using ANOVA-Repeated measures and the ratio of pain response time and the changes of lameness score as Well as lesion score analyzed using Fisher Exact 2-Tailed Test. The result of this study are showed that in the application of wooden block with dressing the Rusterholz lesion with hoof gel without bandage, lesion size reduced in short time (15-21 day), statistically significance with other groups (p<0.05) and Pain score in more than 88% in this group at the end of one week after the start of treatment was negative, which comparing with other groups the percentage is significance.

It was concluded that the application of wooden block with dressing the Rusterholz lesion with hoof gel is a superior method of recurring ulcers. elevating an affected claw, likely to respond to removal of weight bearing forces and accelerate the second healing intention process with No.

AUTOMATED DETECTION OF LAMENESS IN DAIRY COWS

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Detection of lameness in cows is not simple. We validated two automated methods for detecting lameness. To determine whether frequency of visits to an automated milking system (AMS) could indicate lameness, the frequency of visits of 256 cows to 12 AMSs was measured. Cows were classified as the highest or lowest visitors and gait scored. High-visiting cows had better gait scores than low-visiting cows (p<0.05). Four percent of high visitors were classified as slightly lame and 32% of low visitors were classified as either slightly or severely lame. The frequency that dairy cows visit an AMS is related to their locomotory ability, and data from the AMS may help in the early detection of lameness. In a second experiment, we measured the percent (and variability) of weight placed on each leg while standing for lame and healthy cows (n=12), before and after injections of a local anaesthetic into the leg judged as responsible for the lameness. Lame cows placed less weight on the injured leg and placed more weight on the contralateral leg than did healthy cows (p<0.01). The variability in weight applied to the injured leg was increased and the variability in weight applied to the contralateral leg was reduced (p<0.01) in lame cows. Measures of weight applied to each leg were able to detect lame cows and were sensitive to local anaesthetic. Both potential automated means of detecting lameness hold promise.
MODELLING ANIMAL HOOVES

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Introduction. Animal hooves are components which interface between the animal and the ground. In so doing they carry out many functions which are of interest to engineers because they are examples of optimised systems that may be of biomimetic interest. With improvements in Computer Aided Design (CAD) systems and Finite Element Analysis (FEA) methods, engineering models can be created which make it possible to provide accurate analysis and prediction of biological systems. The aim of this abstract is to introduce some of these approaches to modelling.

Structural Modelling. The investigation of the structure is an important task in the research of biological systems. How is geometric information about a hoof or claw characterised? Of what does it consist? What is the relationship between the different tissues? The answers to these questions can not only help people to understand how nature has developed the hoof, but can also provide a basis for precise analysis and prediction.

Fig.1 is a physical model of a hoof/claw for teaching purposes. This model contains not only morphological information but also information about the structure inside the capsule. This is an example of structural modelling.

Figure 1
Structural Model of (part of) a foot

Figure 2
Through depth FEA model of part of a hoof wall

Functional modelling. Functional modelling is another area in the modelling of biological systems. The aim of this kind of model is to investigate and simulate the effects of loading. Finite Element Analysis (FEA) is a powerful tool for this type of modelling. (See Fig 2). However, the accuracy of FEA is dependant on many factors such as the geometrical modelling of the structure, the selected mesh size, the boundary conditions, the specified material properties, the loading conditions and the distribution of that loading.
**Correlation Between Visual Locomotion Scoring with the Presence of Painful Foot Lesions in Dairy Cows**

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**Abstract:** The objectives of this study were to evaluate the level of agreement between visual locomotion scores and the presence or absence of painful foot lesions. Most lame cows in dairy farms are detected by visual locomotion scoring (VLS) by farmers and farm personnel. However, it is unknown how accurately foot lesions can be detected by VLS. 1100 lactating cows from 3 pens were locomotion scored using a five-point scoring system. A VLS of 3 or greater was considered lame. Cows that were scheduled for regular hoof trimming and cows that were lame on VLS had all 4 feet trimmed by a veterinarian trained in hoof trimming. The presence of a painful lesion (PL); which was defined as white line abscess, sole ulcer, digital dermatitis, foot rot and other lesions that caused a reaction in the cow when pressure was applied were recorded. Cochran-Armitage trend test was used to determine the association between VLS and presence or absence of PL determined by hoof trimming. Digit diseases observed at hoof trimming were recorded by type. Overgrowth and imbalance of the hooves were not considered diseased even though it may cause lameness because a cut off for the minimal severity could not be objectively assessed. A total of 886 hoof trimmings from 566 animals were accumulated by the end of the data collection period. Only the first treatment of each cow was used for the analyses. 5.6% of VLS=1, 21.4% of VLS=2, 54.9% of VLS=3, 79.3% VLS=4, and 100% of VLS=5 cows had PL on at least one foot at hoof trimming. Cochran-Armitage trend test had P value of < 0.0001. A very strong association was found between the proportion of cows with painful lesion and VLS. Therefore, VLS is an accurate method to detect cows with foot lesions.

**Functional Trimming at Dry Off Time to Prevent Foot Disease in Confinement Dairy Cows**


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**Abstract**

With the goal of determine the effect of implementation of the functional hoof trimming at the time of the dry off period to control hoof diseases in confinement Brown Swiss milking cow. A dairy farm with a high incidence of hoof diseases was selected, where 47 cows with more than two calving and at the beginning of the dry off period were used. The cows were divided at random in two group; one group was treated with the functional hoof trimming method at the beginning of the dry off period. The other group was used as a control. The digits of each animal were cleaned and evaluated trough visual inspection and palpation for the presence of pain at the lesion. Each diagnosticate lesion was written on a record sheet designed for it. When the functional hoof trimming was performed 39% of the hoofs show any hoof lesion though none of the animals show lameness at the beginning of the experiment. The comparative study of both group shows that the functional hoof trimming prevent the presence of lameness (P<0.05). The relative risk of non treated animal from suffering hoof diseases was 11.25 times more that treated animal. It could be concluded that the functional hoof trimming applied at the dry period prevent the manifestation of hoof diseases in confinement milking cows at the beginning of lactation

**Key Words:** Lameness, bovine, functional trimming.
FREQUENCY AND ANATOMICAL DISTRIBUTIONS OF CLAW DISEASES IN A DAIRY HERD ON CONFINEMENT

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Abstract:
The present research was conducted to know the prevalence of lameness in a commercial dairy herd, with apparently healthy animals. For dairy herds in Venezuela it is unknown the incidence and prevalence of claw diseases. In 2004, during the rainfall period (Sep. Oct. Nov.), 83 Holstein cows and heifers were examined to established the frequency of digital diseases respect to the anatomical site on the digit and the frequency of these lesions for cows and heifers. Each animal leg was examine for digital abnormalities. All lesions founded were classified according to the anatomical location. 3 groups were used to classified the digit lesions: skin lesions, claw lesions and deep lesions. The lesions were described according to the international terminology of digital disease proposed by David Weaver (1994). Using statistics on the data, the results were: 38.9% of the animals showed skin lesions; interdigital dermatitis was the highest in this group (36.7%), followed by interdigital necrobacillosis (2.7%) and interdigital skin hyperplasia (0.6%). Claw lesions were the highest frequency of digital diseases found in the herd (96.1% of the animals). Heel erosion was the highest (88.6%), following by the sole erosion (69.1%) horn overgrowth (19.1%), white line disease (11.3%), hemorrhages (10.1%), sole ulcer (2%) and fissures (1.7%). Several cows showed more than one kind of lesion per digit at the same time. 10.8% of the animals were lameness, due to the white line disease and sole ulcer, Comparing cows to heifers, cows showed 52.2% skin lesions, to 27.6% for heifers. 98.9% of the cows had claw lesions and 91.3% of the heifers. No deep lesions were found. Confinement dairy animals with a hard, wet and abrasive surface produce an abnormal environment for the claw health.

References
THINNING DORSAL WALL HELPS HEALING OF SWOLLEN CORONET

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I usually trim the dorsal wall of a claw flatly when it is uneven. This time I ground the dorsal wall to lessen the pressure in the capsule. I understand the inner pressure swells the coronet and also pushes the capsule. It hurts the cow miserably. In this case I thin the dorsal wall of the affected claw with a grinder. It makes the wall elastic and the wall bulges a little to release the pressure. When you thin the surface of the claw, the color of the horn turns into silky white. So I named the technique SILK WALL TECHNIQUE.

Interdigital phlegmon suffers cows severely. Usually an antibiotic injection solves the problem in the early stage. But the antibiotic injection doesn’t work when you found it progressed. I’ve done more than fifty affected claws by SILK WALL METHOD so far. And I’ve got good results more than forty cases of them.

You can adopt SILK WALL TECHNIQUE not only interdigital phlegmon but also sole ulcer and white line disease, when the affected claws have swollen coronet.

SOAKING IN SUGAR CURES DD

Strawberry jam won’t go bad even if you keep it at room temperature. Because you use plenty of sugar to make jam, and it keeps the jam away from bacteria. So I put half-kilo sugar in a bag and put it on a claw affected by DD (strawberry warts). I’ve already done this method in 42 cases. And I’ve found fine results in every case.

CONTRACTED CLAW, FLAT CLAW, LAMINITIS TYPE CLAW MATERIAL PROPERTIES OF THREE PATHOLOGICAL CLAW FORMS

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Introduction

The sound bovine claw is characterised by a compact outer appearance appropriate to the animal’s body weight, good horn quality and a toe angle of about 45°, which enables an even distribution of weight bearing. A change to an uneven load distribution due to altered loading situations of the limb or prolonged claw trimming periods, as well as several metabolic reasons, can result in pathologically altered claw shapes, such as flat claws, contracted claws and laminitis type claws which reveal the alterations of chronic laminitis. Among many material characteristics the modulus of elasticity (Me) is particularly suitable for describing a biogenic component. Many of the mechanical properties of sound bovine claw horn and their dependence on moisture are already well known.

This study measured the Me and dry matter content (DMC) in flat claws, contracted claws and laminitis type claws and discussed factors other than DMC to be responsible for the change in physical parameters of pathologically altered claw horn.

Materials and Methods

The Me was determined using horn samples from 11 contracted hind claws, 10 flat front claws and 22 laminitis type hind claws of adult Austrian Fleckvieh cows. Horn bars were cut out of the dorsal wall, the abaxial wall, the axial wall and the sole of the dissected claws using an industrial band saw. The sample blanks were milled to obtain final samples with parallel surfaces that were 5080 mm long, 510 mm wide and 35 mm thick. Between all the working steps, dissected claws, sample blanks and the samples themselves were stored in sealed plastic bags at 18°C. The Me was calculated by stretching samples by 0.05% to 0.25% along their edge via a tension test using a standard testing device (Shimadzu 100 hNE), under testing conditions according to EN-ISO 527 (1996) and ASTM D 638-03 (2004). The DMC of the horn samples was determined by calculating their weight loss after being stored for 48 hours in a dry chamber at 110°C immediately after material testing had been completed.
Results
Me and DMC values in flat claws - Me values of the different segments of the claws and the individual localisations within these segments are listed in Table 1. The Me of all test samples of the flat claws (248 ± 196 MPa) was approximately 40% lower than the value for sound claws (411 ± 378 MPa). The Me differed significantly between the flat claws and sound claws in the dorsal wall and in the abaxial wall. The values of the DMC of horn samples of the flat claws are listed in Table 2. The DMC was significantly higher in the abaxial wall, the axial wall and the sole of the flat claws than in the horn samples of sound claws; the same trend was evident for the dorsal wall.

Me and DMC in contracted claws - Me values are again listed in Table 1. The Me was approximately 60% lower for the contracted claws (168 ± 154 MPa) than for the sound claws (411 ± 378 MPa). Significant differences were detectable in all segments. The Me was approximately 30% lower for the whole contracted claw than for the flat claw (248 ± 196 MPa). DMC values are listed in Table 2. The DMC did not differ significantly between the contracted claws and the sound claws, but was significantly lower in CCs than in the FCS in the abaxial and axial walls.

Me and DMC in laminitis type claws - Me values are listed in Table 1. The Me of the entire claw capsule (309 ± 337 MPa) was about 25% lower than that of sound claws. A significant difference was only detectable in the abaxial wall. DMC values are listed in Table 2. A significant difference compared to sound claws was detectable in the axial wall.

Conclusion
The pathological claw shapes of flat claws, contracted claws and laminitis type claws and the resulting altered biomechanics result in focal overloads within the claw capsule and severely disturb the function of the suspensory and support apparatus of the bovine claw. This leads to lesions due to compression and trauma of the soft tissue within the claw capsule. In sound claws, the Me is significantly higher in front claws than in hind claws, and shows a clear correlation with the DMC of horn samples. In the present study this correlation was not detectable. This indicates that a direct connection between the Me as a physical parameter and the DMC cannot be assumed for pathological claw shapes. There are several possible reasons other than the DMC for deterioration of the claw horn. Mülling et al. (1994) described several structural factors influencing horn quality. The number, size and diameter of horn tubules, as well as the biochemical composition of horn vary in different regions of the claw, and so also influence material properties. In laminitis type claws, major morphological alterations are detectable in the area of the dermo-epidermal junction. The resulting disturbance of microcirculation in the corial blood vessels obviously leads to deterioration in keratinisation, which consequently results in structural and functional changes in the derived tissue. The altered sole of the flat claw and the pointed toe angle primarily influence the weight distribution, and the twisted and narrow shape of the contracted claw leads to compression and trauma of the corium. Therefore, the results obtained from this study suggest that pathologically altered claw shapes induce alterations within the corium that greatly reduce the resistance of the material to mechanical stress.

Acknowledgements
This study forms part of the EU Framework 5 Project “Lame Cow” (no. QLK5-CT-2002-00969), and is financially supported by this project.

References
EN-ISO 527: Verlag des Österreichischen Normungsinstitutes, Vienna, edn.: 1 May 1996
Introduction

The beginning of the lactation period has been related to an increase in the number and severity of claw horn lesions of dairy cows and heifers (Offer et al., 2000). The rearing of heifers, their growth rate, feeding and the occurrence of foot lesions have been found to affect the occurrence of lameness in later life (Thomas et al., 1999). Previous experiment with heifers (Winkler and Margerison, 2004) demonstrated an increase in lesion scores of the sole and white line areas in the postpartum period and a decrease in the punch force of the white line. The aim of this experiment was to study the occurrence of lesions in the sole and white line areas of the hoof horn during the prepartum period of first lactation heifers and compare the scoring of lesions to the strength of the horn of different claws.

Materials and Methods

Mechanical tests were completed on hoof sole samples collected from 12 Holstein-Friesian heifers at 6 months prepartum and all the claws were also scored for the level of haemorrhage and ulceration of the sole horn. The heifers were between 24 and 31 months of age and were housed in a straw-bedded yard. The hoof samples were collected from all claws from zones 2, 4 and 5 of the sole, according to the International Foot Map (IFM). These hoof samples were kept in sealed plastic bags and stored at a temperature of 2 °C until analysis. Punch force was tested using a P/2N needle probe on a TA.XT2i Texture Analyser (Stable Micro-Systems, Surrey, UK). The thickness of the sample on the tested area was recorded simultaneously. Considering the test piece to be a circular plate clamped around its circumference and with a small thickness (membrane), the elastic modulus of the membrane was calculated according to Blake (1982) from the equation for maximum lateral deflections of circular plates. A total of 6 to 8 tests were completed on the sole and white line areas. Following the completion of the mechanical tests the samples were weighed and placed in the oven (100 °C for 72 hrs) for the determination of the dry matter. The punch tests and lesion score data was analysed by ANOVA, GLM (Minitab 12.0). The comparison of means was completed using the Tukeys test (95% confidence interval).
The mean values for punch force, elastic modulus of the diaphragm and lesion score of the sole and white line areas of the claw horn of the front and hind claws are presented in Table 1. The lesion score of the sole area did not differ between claws. The lesion score of the WL area was significantly (P<0.001) greater for the hind outer claws when compared to front claws. The punch force required to fracture the sole horn was significantly greater in front inner claws when compared to hind inner claws (P<0.05). The elastic modulus of the diaphragm of the sole horn was significantly greater in front inner claws when compared to hind outer claws (P<0.01). The punch force of the WL area did not differ between claws. The elastic modulus of the diaphragm of the WL was significantly (P<0.05) greater for the front claws when compared to the hind inner claws. The dry matter did no differ between front (DM 31.4%) and hind claws (DM 32.1% (sem 0.53)).

Discussion
The higher lesion scores found in the hind feet indicate that this sole bruising occurred in heifers feet as early as 6 months prepartum, due to the greater pressure exerted on the white line area of the hind outer claw when compared to other claws. Hoof horn conformation is related to the pressure exerted by the weight distribution on the claws that is related to the conformation of feet and legs. Winkler and Margerison, (2004) reported lower punch resistance and elastic modulus of hoof horn from heifers with lower foot angle, poor locomotion score and lower scores for the composite (HUKI) trait legs and feet. The higher values for punch force and elastic modulus of the sole area and elastic modulus of the white line area of different front claws when compared to hind claws can be related to morphological differences between those claws. Leopold and Prietz (1980) found a significant higher density of tubules in the wall horn of the hind claws (8.7 % more tubules/area) when compared with the front claws. The mean diameter of the tubular medula of the wall horn was also 12.1 % significantly greater for the hind claws when compared to the front claws (Leopold and Prietz, 1980). Higher hoof hardness (Schmid, 1995) and higher elastic modulus values (Zoscher et al, 2000) have been reported for front claws when compared to hind claws. In both these experiments the dry matter of the front claws was significantly higher than that of the hind claws and the higher hardness values may have been in some part due to differences in horn DM content. In this present experiment hardness hoof horn of the hind claws was significantly lower compared with front claws, while the dry matter did not differ between front and hind claws.

References


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RUBBER VS. CONCRETE FLOOR FOR DAIRY COWS IN LOOSE HOUSING SYSTEMS

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Objectives
Lameness in dairy cows housed in free stalls is both economic and welfare problem and directly linked to flooring (1). Research aimed at comparing claw health, horn capsule development, milk yield and activity in dairy cattle, housed in free stalls with concrete (n = 27) and rubber covered slatted floor (n = 26).

Methods
F1 cross bred animals of German Holsteins and German Simmentaler were compared over one lactation, starting 21 days before expected day of calving (-21), ending with day 305 of lactation. Claws were evaluated, measured and trimmed at day -21 (m1), day 150 (m2) and day 305 (m3). Activity and milk yield were recorded daily by an automatic milking system. Data analysis was done by GLM procedure.

Results
On elastic floor horn capsule changed resulting in a longer dorsal wall. Evaluation of claw health showed that housing on elastic floor causes an increase of digital dermatitis at m2 and m3 and sole ulcers at m2, nevertheless there was no difference between numbers of acute lame cows caused by any digital diseases in both groups. Activity measurement showed higher movement-level on elastic floor. Comparison of milk yield showed no difference between the two groups.

Conclusions
1. Digital diseases increase on soft floor.
2. Cows prefer moving on elastic floor.
3. Milk yield seems to be unaffected by floor conditions.
4. Horn capsule changes due to less wear on elastic floor, that obliges to do correct claw trimming.

References

MORFOMETRIA DE LESIONES DE DERMATITIS DIGITAL BOVINA

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En los últimos años, el mercado agropecuario ha pasado por cambios causados especialmente, por la abertura de los mercados y, consecuentemente, por la alta competencia entre los diferentes segmentos productivos. El uso de tecnologías ha contribuido positivamente en el desarrollo de la actividad ganadera. A pesar de que estas innovaciones resultaron en inúmeros beneficios para los criadores, han inevitablemente competido para aumentar la aparición de afecciones del aparato locomotor especialmente las enfermedades digitales, que sabidamente, constituyen una de las mayores travas económicas, sobre todo en aquellos que explotan bovinos de aptitud lechera. Entre las enfermedades digitales de los bovinos se destaca la dermatitis digital, definida como la enfermedad podal más preocupante, por ser extremadamente contagiosa y de cura incierta. Luego el objetivo de este estudio fue caracterizar morfométricamente las diversas fases evolutivas de la dermatitis digital bovina. Fueron evaluadas por medio de la morfometría las pieles del espacio digital de los bovinos, de diferentes sexos y pesos, de aptitud lechera o mixta, dispuestos en cuatro grupos de acuerdo con la evolución clínica de la dermatitis digital bovina. Participaron del estudio 8 bovinos portadores de lesiones en la fase inicial (Grupo II), 7 en la erosiva o ulcerativa (Grupo III), 7 en la papilomatosa o proliferativa (Grupo IV) y 8 animales saludables (grupo de control - Grupo I), totalizando 30 muestras. Estos materiales se obtuvieron por medio de biopsia, siendo los mismos fijados en solución de formalina neutra taponada a 10%, procesados y posteriormente incluidos en parafina histológica. Los cortes fueron entonces seccionados y coloreados por las técnicas de HE y tricrómico de Mallory. Las imágenes de las láminas fueron capturadas con el auxilio de una lupa (STEMI DV4 - ZEISS) para la computadora, por medio de una máquina fotográfica digital (Sony), en campo de 8x, 20x, 25x y 32x, una vez que el programa permitió la adecuación de valores para cada objetiva. Antecediendo la realización de las medidas, se procedió a calibrar la lupa con una regla provista de divisiones en cm. Para la histometría de la espesor de la epidermis en centímetros (cms), se utilizó el Software Axio Vision 3.1 (Carl Zeiss Visión – Alemania). Fueron medidas las capas granulosa, espinosa y basal, con el objetivo...
The efficacy of foot-bath chemicals is likely to be affected by both the amount of soil that may contaminate the foot-bath and the contact time of the soil with the solution. This study presents a laboratory model that simulates the effect of time and soil load on different commercially available footbath solutions. The model consists of two different tests. Test 1 is a tolerance evaluation of the footbath solutions to different concentration of manure. Test 2 is an in-vitro test of the different foot bath solutions to test their ability to inhibit the growth of E. coli colonies at different dilutions. The results show that there is a big effect of time and soil load on the activity of the solutions. Most of the solutions lose effectiveness after more than 20% soil load or more than 48 hours contact time.

DeLaval hoofcare DA was shown to inhibit bacterial growth in the presence of 20% manure (w/w) after 48 hours contact. Copper sulfate did not inhibit growth under these conditions.
THE EVALUATION OF SPORADIC AND GROUP TREATMENT OF BOVINE DIGITAL DERMATITIS IN DIFFERENT SIZED HERDS

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Abstract

Digital dermatitis (DD) is one of the most important infectious disease of feet in dairy cows. Economic aspect of the disease is important because of decreased milk yield, weight loss, impaired reproductive performances, increased number of culls, and costs of treatment and control. Since 1974 that DD has been described by Chelli and Mortellaro, various therapeutic measures have been introduced for treatment and controlling the disease. Among them local spraying of the antibiotics have the best results as in sporadic or group treatment. Both methods, sporadic and group treatment have some advantages, limitations, and disadvantages due to variations in herd size, housing, management, climate, etc.

In this study with considering the costs and simplicity of the therapeutic method, we evaluated the effectiveness of the sporadic (individual affected cows) and group (all of the cows in herd) treatment in 6 different sized herds with DD.

Our results showed that; in small herds we could control or even eradicate the disease by sporadic treatment easily with minimum cost; however group treatment is not necessary in these herds. In medium sized herds, this method was useful for controlling the disease but it could not eradicate the disease, though group treatment is necessary for eradicating the disease. In large herds sporadic treatment was difficult, time consuming and it was not effective for controlling the disease. In these herds the best method for controlling and eradicating the DD was group (herd) treatment; although the eradication of the disease in large herds is very difficult and treatment should be repeated at regular intervals for several times to achieve the satisfactory results.

Introduction

Digital dermatitis (DD) is one of the most important widespread disease of feet in dairy cows (25). The disease causes significant economic losses (5). Economic importance of the disease is due to decreased milk production, weight loss, impaired reproductive performance, increased culling rate in herd, and costs of treatment and control (1, 21, 25, 31, 32, 34). This disease has various clinical features; though it has been named in several terms such as ulcerative digital dermatitis, papillomatous digital dermatitis, hairy warts, foot warts, strawberry heel and Mortellaro disease (21, 35).

Little is known about the cause and epidemiologic impact of the disease. It is believed to be a multifactorial disease in which infectious agents are primarily involved (24, 31). A good response to treatment by antibiotics suggest a substantial bacterial role in this disease (25, 31, 32, 35). Numbers of bacteria have been recovered from DD lesions, but the most suspected microorganism is a spirochete named Treponema that it has several species (6, 7, 8, 9, 17, 20, 26, 32, 33, 34). Some other predisposing factors are host skin defense mechanism, humidity, temperature, and housing (13, 17, 21, 24, 31).

Since 1974 that DD has been described by Chelli and Mortellaro (5), various therapeutic measures have been introduced for treatment and controlling the disease. Footbaths or topical application of nonantibiotic preparations such as formalin (13, 14, 15), copper sulfate (11, 13, 14, 18), acidified ionized copper (4, 11, 18), ammonium compounds (15), peroxyacetic acid (11, 14), glutaraldehyde (18) and sodium hypochlorite (4, 30) or antibiotics such as oxytetracycline (4, 10, 11, 12, 27, 28, 30, 34), lincomycin/spectinomycin (27), lincomycin (2, 19, 21, 27), chloramphenicol (15), and erythromycin (14, 16, 34), systemic use of antibiotic (15), surgical removing of the warts and dressing the wound and cryosurgery (4, 29) are the main treatments that have been challenged during these years. Among these, local spraying of the antibiotics has have the best results as in sporadic or group treatment (21, 25); but there is little about how we choose an appropriate method of therapy according to the herd sizes. Though we decided to do this study to evaluate the effectiveness of two therapeutic procedures (sporadic affected cows, and herd treatment) in different sized herds.

Materials and methods

This study was performed on 6 DD affected dairies with different sizes from mid 2000 to mid 2004. Based on the herd sizes they were categorized to small, medium and large herds. Dairies 1 and 2 with 25 and 30 cows (total population = 58 and 65 respectively) were categorized as small herds. Dairy 3 with 80 cows (total population = 202) and dairy 4 with 96 cows (total population = 227) were categorized as medium sized herds. Dairy 5 with 202 cows (total population = 488) and dairy 6 with 750 cows (total population about 1800) were categorized as large herds.

Medical history of these dairies showed that, except the herds 1 and 6 that had been affected with DD for many years, disease had been observed recently in 4 others. The source of the herds 1 and 2 was dairy 6. The cows in herd 1 had been purchased about five years ago and the dairy 2 was mostly contains primiparous cows that had been purchased eight months before the beginning of this study. Also dairy 5 had purchased some pregnant heifers from dairy 6 six months ago. Dairies 3 and 4 had the history of purchasing adult cows from other provinces recently.

For detecting the affected cows and to approximate the affection rate, cows were examined in milking parlor after washing all feet by medium pressure tap water. In the first stage of this study the recognized affected cows were individually restrained in hoof trimming chute. After washing, cleaning and drying, the feet were treated by a commercial oxytetracycline spray (contains oxytetracycline 20 mg/ml and gentian violet 2 mg/ml) for 1 to 3 days pertaining to severity of
the lesions. This work was continued for other diagnosed clinical cases for several months. Furthermore some management and hygienic measures such as frequent scrapping of the manures, cleaning of the stalls and applying fresh beddings to keep the floors dry were suggested to the owners. After four months in dairies 3, 5, and 6, herd treatment was done. The feet of all cows and heifers in the herds were sprayed by lincomycin solution (1.5 gram lincomycin hydrochloride 40% in one liter of water) two times daily for seven consecutive days (2, 21) after washing the feet with tap water each time in milking parlor. The treatment was repeated after two weeks. This two-steps therapeutic procedure was repeated in nearly six months intervals two times in herd 3 and three times in herd 5 and 6.

Results
In all studied dairies DD was diagnosed only among the cows and no heifers or calves were affected clinically, except the herd 6 that it had a long time history of DD and it had the most prevalence of the DD among the herds. In this herd clinical cases of DD not only had been found in milking and dry cows, but also in pregnant and non pregnant heifers as well as calves under one-year old.

In dairies 1 and 2 continuous sporadic treatment and good management and hygienic measures resulted in control and even eradicating the disease with minimum cost of treatment, so in these herds, we had not seen DD for near 1.5 year follow up studies.

In dairies 3 and 4 sporadic treatment could control the DD, as the numbers of lame cows decreased to a low degree, but this measure could not eradicate the disease. In dairy 3 that three consecutive herd treatment was done, DD cases had not been diagnosed for near two years follow up studies; This dairy had good management, housing and hygiene. But in dairy 4 that its owners were unwilling to do the herd treatment and they continued the sporadic treatment, although the disease was nearly under controlled, but remained in the herd.

In dairies 5 and 6 sporadic treatment was not effective enough for controlling the disease. It was less effective in herd 6 than the 5. By four consecutive herd treatment the disease nearly eradicated in dairy 5, as DD had not been reported for one year after the last treatment. But in dairy 6 in spite of four consecutive herd treatment DD had not been eradicated, but this procedure could control the disease well; although the costs of the herd treatment was really higher.

Discussion
There are several reports about the positive effects of topical treatment of DD by antibiotics in dairy cattle around the world (2, 15, 18, 21, 27, 30). In our study the response to the treatment in both sporadic and group treatment was very good in all clinical cases; but as we know DD is a multifactorial disease (1, 25, 31) and treatment alone can’t eradicate it (3). Recurrence of the disease is possible some weeks after a single treatment (18, 22). There is a strong correlation between the wet dirty and muddy environment and incidence and prevalence of the disease (23, 24). “Prolonged moisture and reduced access to air are necessary for establishment and transmission of the disease” (13); though in these situations the prevalence of the disease is higher (13, 31). Our findings were agree to other authors, so in the herds that good housing and hygienic measures had been regarded, control and eradicating programs were more successful.

In herds 1 and 2 because of small numbers of cows in the herds and possibility of better observation and diagnosing the diseased animals, mostly in the primary stages, as well as regarding the management, housing and hygienic measures, the disease had been controlled and even eradicated more easily by sporadic treatment. Herd treatment was not necessary in these small herds.

In the larger herds precise regarding the above measures may be impossible, so the prevalence of the disease is higher (25, 31); and the control of the disease may be more difficult. This difficulty may be increased with increasing the size of the herd; though for obtaining the satisfactory results, it is necessary to select the most appropriate method of therapy in conjunction with good management, housing and hygiene in the farm. We saw that in herds 3 and 4 with medium populations, sporadic treatment could nearly control the disease, but for good controlling or eradicating the disease, regular periodic herd treatment was necessary, as it was done in herd 3 and gives good results.

In large dairies that precise observation and diagnosing all diseased animals is more difficult or even impossible, it may be better to choose the herd treatment (2, 21). It should be repeated for several times to achieve good results (21).

In dairy 5 this procedure could nearly eradicate the disease. There are some other reasons for achieving successful results in this farm: It was newly affected by DD and the prevalence of the disease was low. Furthermore, it had a well designed housing that permits us to apply all hygienic measures well. All therapeutic and eradicating programs were done accurately in this farm.

Dairy 6 was very greater than dairy 5 and it had the history of DD for about two decades. The prevalence of the disease was too higher in this herd and there were some failures in accomplishing the eradicating programs. For example, because of high numbers of animals in this dairy and some facilities shortages, group treatment could not be done for all animals at the same time; though they had been divided to some groups necessarily, and treated at different times. Other problems in this dairy were inappropriate housing, over crowding and high moisture in the floors and beds (1, 17, 21, 24); also this herd was under more stresses because of higher milk production (21). The mentioned factors may be some reasons that why DD could not be eradicated in dairy 6; although the disease could be controlled in this herd.

References


CHANGES IN STANDING BEHAVIOR IDENTIFY COWS AT RISK FOR DIGITAL AND INTERDIGITAL DERMATITIS

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Dairy cows housed in free stall barns experience a high incidence of claw disease in the first few months after calving. Early identification of cows most at risk for claw disease could help reduce this incidence. The aim of this study was to determine if standing behaviour during transition could identify cows at risk for digital and interdigital dermatitis after calving. The number of standing bouts and the total time spent standing per day were measured from 2 wks before calving until 2 wks after calving for 48 Holstein dairy cows. Digital and interdigital dermatitis were scored as present or not present at 2 wks before calving and 3 and 7 wks after calving. Nine cows that had no visible signs of digital or interdigital dermatitis before calving showed clinical signs of disease at either 3 or 7 wks after calving. We compared these cows with a sample matched for parity that remained healthy throughout the study using ANOVA. Before calving, cows that developed dermatitis spent more time standing (811.38 ± 30.25 versus 686.52 ± 30.25 min/d; P=0.02) and had fewer standing bouts (9.00 ± 0.74 versus 11.73 ± 0.74 number/d; P=0.01) than cows that remained healthy. After calving, cows that developed dermatitis spent more time standing (909.60 ± 25.70 versus 787.10 ± 25.70 min/d P=0.004) but showed no difference in standing bouts compared to healthy cows. These results indicate that longer standing times and fewer standing bouts before calving and longer standing times after calving are important risk factors in the development of digital and interdigital dermatitis.

TREPONEMA PHAGEDENIS-LIKE SPIROCHETES ISOLATED FROM DIGITAL DERMATITIS LESIONS IN SWEDISH CATTLE

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Many studies show that the bacteria with the highest probability to be involved in the etiology of digital dermatitis (DD) are of the genus Treponema. In Sweden the first description of DD was published last year whereas previously only sporadic, atypical cases have been reported.

Biopsies were taken from DD lesions from four different dairy cows in one herd. Sequences of amplicons from 16S rDNA prepared directly from biopsy material were analyzed. Pure spirochete isolates were obtained by culture of biopsy material from two herds (the above herd and another herd in the same area). For these two isolates the whole 16S rDNA sequence was determined. Comparison of DNA sequences from the 16S rRNA genes was made and a phylogenetic tree, including other known Treponema spp. 16S rDNA gene sequences, was constructed. Additionally, electron transmission micrographs were made from sections of biopsy material. One dominating 16S rDNA sequence was found in all biopsies, which was also identical to the sequence from the pure isolates. However, the sequences from the biopsies were of low quality because of the presence of other bacterial sequences. The 16S rRNA gene sequence was also identical to deposited sequences from digital dermatitis treponemes isolated in California, Iowa, and the UK. The most closely related treponeme with an approved species name was T. phagedenis. The electron micrographs showed numerous spirochetes in the ulcerated tissue and the number of periplasmic flagella could be estimated to be at least seven.

The DNA sequences from the pure cultures show that Swedish cattle with DD are colonized with a Treponema species, which is very closely related (or identical) to those obtained from cattle in the USA and the UK. The sequences from the biopsy material indicate that this species also is the dominating spirochete species in the lesions, and hence the ones visualized by transmission electron microscopy.
TREATMENT OF DIGITAL DERMATITIS IN LARGE DAIRY HERDS WITH REACRE® AGRICURA, A BIOLOGICAL TOPICAL PRODUCT

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Digital dermatitis represents an increasing lameness problem worldwide and is predominantly seen in large loose-housing dairy herd systems. Many questions regarding the efficacy of treatment, control methods, antibiotic resistance and environmental issues remain unanswered. We undertook a controlled trial to investigate the efficacy of a topical, non-antibiotic ointment for treatment of digital dermatitis in 115 cows.

The study was conducted in five high yielding dairy farms in Saxony, Germany. Lesions on one or more digits were subjected either to topical antibiotic treatment or topical non-antibiotic treatment under a bandage.

Each cow was examined four times following treatment within a two week period. Diagnoses were based upon clinical picture, severity and location of the lesions according to a modified ABC-scoring system. Lesion areas were measuring using a computer analysis program. Degree of lameness and inflammatory parameters were also recorded.

Treponema phylotypes were investigated using FISH and confocal laser scanning microscope to determine the sensitivity towards reacre® agricura and determine the spatial distribution within the tissue. Other gram negative bacteria possibly involved in Mortellaro disease were cultured to determine the sensitivity towards the reacre product. Histological characteristics of different lesion types and severity were investigated with specific Treponema staining methods. 78% of the lesions were classified as Digital dermatitis and 22% were Papillomatous digital dermatitis. Improvement was seen 91% of all cows treated with reacre® agricura. 51% of the lesions healed completely within a two week treatment period.

Conclusions
1. Trial results suggest that reacre® agricura could be a useful tool in treatment of Mortellaro disease.
2. reacre® agricura is more effective against the papillomatous form than the digital form.

Foot rot in American Bison

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An American Bison herd of 500 adults is maintained at Custer State Park, Custer, SD. A serious foot rot problem occurred in 2003 and 2004. Fifty calves were lost subsequent to a foot rot outbreak during the summer months of 2003. Western South Dakota was undergoing a drought at the time. The herd gathered around stock dams to water and this may have contributed to the outbreak. Two chronically affected claws were submitted to the Animal Disease Research and Diagnostic Laboratory. Arcanobacterium pyogenes organisms were identified. Management changes were made in following summers to decrease losses. An air powered dart rifle was used to treat affected animals. Case details will be discussed.


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Digital Dermatitis (DD) is an infectious bovine claw disorder, which can cause a reduced welfare and performance of dairy cows. Information concerning the presence or absence of DD and other lesions on the hind claws of 22,454 cows was collected by hoof trimmers on 383 farms. The results showed that DD was present in 21.2% of the study population. The cow’s breed, parity and the stage of lactation appeared to be associated with the presence of DD. The concurrent presence of other infectious claw disorders was predisposing for DD. Furthermore, factors like trimming interval, herd size and access to pasture were associated to the presence of DD.
Treponema spp. in different stages of (Papillomatous) Digital Dermatitis Lesions in Cattle

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(Papillomatous) Digital Dermatitis (PDD) is an economically important infectious ulcerative disease affecting the skin of the foot and subsequently the claws in cattle. Therefore (PDD) represents an important welfare issue as well. Despite of the fact that the aetiology and pathogenesis are not completely understood, a variety of different Treponema spp. have been found during the pathogenesis of (PDD) (Choi et al., 1997; Moter et al., 1998). During the clinical course of (PDD), five different stages (M0-M4) have been defined based on visual inspection, odour, pain reactions etc., (Döpfer et al., 1997).

During an intervention study in an endemically infected herd, more than 150 superficial smear samples were obtained from different (PDD) lesions and at the end of the intervention study, 7 intra-dermal biopsies were taken at the border of different (PDD) lesions with normal digital skin, but mainly from the classical ulcerative M2-lesions. The smear samples were stored at -20 °C and the biopsies were fixed in 10% formaldehyde for 24 hours rinsed and stored in PBS afterwards. All samples were shipped on ice to the diagnostic laboratory of the Freie Universität Berlin/Germany, where the biopsies were studied morphologically and the smears were screened for the presence of Treponema spp. using hybridisation techniques. A correlation analysis was performed to investigate the relation between the morphology of the biopsies, the presence of Treponema spp. in superficial smears and the different stages of (PDD). A clear differentiation could be made for the different (PDD)-stages and the bacteriological findings. Some Treponema spp. were found significantly more frequently in smear samples of the M2-stages when compared to other stages of (PDD).

This study may contribute to an enhanced understanding of the aetiology of (PDD) and it increases the current knowledge about the potential infectivity of for the different (PDD)-stages.

WEIGHT GAIN IN NELORE BREED BOVINES WITH DIGITAL DERMATITIS

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In the last decades, the Brazilian beef cattle breeding is passing through considerable economical loss related to digital diseases, which can lead to 25% decrease on meat production due to low food ingestion. This study aimed to evaluate the effect of surgical treatment on the weight gain of bovines with digital dermatitis. To reach that objective, 75 male, orchiectomized, 28 month-old and 310 kg medium weight Nelore bovines were studied. This research was proceeded in a single cattle breed farm in Goiás State, Brazil, between January and August, the 2005th. The bovines were distributed in three groups, GI, GII and GIII, after the claudication scoring and clinic evaluation and determination of the type of digit lesion, and their weight were measured with intervals of 28 days, in a total of six evaluations. The groups GI and GII were constituted by animals with digital dermatitis. In the GI, the lesions were not treated, while in GII, the wounds were treated surgically or the ill digit was removed. The GIII was composed by clinically health animals. The results were submitted to variance analysis and the mean weight were compared through Duncan test. The simple regression test was employed to evaluate the weight gain in and among the groups. The mean weight differed (p < 0.05) among all groups, GI (317.1 kg), GII (323.5 kg) and GIII (363.2 kg). The weight gain was progressive in the groups GII (r² = 0.94) and GIII (r² = 0.96), from the beginning until the end of the experiment. The bovines from GI presented weight loss by the third weight measurement (r² = 0.97). The weight gain was lower in the non treated animals with digital disease, thus, the surgical treatment was effective for the recovery of the animals. Key words: cattle breeding, economic, infirmity, surgery.
STUDIES ON THE BOVINE SYNOVIAL FLUID OF THE DISTAL SESAMOID BURSA

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The aim of the study was to analyze the synovial fluid of the distal sesamoid bursa in dairy cattle. Seventeen digits with overgrown hooves and sixteen normal digits were collected from Shiraz slaughterhouse, Shiraz, Iran. The synovial fluid was obtained from the bursa of the distal sesamoid in all specimens and then examined for biochemical analysis and cell count. The appearance of abnormal synovial fluids was yellow to pale yellow and turbid. Viscosity and mucin clot test in normal and abnormal synovial fluids were normal and slightly poor, respectively. There were a significant difference (p<0.05) in concentration of glucose and protein in synovial fluid of bursa between abnormal and normal digits. There were a significant difference (P<0.05) in the activities of synovial fluid LDH, AST and ALP between normal and abnormal digits. Cellular parameters of synovial fluids of normal and abnormal digits were similar and no difference was observed.

PATHOLOGICAL FINDINGS WHILE APPLYING FUNCTIONAL CLAW TRIMMING IN THE DRY OFF PERIOD IN DAIRY COWS IN STABULATION


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Asbtract

The objective of this research was to describe pathological findings observed while applying functional claw trimming in the dry off period in dairy cows in stabulation. Feet of 25 Brown Swiss cows were clinically examined and functional trimming was applied at the beginning of the dry off period. Pathological findings were recorded on cards designed for this purpose. Results show, most frequent injures were: hemorrhage, (39,8%), white line disease (23,7%), and corium overgrowth. 78,4% of injures were in the hind limbs and 21,6% in the fore limbs. Significant differences were observed (P>0,05). Distribution of claw lesions were as follow: in the hind limbs, 68,1% of pathologies were found in lateral claws and 31,9% in medial claws. Contrary to this, in the fore limbs 58,4% of lesions were in medial claws and 41,6% in lateral claws. Significant differences were not observed (P>0,05). It may be concluded that more lesions were found in the lateral claws of hind limbs. Also, it was observed that limbs reach the dry off period in very bad conditions and this is reflected in feet conditions at delivery time and during the first months of lactation. This could cause podal disease during this period, in which dairy cows are highly productive.

Key Words: Lameness, pathological, bovine, functional trimming.
INTRODUCTION

After the reproductive disorders and mastitis, the digital infirmities are one of the main barriers to the world wide cattle breeding, especially to dairy production (NOCEK, 1997). Among the digital infectious diseases of great economic and productive importance, bovine digital dermatitis is remarkable and, for DEMIRKAN et al. (2000), it is a disorder characterized by palmar/plantar or dorsal interdigital skin inflammation and can reach the limit line between the corium coronary and the heel horn. The lesion can acquire an erosive or ulcerative aspect, commonly known as strawberry disease, or proliferative, also called papillomatous or verrucosa stage. According to the relates of WEAVER et al. (1981), the verrucosa stage is a proliferative inflammation secondary to the chronicity of the erosive process. LEÃO (2006) has affirmed that the initial clinical aspect is usually ulcerative and it can develop to proliferative or verrucosa stage, according to the lesion localization. Its etiology has not been completely cleared, although Dichelobacter nodosus, Fusobacterium necrophorum and some spirochetes, such as Treponema spp. and Borelilia spp., have been isolated from typical lesions of that infirmity (DEMIRKAN et al., 2000). The aim of this study was to evaluate the behavior of dairy cows owning digital dermatitis in comparison to clinically healthy cows.

MATERIAL AND METHODS

The research was developed in a cattle breeding farm on Goias State, Brazil, between June and July the 2006th, were the behavior of 30 lactating cross-breed cows (Holstein X Zebu), managed intensively and distributed in three groups (GI, GII and GIII) of ten animals each one, was evaluated. Healthy animals were allocated on GI, erosive digital dermatitis affected bovines on GII and animals owning the verrucosa stage on GIII. The observations were taken by three professionals, during three consecutive days, between 8:00 a.m. and 6:00 p.m. The evaluated parameters were: positioning (standing or decumbency), feeding period, water intake frequency, movements during milking and inactivity period. The milking was practiced manually, twice a day. The mean time spent by the animals to exceed each evaluated activity was transformed in percent rate of the total observing time per day.

RESULTS AND DISCUSSION

Considering the positioning, the animals from all groups rested most in standing position. The bovines from GI were standing in 64,2% of observing time, while the animals from GII and GIII remained in quadrupedal position respectively in 53,7% and 54,5%. In the group I, 23,1% of time in quadrupedal position was spent for feeding, 25,4% for milking. 4,3% for rumination, 1,6% for water ingestion and 9,8% in inactivity. 8,2% were spent for rumination and 27,6% in inactivity during decumbency. In the group II, 16,9% of time during standing position were spent for feeding, 25,4% for milking, 3,9% for rumination, 1,3% for water ingestion and 6,2% in inactivity. During decumbency, 5,1% of time was spent for rumination and 41,2% in inactivity. Seven of the 20 animals from both GI and GII showed signs of digital pain, such as claudication, rearing and frequent licking digit lesions. The percentual values of the evaluated parameters were lower in animals owning digital dermatitis. In the bovines from GIII, from 54,5% of standing position, 17,2% were spent for feeding, 25,4% for milking. 4% for rumination, 1,4% for water ingestion and 6,5% in inactivity. When they were in decumbency, 5,5% have been spent for rumination and 45,5% in inactivity. According to the conditions of development of this research, we concluded that the increase in the decumbency time in the groups GI and GII could be inherent to the pain in the digital lesion sites, which leads to lower production, as discussed by BERTERO (1992) and STURION et al. (1999). Those authors have proven that the animals with digital diseases, even in lower scores, arrived latter and ingested lower pasture volume, rested near to the water fountain, did not present estrous comportment signs and remained the majority in decumbency. Additionally, the digital disorders occasionally result in death of the animals, although the productive efficiency continues compromised, what makes necessary the premature culling of high genetic potential animals. According to REBHUN (2000), the dairy production decrease occurs due to reduction o food intake, especially when they are obligated to walk to the feeding place. Nonetheless, the cost/benefit of treatment is univiable.

Key words: digital disease, bovines, productivity, cattle housing.

REFERENCES


LEÃO, M. A.; Aspectos epidemiológicos, Evolución Clinica e Controle da Dermatite Digital Bovina em duas propriedades de
The digital diseases, mainly the bovine digital dermatitis, are considered as one of the most negative influence on the bovines’ body score and lead to low productivity and reproductive parameters alterations, in both female and male animals. This study aimed to evaluate the fertility of clinically healthy bulls and the ones with digital dermatitis, managed extensively, in a breed farm on Goiás State, Brazil. Ten 30 month-old bulls, five of them clinically healthy (G1) and five with bovine digital dermatitis (GII), were studied. The animals were managed from September the 2005th to January the 2006th in pastures with cows in different stages of estral cycle, at the relation of one male for each 20 females. Eight samples of sperm of each bull, were collected with intervals of 15 days for the physical and morphologic analysis. At the end of the sampling, the animals with digital dermatitis received local and systemic treatment and posterior footbath prophylaxis. The bulls’ libido was also visually observed for eight hours/day in a period of ten days consecutively. The data were evaluated descriptively and the physical analysis, including individual motility, movement massal, vigor and concentration revealed that the animals from G1 showed lower movement massal and spermatic concentration, when compared to the bovines from GII. By the behavior evaluation of the bulls from GII in pasture with the cows, reluctance during locomotion and decrease on the search for females in estrus and food were observed. The number of positive cows for pregnancy among the ones that copulated with bulls from G1 and GII were respectively 76% and 54%. The results pointed that fertility of the bulls destined to reproductive management may be affected by bovine digital dermatitis.

Key words: digital diseases, bovines, males, reproduction.

CATEGORIES: Animal welfare and claw disease
Abstract
Oligofructose is a common carbohydrate of many plants and has recently been incriminated a possible role in laminitis of alimentary origin. Six maiden dairy heifers were therefore used to examine changes at the lamellar interface after an oral oligofructose overload in cattle and compared with sections from a control group (N=6). Four of the 6 heifers administered oligofructose developed clinical signs of acute laminitis before they were euthanized. Post mortem samples from front claws were processed for histology. A list of 11 histopathologic characteristics were selected from the existing literature and used in a blinded evaluation of sections. In total, 104 front claw samples, including 8 samples from 2 cows having spontaneously occurring acute laminitis, were evaluated histologically using hematoxylin and eosin as well as periodic acid Schiff-staining. The major morphological features associated with oligofructose-induced acute clinical laminitis were stretching of lamellae, dermal edema, hemorrhage, changes in basal cell morphology, presence of white blood cells in dermis, and signs of basement membrane detachment. Changes at the lamellar junction of claw tissue affected by oligofructose-induced clinical laminitis resembled tissue from the 2 cows suffering from spontaneous acute clinical laminitis, and generally were consistent with existing descriptions of laminitis histopathology. Important exceptions to existing descriptions in the literature, were stretching of lamellae and basement membrane changes. Previously not described, we considered these to be early signs of acute laminitis. In conclusion, this study documents that oligofructose-induced clinical laminitis is associated with histopathological changes at the lamellar interface. A weakened dermo-epidermal junction is a possible intermediate stage in the pathophysiology of bovine sole ulceration at the typical site.

Reference
CHANGES IN LAMENESS TREATMENT RATES IN UK DAIRY CATTLE: AN EVALUATION BASED ON DATA FROM A VETERINARY PRACTITIONER SURVEILLANCE NETWORK

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Background

Laboratory based veterinary surveillance provides very little continuous data on lameness incidence. NADIS, a UK-based network of 40 private veterinary practitioners, has collected data since 1997 on veterinary treatments of lame cows. This is the first analysis of this data.

Materials and methods

Practitioners recorded on Dictaphone each case they saw. These data were then downloaded onto a database. The effect of year on veterinary treatment rates was analysed using a univariate general linear model with total number of monthly reports as the dependent variable and year as a fixed variable.

Summary

The total number of lameness reports decreased every year from 1997 to 2002 (from 7687 in total to 5014) and increased thereafter (to 6217 in 2005). Rates in 2005 rates remained below those seen in 1999, although statistically only 2000, 2002, 2003 and 2004 had significantly lower numbers of reports (2001 was excluded from analysis because of the FMD outbreak). Similar trends were seen for veterinary treatments digital dermatitis, white line disease, foul-in-the-foot and sole ulcer. Additionally the proportion of lameness caused by these four diseases reduced from 50 to 37% between 1997 and 2004.

Conclusions

1) These data are consistent with other databases that suggest that the incidence of lameness in UK dairy cattle may be reducing, although the level is still far too high.
2) However as veterinary rather than farmer treatments were recorded some of this decrease may be due to a reduction in veterinary involvement. Further research is required to establish whether this is the case.
3) There has been a significant increase in lameness not due to the four major diseases, digital dermatitis, white line disease, foul-in-the-foot and sole ulcer. Additional research is needed to establish why this is the case.

FIRST STEP™: AN INTERACTIVE TOOL FOR INVESTIGATING HERD LAMENESS PROBLEMS

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While awareness of lameness in dairy cattle has improved with the widespread use of locomotion scoring, there is a need for a framework for conducting a lameness investigation so that all of the relevant risk factors may be identified and solutions suggested for individual herd problems.

First Step™ is a new interactive tool developed by Zinpro Performance Minerals and the School of Veterinary Medicine, University of Wisconsin-Madison. It consists of a Windows Explorer based tutorial package and a Microsoft Access herd database program, designed to assist industry consultants troubleshoot dairy herd lameness problems. While the tutorial package provides background information and training on a range of lameness related topics, the database is used to store and summarize data collected from a farm.

Components of the tutorial and database include analyses of:

1. Locomotion score and lameness cost analysis
2. Lesion types and frequency
3. Foot bath program
4. Walking surfaces
5. Heifer transition
6. Nutrition and feeding practices
7. Stall design
8. Heat stress abatement strategies
9. Time budget constraints

The program summarizes data collected on-farm and produces a series of automated summary reports for the herd owner. The database is linked to the tutorial program, so at any time, the user can learn more about a subject area, before completing the analysis.

First Step™ provides a framework for discussion of the factors promoting lameness in individual herds and aims to produce a targeted action plan to help herds resolve their specific lameness problems.
INVESTIGATION INTO THE EFFECT OF DIFFERENT COMPOUNDS ON THE PREVALENCE AND INCIDENCE OF DIGITAL DERMATITIS IN DAIRY CATTLE USING SPLIT FOOTBATH DESIGN

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The objective of this study was to evaluate the efficacy of two compounds used in footbaths to reduce the prevalence and incidence of digital dermatitis (DD) compared to a positive control. Approximately 727 lactating dairy cattle in two commercial dairy herds (Farm A and Farm P) in central New York State were subjected to different treatments on the two sides of a split footbath. Treatments were a proprietary quaternary ammonium in a mineral acid solution (QAMA-DeLaval hoofcare DA) compared to copper sulfate on Farm A and quaternary ammonium in copper sulfate solution (QAMC) compared to copper sulfate on Farm P. Hind feet were evaluated for signs of pain, absence or presence of digital dermatitis lesions and, in the case of lesions present, the characteristics of those lesions. Cows were scored once and twice, respectively, before and four times after the start of the trial. Lesion scores were compared using the McNemar test for ordinal, paired data. Total score was compared using the paired t-test. At Farm P, copper sulfate performed better than QAMC in preventing an increase in prevalence of feet affected with digital dermatitis and preventing an increase in total score. The compound QAMA was significantly more successful in reducing both prevalence and incidence of digital dermatitis on Farm A when compared to copper sulfate.

OBJECTIVE PAIN MEASUREMENT OF THE BOVINE CLAW AND INTERDIGITAL SPACE


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Although pain is the pivotal element underpinning lameness, objective pain quantification of bovine foot and limb disorders remains elusive. The goal of this study was to objectively quantify pain associated with lesions of the bovine limb and characterize the variability of pain responses between and within lesions of the claw and interdigital space. Specific objectives were to characterize relationships of the magnitude of the pain response to lesion severity scores, absolute lesion size, proportional lesion size (expressed as a proportion of surface area of the sole, length of the white line or length of the interdigital space) combined lesion scores (product of lesion size and lesion severity score) and locomotion scores. As a part of an ongoing lameness study, hoof testers fitted with a Dillon Force Transducer quantified the force applied onto the lateral and medial claws of each limb. A Wagner’s Force DialTM quantified the force applied to lesions of the interdigital or plantar space. Locomotion scores were assigned for each hind limb prior to pain evaluation and lesion severity scores and size determined after the claw was cleaned and trimmed. Clinical characteristics of each lesion on the foot are utilized to derive an overall summated index for each limb. The index obtained is a weighted sum of individual lesion characteristics such as severity score. The weights are obtained by quantifying the degree of pain induced by the lesion type using hoof tester and algometer measurements. The weighted index in cattle with lesions of the claw and interdigital space is highly variable between and within foot lesion type but differs from cattle with normal feet in a lesion dependent fashion. The weighted index is also related to locomotion scores within and between lesions.
THE DEVELOPMENT OF AUTOMATED LAMENESS DETECTION TECHNOLOGY


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Lameness in dairy herds is a critical economic factor and vital animal-welfare issue for the dairy industry around the world. Early, accurate detection could lead to more efficacious practices that reduce lameness problems in commercial dairy units. An automated system for detecting hind limb lameness has been developed by the authors. Bou-Matic, LLC, has adapted our technology for commercial development of a real-time, observer independent, lameness detection system that continuously monitors the lameness and soundness of dairy cattle.

This paper describes the technology, developed with partial funding from USDA, and explains the scientific foundation underpinning the detection system. The system records the signals of eight single axis loadcells as cows walk freely through. The signals generated by the loadcells are used to calculate three types of gait characteristics: (i) the relative body weight distribution on the four limbs, (ii) the relative left/right floor contact times of the limbs, and (iii) the frequency contents of the vibrations induced on the floor as the animal walks through. These three gait characteristics are fed into a logistic regression model that assigns SMX™ scores ranging from 1 to 100. Elevated SMX™ scores indicate higher probabilities that the examined cow is lame. The recommended cutoff SMX™ value is 38 nevertheless producers can adjust this value and fit it to their own management styles.

In a recent study, using a commercial adaptation of our technology (StepMetrix™ by Bou-Matic) with the current logistic regression model has provided more than 80% accuracy in detecting soundness and lameness in individual cows. Research is continuing to further substantiate the benefits of the automated lameness detection system to the dairy industry and the research community.
THE ASSOCIATION BETWEEN HOOF LESIONS AND CULLING RISK IN ONTARIO DAIRY COWS

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There is concern within the dairy industry about the longevity of today’s dairy cow. Considering the high prevalence of lameness it is surprising that the association between hoof lesions and culling has not been widely evaluated. The objective of this project was to determine the association between hoof lesions and culling risk in dairy cows.

A sample of 5 hoof trimmers was trained and recorded lesions on a standardized form for all cows trimmed. Individual lesion data from 7610 cows in 173 herds were merged with dairy herd improvement (DHI) culling data. Using a Cox proportional hazard model the association between individual lesions and culling risk was determined. All models included 305-day milk, breed, lactation, days in milk, linear score and hoof trimmer as fixed effects. Herd was accounted for using robust standard errors.

2888(38%) of cows were culled. Median time to culling from hoof trimming was 245 days. Cows identified as lame by hoof trimmers had a 30% increased culling risk. The presence of any lesion significantly increased culling risk by 22%. Predominately due to the effect of non-infectious lesions such as white line abscess, solar hemorrhage, white line separation and sole ulcers as they increased culling risk 46%, 32%, 69% and 34% respectively. No infectious lesions had a significant association with culling risk.

These results highlight the importance the industry should place on lameness and hoof lesion prevention. Dairy producers cannot afford to ignore a problem that increases the culling risk of high producing cows by 30-70%.
HERD LEVEL RISK FACTORS FOR NON-INFECTIOUS AND INFECTIOUS CAUSES OF LAMENESS FOR ONTARIO DAIRY HERDS

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Lameness is one of the most important issues facing the dairy industry, in terms of both production costs and public perception of animal welfare. The objective of this project was to determine the effect of selected risk factors on the prevalence of infectious and non-infectious lameness lesions on dairy farms.

A convenience sample of 5 hoof trimmers were trained and asked to record lesions on a standardized form for cows they trimmed in a herd. In addition, they completed a questionnaire for each herd. Complete data was collected on 24 free stall herds and 89 tie stall herds, with an average herd size of 50 cows. Average prevalence of infectious causes and non-infectious lameness lesions was 22.9% and 17.9% respectively. The impact of specific risk factors was evaluated using separate linear regression models for infectious and non-infectious lesions and for free stall and tie stall herds.

Free stall housing was a significant risk factor in both infectious and non-infectious models. For tie stall herds, the use of wood shavings for bedding and routinely spraying cows feet were associated with an increased prevalence of infectious lesions. For non-infectious lameness lesions in tie stall herds, trimming heifers prior to calving decreased prevalence by 4.6%. In free stall herds, using less than 2.5 cm of bedding was associated with a 13.3% increase in non-infectious lesion prevalence.

From these results, it is clear that the dairy industry continues to struggle with both infectious and non-infectious lameness lesions. They also identified certain risk factors that can be managed with considerable effects on prevalence levels.

PREVALENCE AND CAUSES OF LAMENESS IN 91 DAIRY FARMS IN THE SOUTH OF CHILE.*

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Introduction
Lameness in cows is a multifactorial problem. In Chile literature about lameness in dairy cows is limited. Tadich and col (2005) examining 7500 dairy cows found a mean prevalence of lame cows of 9.14%. The objective of this study was to produce reliable information about the prevalence of lameness in dairy cows from 91 dairy farms in the south of Chile.

Material and methods
Ninety one dairy farms from the Xth Region of Chile were visited between August and December 2004. Sample size was calculated based in a 10% prevalence (Tadich and col 2005). Farms were conveniently selected based in their milk production and herd size and the willingness of their owners to participate. Thirty four dairy farms with milk production 1.000.000 L/year and 300 dairy cows and 57 farms with milk production 100.000 L/year and 50 cows, were selected.

Ten thousand-seven hundred cows were observed. Locomotion score was classified according to Tadich and col. (2005). From those lame cows, 20 were proportionally selected representing the different locomotion scores, and examined next day. Farm and total prevalence were determined. Frequency of presentation of the different causes of lameness, were determined. Statically analysis was carried out using STATISTIX 8.0 software.

Results
The prevalence of clinically lame cows in large and small dairy farms was 20.4% and 15.7%, respectively (P< 0.02). The lesions more frequently found in cows from large dairy farms were: White Line Disease (WLD) (54.9%); Sole Hemorrhage (SH) (52.9%); Heel erosions (HE) (48.4%); Sole ulcer (SU) (30.6%); Double sole (DS) (21.4%); Digital dermatitis (DD) (7.7%); others (11.4%), meanwhile in small farms were: (WLD) (82.5%); (HE) (53.3%); (SH) (24.6%); (DS) (13.7%); (SU) (7.8%); (DD) (6.6%); others (21.8%).

Conclusions
Size and milk production of the herd influenced prevalence of lame cows. Lesions found were related to management and nutrition of the cows. Infectious Diseases had a low prevalence.
ASSESSMENT OF THE RESPONSE TO MECHANICAL NOCICEPTIVE STIMULUS IN DAIRY COWS WITH DIFFERENT LOMOCITION SCORES.

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Introduction
Nociception refers to the capacity of a stimuli to produce a visceral lesion and a reaction of the organism. The measurement of nociception in cattle has been included in studies on the effect of acute stress or chronic pain (Herskin and col 2003). In order to evaluate nociceptive stimulus in dairy cattle measurement based in mechanical stimulation, has been used (Whay and col 1997, 1998). Whay and col (1997) found an association between the threshold to mechanical stimulus and the degree of lameness. The objective of this study was to determine the degree of hyperalgesia in dairy cows with different degrees of lameness, using mechanical stimulation.

Material and Method
The study was carried out between May and December 2005. One hundred and twenty seven cows with different locomotion scores, milk production, stage of lactation and parity, were used. Locomotion scores were distributed as follow 0 (n= 44); 1 (n= 1); 2 (n=28); 3 (n= 23); and 4 (n=14). Cows were from 6 different dairy farms. The locomotion score was determined when the cows left the parlour. Selected cows were introduced into a crush where they rest for 10 m before a mechanical device developed for this study was located on the metacarpal bone of the affected leg. Once the animal was comfortable with the device, the nociceptive stimulus was triggered; the pressure stopped at 20 Newton or when the animal moved their leg. This procedure was repeated three times with intervals of 5 m. The results were analysed using ANOVA of one way and the Scheffe procedure was repeated three times with intervals of 5 m. The results were analysed using ANOVA of one way and the Scheffe test, with a significance level of 95%.

Results and discussion
From the 127 cows examined, Cows with score 0 and 1 presented thresholds of reaction to nociceptive stimulus significantly (P< 0,001) greater than those cows with higher locomotion scores. These results are similar to those reported by Ley and col (1995) in sheep and Whay and col (1997) in cows. Our results confirm that lame cows develop a stage of hyperalgesia affecting their welfare an eventually their milk production.

B5 / POSTER
BLOQUE / BLOCK 5

A pilot study carried out in 2002/2003 (50 farms) revealed that lameness plays a considerable role in German organic dairy farming. Whereas straw yard systems had beneficial effects, the importance of other (management) factors seemed to be even more pronounced in cubicle systems. It is therefore the aim of the present study to investigate the effectiveness of farm-individual intervention measures related to management and housing conditions on lameness reduction.

43 cubicle housed organic Holstein Friesian herds are regularly visited at 3-months intervals for two years (starting in the winter housing period 2004/2005). In each farm, the locomotion of all cows is scored using a 5-point numerical rating scale. Housing conditions (design, space allowance, stall dimensions etc.) and management (feeding, health control etc.) were obtained by checklists and questionnaires; data from milk performance testing are also available.

In approximately half of the farms, intervention measures (e.g. bedding, claw trimming) were identified on the basis of the initial data collection and discussed with the farmer. In order to evaluate the effectiveness of the intervention measures, all farms will be followed for in total two years.

The average baseline lameness prevalence (visit 1) was 26% (range 2 - 50%). Lameness prevalence decreased to 19%, 17% and 17%, respectively, at the following visits. Intervention farms showed a greater reduction in lameness prevalence (median 13.3%, range 33.3 - 12.9%, n=21) than control farms (median, 4.7%, range 21.0 - -15.7%, n=22; p=0.001, Mann-Whitney-U). The effectiveness of different intervention measures will further be evaluated.

In conclusion, the preliminary findings in this study provide evidence for improvements of the lameness situation in commercial organic dairy farming due to intervention measures thus demonstrating the potential for lameness prevention and control. However, the farmer’s motivation and cooperation plays a key role in implementing measures.
IMPROVING ‘SELF-ASSESSMENT’ OF LAMENESS PREVALENCE BY ORGANIC DAIRY FARMERS: PRELIMINARY RESULTS FROM A COACHING STUDY IN GERMANY*

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Earlier studies on health status in German organic dairy farming demonstrated that production diseases such as lameness, mastitis and metabolic disorders play a considerable role and underline the high potential for improvement. With regard to lameness, it has repeatedly been reported that farmers generally underestimate lameness prevalence thus indicating that this health and welfare problem is often not identified and therefore no or too few measures taken. It is therefore of special interest to promote the sensibility for animal health by training farmers.

Starting with the winter housing period 2004/2005, 43 organic dairy farms are visited at 3-months intervals for two years. Gait scores are recorded at each visit using a 5-step numerical rating scale. Intervention measures to reduce lameness prevalence were defined and recommendations to improve management and or housing system suggested. Furthermore, farmers were trained with regard to gait scoring and possible risk factors for lameness.

In the course of the first four farm visits, the average lameness prevalence as assessed by the external observers decreased (26%, 19%, 17% and 17%, respectively). Concurrently, lameness prevalence estimates by the farmers increased (10%, 12%, 12% and 13%, respectively). At herd level, the farmers estimated on average 45.4% (sd 34.3); 63.9% (sd 42.2); 78.8% (sd 48.7) and 81.6% (sd 61.5) of the lameness prevalence assessed by the trained observers. Correlations between farmers’ estimates and gait scoring results also increased from rs=0.59 (visit 1, p<0.01) to rs=0.69 (visit 4, p<0.01) for overall lameness prevalence.

In conclusion, coaching of farmers showed an improvement in self-assessment of the lameness situation in the herds thus demonstrating the opportunities to advance the health and welfare status in dairy cattle by integrating the farmers.

THE EFFECT OF DIFFERENT FOOTBATH SOLUTIONS ON HOOF HEALTH

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The use of formalin (37 % (w/w) formaldehyde) as a footbath solution is common in Western Europe and the US as preventative for digital dermatitis (DD) and other inter-digital skin diseases. However, formalin can cause allergies and the inhalation of formaldehyde vapors may cause membrane irritation, skin irritation, asthma and potentially sino-nasal carcinoma. It is listed as Chemical Hazard in the International Hazards Datasheets on Occupation (International Labor Organization), and in some countries its use is not permitted. Other widely used solutions contain heavy metals such as copper sulfate that are harmful to the environment and can build up over time, poisoning the soil. In the UK, copper poisoning is becoming a significant issue in dairy cows.

The purpose of this study was to analyze the effect of a hoof care product free of heavy metals and aldehyde (DeLaval DA) on the prevention of DD and heel erosion and to compare it to 5% formalin solution. This trial was performed at a commercial dairy where a split cow design was used to allow observation of the effect of the two treatments on the same cow. A special automated split foot bath was constructed for that purpose. As cows walked through, the right front and right rear feet were exposed to one treatment and the left side to the other. Both hind feet of each cow were examined before the trial and then every month afterwards for a period of 6 months. Results indicate that it is possible to obtain similar results to 5% formalin using a product that is not hazardous to the environment and human health.
CLINICAL AND HISTOPATHOLOGICAL STUDY OF CHRONIC LAMINITIS IN A HERD OF DAIRY CATTLE

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Abstract
Laminitis is of great importance to the cattle industry. The purpose of this study was to describe clinical and pathological features of subclinical laminitis outbreak that leaded to a chronic laminitis in a herd of dairy Holstein cattle. A dairy farm south east of Shiraz consisting of 55 Holstein cow and heifer was presented with lameness problems. The objective of this study was to determine the cause of lameness and hence the control of the disease. In this study, 28 cases of lameness were observed. Laminitis was confirmed by hoof trimming, hematology, serum biochemistry and radiography. Out of 28 cases, 12 cases were confirmed as chronic laminitis. The herd was treated by antibiotic spray for seven days. The herd was reassessed 10 days after the last treatment. Heel horn erosion was evident in 94% of the cattle. Out of 55 animal in this herd 23(41.8%) had ulcers or hemorrhages from which 47 digits or two digits per cow had ulcer or hemorrhages. 22 (20.9%) ulcers had progressed into claw wall white line. Overgrown sloe and corkscrew was noticed in 28 digits(20.5%) and double sole in 18 digits (13.2%). Histopathologically there was typical hard keratin with cornified material and prominent tubular and intertubular pattern without cellular component. The small vessels had hyaline thrombosis without any inflammatory cells or any hyperplasia of the epidermis. Improving some of the management system resulted in improvement of claw disease in this farm.

Key words: Cow, laminitis, heel horn erosion, hoof ulcer, hoof hemorrhage.

Material and methods
A dairy farm south east of Shiraz consisting of 55 Holstein cow and heifer was presented with lameness problems complaining of reduced milk production and other problems. On the basis of severe lameness in the herd all the animals were underwent foot examination and foot trimming. We used a letter code in combination with the numbered claw diagrams (Fig.1) for identification of foot disorders to accurately document appropriate region of the claw or foot (6, 7). Also the management system, feeding system and other necessary information were recorded. All the cows underwent hoof trimming. Those complicated cases such ulcers, sole hemorrhages and abscesses were treated accordingly. Tissue lesions removed from ulcerative and hemorrhagic sole were sent for histopathologic study. The herd was treated by antibiotic spray two times a day for seven days and repeated a week later. The herd was reassessed 10 days after the last treatment. The floor yard of the farm was cleaned then was burned (heat disinfection) to make sure there is no infection remedies in the farm. They received good quality concentrate with a good portion of ground barley (4.0 kg/cow) in it. Finally the barley was withdrawn gradually from the concentrate and also the amount of concentrate per cow was reduced. The cattle in this farm were kept in an open area, the floor was natural rock with severely uneven surfaces, mostly wet. The next step was reconstruction of the flooring system and reduction of milking parlor distance.

Results
Heel horn erosion was evident in 94% of cattle to a varied extent. There was an irregular loss of bulbar horn as a result of which multiple pits like depressions and deeper oblique (V-shaped) grooves were formed. In some instances the erosion had progressed owing to the lack of formation of new horn affected the skin heel junction also. There were typical circumscribed lesions of varying severity. In the process of hoof cleaning and hoof trimming, ulcers and hemorrhages of varying degree became evident (Table 1 and 2). The typical ulcers were surrounded by a stagnation of blood (clotted blood) which could have been results of arterial thrombosis showing no active or even passive bleeding. Therefore the ulcer area was manipulated and dogged out to get into a healthy bleeding tissue, then was disinfected and bandaged. Since all of sole hemorrhages were covered by poor quality thin horn, they were also regarded as ulcer and treated accordingly. Table 1 refers to distribution of 47 hoof ulcers and hemorrhages in the different legs and claws. And Table 2 refers to distribution of ulcers and hemorrhages on different sole location according to the classification of numbered claw diagram (Fig.1). In some cases the ulcer or hemorrhages...
were extensive and involved more than one numbered sole location. (Table 2). Out of 55 cows 23 (41.8%) had ulcer or hemorrhages from which 47 digits or 2 digits per cow had ulcer or hemorrhages. 22 (20.9%) of ulcers had progressed into lateral claw wall white line and caused abscess formation. There was one interdigital fibroma and two interdigital dermatitis in this herd also. Overgrown sole and corkscrew was noticed in 28 digits and double sole in 18 digits of the cow.

Histopathological study was done on the ulcerative tissues that were removed from lesions during hoof trim examination and revealed; typical hard keratin with cornified material and prominent tubular and intertubular pattern without cellular component. All the small vessels had hyaline thrombosis without any inflammatory cells or any hyperplasia of the epidermis. There was arteriosclerosis of blood vessels at the ulcer site with overgrown sole. Onychogenic substance was disappeared partially or completely in the sole. Antibiotic therapy, hoof trimming, improved sanitary condition of the farm did not improve the laminitis conditions. Even concrete flooring, reduction of the milking parlor distance and reduction of the barret and concentrate improved the lameness condition of this farm.

Discussion

Heel horn erosion may occur after an outbreak of laminitis (8). The horn formed during an episode of laminitis is of poor quality and less resistant to physical, chemical and microbiological attack. Conversely it has been suggested that heel horn erosions might be the primary cause of laminitis (9, 10). The lack of adequate supporting heel horn might reduce the weight-bearing capacity of the claw, so causing traumatic necrosis of the corium through overburdening, and leading to laminitis and at a later stage to ulceration of the sole. Because of the difficulty in culturing the pathogenic microorganisms, the heel horn erosion is often diagnosed solely on the basis of the appearance of the local lesions. The clearest signs of erosions caused by interdigital dermatitis are the straight fissures and V-shaped lesions which do not cause pain or lameness initially. The erosions caused by digital dermatitis are more nearly circular, they are always painful and have characteristic smell. The heel horn erosions associated with laminitis are characterized by the presence of sole hemorrhages (11). The extensive and severe heel horn erosion in the herd studied was due to persistent laminitis. It could have not been due to any infection because antibiotic therapy and other control measures did not show any improvement. Histopathological studies of the laminitic hooves have been performed on legs that have been obtained after slaughter (12-15). But in this study ulcerative tissues during hoof trimming were used for histopathological study. The pathogenesis of laminitis have been divided into different phases (16), the primary phase initiated by impairment of the blood supply to the corium due to reaction of vasoactive substances such as histamine and endotoxin in the blood stream (16). Bovine laminitis is a debilitating disease that results in functional and/or morphological changes within the claw. It can present itself in various forms based on the severity and duration of the condition, i.e. acute, subacute, chronic, and subclinical laminitis. Subclinical laminitis also gradually progresses into chronic laminitis (17).

In this farm the hoof trimming and individual treatment of ulcers did not improve the condition. Application of antibiotic spray two times a day for seven consecutive days and repeating the treatment after seven days did not effect the situation of laminitic cows at all. Gradual reduction of barley from concentrate, reduction of the amount of concentrate per cow prior to calving as well as after calving, even concrete flooring, reduction of the milking parlor distance slowly brought back the hoof normal condition and laminitis disappeared. The association of excessive carbohydrate intake and laminitis was studied extensively (17). Most laminitis problems in cattle are thought to be associated with the type of feed. However the hypothesis of multi factorial etiology extends beyond nutritional factors. Combination of mainly independent factors influence the occurrence and severity of laminitis. It has been suggested that histidine in barley could be metabolized into histamine, or histamine could be released following an allergic reaction to barley after sensitization of the animal (18).

Reduction of barley from the concentrate and also reduction of concentrate per cow, improving flooring system and reduction of milking parlor resulted in improving this herd laminitic conditions.

References


Table 1. Distribution of the hoof ulcers and hemorrhage in different legs and different claws in chronic laminitis.

RR(right rear), LR(left rear), RF(right front), LF( left front), L(lateral), M(medial).

Table 2. Distribution of ulcer and hemorrhage location on the sole

U( ulcer and hemorrhage), 1-9 ( numbered claw diagram- Fig.1)

RELATIONSHIP OF BODY CONDITION SCORE AND OXIDANT STRESS ON TUMOR NECROSIS FACTOR EXPRESSION IN DAIRY CATTLE

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Background
In humans, obese patients have an enhanced production of pro-inflammatory cytokines (such as Tumor Necrosis Factor-alpha and Interleukin-6), which has been recognised to induce a pro-inflammatory environment and facilitate oxidative damage, leading to the initiation and progression of an array of diseases, including periodontitis. Digital dermatitis has striking similarities with periodontitis, in the synergistic method the lesions are effected and in the humoral antibody response shown to them. Pro-inflammatory cytokines have been shown to play a major role in the pathogenesis of periodontitis and have been implicated in the aetiology of digital dermatitis. The purpose of this study was to investigate if a similar relationship exists in the dairy cow between obesity, oxidative stress, pro-inflammatory cytokines and susceptibility to disease.

Materials and Methods
Sixteen pluriparous Holstein cows in mid-lactation (150-200 DIM) were selected from a commercial herd of 3000 dairy cows based on their Body Condition Score (BCS). Eight were selected as normal BCS (2.5-2.7) and the remainder were considered obese with a BCS of >3.5. Markers of oxidative and metabolic status were measured.

Results
Obese cows had a significantly lower level of NEFAs compared to normal cows. High BCS cows also showed indicators of oxidant stress (lower TrxR and GSH/GSSG) as well as elevated TNF-alpha levels.

Significance
This is the first report relating both high BCS and oxidant stress, with the increased expression of TNF-alpha in dairy cattle. Further studies are needed to establish the underlining pathways in this relationship.

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DERMATITIS DIGITAL BOVINA: ASPECTOS MORFOLÓGICOS, HISTOPATOLÓGICOS E HISTOQUÍMICOS

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El daño recurrente de las enfermedades digitales de los bovinos, como la dermatitis digital (DD), debe ser contabilizado teniéndose en cuenta todos los segmentos envueltos en la producción animal. El alto índice de la enfermedad en el rebaño brasileño, especialmente en la Provincia de Goiás, justifica la necesidad de mayores estudios, con el fin de definir aspectos aún inciertos con respecto a la manifestación clínica, etiología, diseminación de la enfermedad, factores de riesgo y el establecimiento de un protocolo de tratamiento eficaz. La enfermedad, de etiología multifactorial y patogenia compleja, representa un significativo obstáculo productivo y económico en la ganadería mundial. El objetivo de este estudio fue evaluar los diversos aspectos anatomo-patológicos relacionados con la dermatitis digital bovina en diferentes fases evolutivas. En el periodo de agosto de 2004 a noviembre de 2005, fueron visitadas 10 propiedades rurales que exploraron la cría de bovinos, tanto de aptitud lechera como mixta, con el fin de verificar la presencia de dermatitis digital bovina y recolectar muestras para la evaluación anatomo-patológica. Esas propiedades se hubicaban en los municipios de Jataí, Orizona, Quirinópolis, Gameleira, Hidrolândia, Goiânia y Ouro Verde, que conforman la Mesoregión del Sur y Centro-Oeste Goiano. Participaron del estudio 10 bovinos portadores de lesiones en la fase inicial (Grupo II), 10 en la erosiva o ulcerativa (Grupo III), 10 en la papilomatosa o proliferativa (Grupo IV) y 15 animales saludables (grupo control - Grupo I), totalizando 45 muestras. Para una mejor comprensión del proceso mórbido, en cada propiedad fue aplicado un cuestionario para la identificación de los diversos aspectos relacionados con el género de la enfermedad. Las biopsias fueron realizadas mediante una incisión en forma de cuña, que incluía en un mismo fragmento el centro de la lesión y la piel marginal normal, con aproximadamente 2 cms de diámetro. Luego de la recolección de los fragmentos los animales fueron tratados quirúrgicamente, promoviéndose el retiro de todo el tejido comprometido, con la aplicación de curativos locales y antibiótico-terapia. Las muestras de tejido fueron fijdas en solución de formalina neutra taponada a 10%, procesadas e incluidas en parafina histológica. Los fragmentos fueron seccionados y colorados por la técnica de hematoxilina y eosina, rojo congo, tricrómico de Mallory, Luna, gram, ácido peridólico de Schiff (PAS) y Warthin-Starry. Todos los procedimientos fueron realizados en el Laboratorio de Histopatología del Sector de Patología Animal del Departamento de Medicina Veterinaria de la Escuela de Veterinaria de la Universidad Federal de Goiás. Al final de los procedimientos histológicos, se obtuvieron un total de 315 láminas que fueron observadas en microscopio óptico de campo claro. Las imágenes fueron capturadas para la computadora, utilizando una cámara de video analógica. Para la cuantificación de las diferentes intensidades del infiltrado inflamatorio eosinofílico fueron establecidos los siguientes escoros: discreto (+ = 1), moderado (+ + = 2) e intenso (+ + + = 3), observados en campo de 25x. En las propiedades la dermatitis digital estaba presente y asociada a otras enfermedades digitales, especialmente la pododermatitis séptica, la erosión de los talones y la dermatitis interdigital. Se pudo observar que en un 70% de las propiedades, el ambiente en que los animales eran manejados presentaron condiciones de higiene de las instalaciones precarias y presencia marcante de humedad, asociada al acúmulo de estiércol y lodo en los corrales y en las proximidades de los locales de alimentación. Las condiciones sanitarias deficientes de ciertos criaderos de bovinos constituye un fuerte factor predisponente para el surgimiento de enfermedades digitales, una vez que proporcionan condiciones favorables a la presencia y proliferación de agentes infecciosos. Macroscópicamente las lesiones en la fase inicial de la DD ocurrieron predominantemente entre los talones y en el espacio interdigital dorsal, midiendo alrededor de dos centímetros de diámetro y eran delimitadas por una faja pilosa. En el examen histopatológico de este grupo (GII), se observó el engrosamiento del estrato córneo, necrosis tejidual, hiperplasia, acantosis, espongiosis, hiperqueratosis (50%) y presencia de flora bacteriana mixta, compuesta principalmente por microorganismos espiralados. Probablemente tales microorganismos eran de la familia Spirochaeta y, en un 60% de los casos examinados, fue posible observar la presencia de estos tipos bacterianos, proyectándose perpendicularly a las capas superficiales de la epidermis, sugiriendo una invasión celular. La presencia de las bacterias en espiral preferencialmente en la capa córnea indica la predilección de esta localidad para multiplicación y crecimiento. La dermis demostró infiltrado inflamatorio predominantemente mononuclear, asociada a la discreta presencia de eosinófilos, con excepción de dos animales en que la ocurrance de estas células fue moderada. Las lesiones observadas en la piel interdigital de los animales portadores de dermatitis digital erosiva (GIII) mostraban una intensa hiperemia, considerable necrosis y alta sensibilidad, vista que en los casos más avanzados, se observó que estas se expandían en todas direcciones del talón, en la forma de erosiones profundas, provocando una claudición intensa en los animales. En el examen histopatológico se pudieron observar las siguientes alteraciones de la epidermis: engrosamiento de la capa córnea, asociada a una paraqueratosis y necrosis multifocal. En la dermis más profunda se observó la presencia de tejido de granulación. Las alteraciones en la dermis de los animales del
grupo GII fueron más acentuadas que las alteraciones observadas en el GII, sin embargo las espiroquetas fueron observadas en apenas dos animales (20%). Las lesiones macroscópicas de los animales con dermatitis digital papilomatosa o proliferativa eran preminentes, con superficie irregular e inúmeras formaciones papiliformes blanquecinas y cornificadas. Las papilas medían alrededor de cuatro centímetros de largura demostrando áreas de necrosis y maloliente. Histológicamente fueron observadas alteraciones acentuadas, cuando comparadas a los grupos GII y GIII, demostrando destrucción de la capa córnea y un comprometimiento de las otras capas de la epidermis. La necrosis de la capa córnea fue observada en el 100% de los animales, con distribución multifocal en el 60%, focal en el 30% y en el 10% la alteración estaba distribuida difusamente en la epidermis superficial. En este grupo las espiroquetas y otros tipos bacterianos no tipificados, como cocos, cocobacilos y bastonetes, fueron observados en todos los animales, estando localizados principalmente en la capa córnea. En dos animales, el grado de destrucción del tejido de la capa córnea y granulosa era tan intensa que, las bacterias en espiral fueron encontradas invadiendo la capa espínica. La presencia de numerosas espiroquetas y de infiltrado inflamatorio compuesto por eosinófilos, en el presente estudio fue considerada como una característica marcante de esta fase evolutiva. El infiltrado inflamatorio eosinofílico, se restringió la dermis de forma discreta en la fase inicial e intensa en la forma papilomatosa, demostrando que la intensidad tiende a aumentar con la evolución de la enfermedad. La evaluación histopatológica permitió concluir que las espiroquetas fueron encontradas en mayor concentración colonizando las capas superficiales de la epidermis, especialmente de los animales portadores de dermatitis digital en la fase inicial y en la fase papilomatosa o proliferativa, lo que sugiere que estas bacterias poseen papel activo en la etiopatogenia de la DD, sin embargo no confirmando su actuación como agentes primarios.

B7 / POSTER
BLOQUE / BLOCK 7

PERIPHERAL BLOCKADES IN BOVINES AN ALTERNATIVE IN CHIROPODY

Brynkier Javier Clinic and Surgery Area in rumiants and pigs. Arzone Carlos , Genoud Pablo Anatomy I and II Area. Veterinary Science Faculty Buenos Aires University, Argentina

POSTER INTRODUCTION

ALONG MANY YEARS, DIFFERENT ANAESTHETIC TECHNICS HAVE BEEN USED IN CLINIC EXAMINATION AND IN SURGERY MANIPULATION TOO, ON BOVINE FOOT. THESE TECHNICS ARE VARIED BUT THERE ARE 2 WHICH ARE THE MOST USED AND THEY ARE THE RING IN THE CORONARY BORDER BLOCKADE AND THE REGIONAL INTRAVENOUS TECHNIC. THESE MAKE THE DIGITAL NERVES BLOCKADE, ALTHOUGH SOMETIMES A CORRECT LOSS OF SENSITIVITY IS NOT PRODUCED BECAUSE OF THE NERVOUS JOINTS AT LEG AND FOOT LEVEL.

WHEN THE TECHNICS MENTIONED BEFORE ARE USED, THE ANIMAL SHOULD BE ALWAYS LIED DOWN WITH THE POSSIBILITY TO GET TIMPANISM AND PARESIA OF LIMBS AS A CONSEQUENCE OF THE COMPRESSION OF NERVES.

THE REASON TO CARRY OUT THE PRESENT WORK WAS TO FIND OUT AN ALTERNATIVE WAY FOR THE ANAESTHETIC OF PERONEUS NERVE, IN ORDER TO CUT OUT SENSITIVITY IN FOOT REGIONS, ADDING TIBIAL NERVE’S AND IN THIS WAY, STATION IS NOT AFFECTED BY THE ISQUIATIC NERVE BLOCKADE.

TO GET THIS, WE MADE DISSECTIONS IN 27 BOVINE LEFT PELVIAN LIMBS OF DIFFERENT BREEDS, AGES AND SEX. THE RIGHT PELVIAN LIMBS OF THESE ANIMALS WERE DESTINED TO INJECTION TESTS OF COLOURED SUBSTANCES, SIMULATING THE INJECTION OF THEANAESTHETIC.

WHEN THE DISSECTIONS OF THE NERVOUS TRUNKS, MADE WITH THE TECHNICS AND INSTRUMENTAL OF ROUTINE, WERE FINISHED, WE ESTABLISHED THE ANATOMIC REFERENCE POINTS. THE CRITERA WE USED TO ACCEPT THEM OR RULE THEM OUT WAS:

a. SLIGHT RISK TO THE OPERATOR.
b. VISIBLE OR FEELING STRUCTURES.
c. REACH, WITH A UNIQUE INOCULATING POINT, THE ANAESTHETIC OF THE WANTED REGION.
d. NOT BEING FORMING AN IMPORTANT VASCULONERVOUS PACKET.
e. BEING AWAY FROM ARTICULAR CAVITIES.

FOR THIS WORK WE USED 5 ADULT BOVINES OF 5 YEARS OLD, IN WHICH WE MADE THE TECHNIC IN STATION. TO MEASURE THE ALGUESIA OF THE FOOT, WE MADE TESTS OF PUNCTION IN THE LIMB, WITH NEEDLES AND TWEEZING WITH SURGERY INSTRUMENTS.
METACARPAL AND METATARSAL FRACTURES IN CATTLE (TWO CASE STUDIES)

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Limb fractures are not uncommon in cattle and it is frequent that owners request veterinary practitioners for fracture repair nowadays in our country. Some limb fractures can be successfully managed with external fixation with casts. A case of comminuted open metacarpal diaphysis fracture in a 1 week old Holstein Friesian (HF) calf and closed metatarsal distal metaphysis fracture in first lactation Simmental (SL) cow is described in the case study. We used full limb fiberglass fabric cast without splints in the first case and full limb fast bandage water resistant plaster cast with two splints in the second case. The calf had to be recasted after 2 weeks for another 4 weeks because of a large cortical sequester formation. After the treatment the HF calf completely recovered and already has a calf of her own. About 4 weeks after casting, the SL cow escaped from the stanchion and fell down the steep river gorge inclination. When we recasted it a week later, we discovered a draining tract at the site of fracture and instability of the fracture. Antibiotic therapy was implemented at that time. The cast was removed after 5 weeks and fracture site was stable. Both cows were x-rayed, HF almost 2 years after fracture and SL about 6 months after fracture. Some deformities of bone without signs of osteomyelitis were visible on the x-ray images of healed fractures which also speak about the extent of fractures in both cases. HF cows is mildly lame and SL cow moderately lame currently. We encourage practicing veterinarians to treat metacarpal and metatarsal fractures with external fixation with cast especially in calves because results of this treatment can be very favorable and treatment is not expensive.

FIELD TECHNIQUE FOR DISTAL INTERPHALANGEAL JOINT RESECTION AND PROXIMAL DEEP DIGITAL FLEXOR TENDON RESECTION

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Abstract

A modified technique for distal interphalangeal (DIP) joint resection and proximal resection of the deep digital flexor tendon (DDFT) is described for field surgery as a treatment of septic arthritis of the DIP joint and ascending tenosynovitis of the DDFT. Practitioners under field conditions do not usually perform arthrodesis. This results in cows that could have been salvaged being culled or treated with digit amputation. It is generally believed that arthrodesis surgery is superior to digit amputation for the treatment of septic arthritis of the DIP. Therefore, an arthrodesis procedure, which is rapid, requires little specialized tools, and minimal post-operative care would be beneficial. Four cows were diagnosed with ascending tenosynovitis during DIP joint resection and also had proximal resection of the DDFT tendon performed. A heel approach was used to remove the navicular bone and curate the DIP joint. A hole was drilled through the DIP joint and drains were placed through the hole and incision. The incision was sutured and a block placed on the sound claw. Cows with ascending tenosynovitis had the DDFT removed through an incision made proximal to the dewclaw. All animals remained moderately to severely lame for two weeks post operatively but quickly recovered and normal gait was observed in all animals by 5 months post surgery. At the end of the follow up period, which was eight months after the last surgery was performed; only one cow was culled, but only after 321 days post arthrodesis surgery, for reproductive failure. The average days-since-arthrodesis-surgery for the seven surviving cows was 308 days with the range of 235 and 392 days. This procedure should be considered as a treatment option for animals that are presented in the field with a septic process involving the DIP joint with or without ascending tenosynovitis of the DDFT tendon.
ULTRASONOGRAPHIC DIAGNOSIS OF FIBRINO PURULENT ARTHRITIS OF THE COFFIN JOINT IN CATTLE

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Introduction
The clinical diagnosis of the fibrinopurulent arthritis of the coffin joint (FACJ) is often difficult. Especially in cases with covered injuries or inflammation of the corium, paracentesis of the joint is necessary to arrive at an accurate diagnosis. Not always is it possible to extract synovia. Here, the ultrasonographic examination is a valuable diagnostic procedure.

Objective
The aim of this study was to examine whether FACJ is characterised by definite ultrasonographic findings and whether ultrasonography is a means to achieve a precise diagnosis.

Study design
60 Holstein-Friesian cows suffering from FACJ were examined by ultrasonography (7.5 MHz, linear probe). FACJ was confirmed clinically, arthrocentesis, radiographically, and surgically. As controls served the partner claws of affected claws and claws from 18 healthy HF cows. Studied parameter were dimensions of the joint cavity, and echogenity and flow phenomena of the contents of the dorsal pouches (DP). Results were evaluated statistically by SAS by means of parametric and non-parametric tests, calculating sensitivity and specificity of test results and using receiver operating characteristics to determine threshold values.

Results
Quality of ultrasonographic images was characterized as good in 64%, as moderate in 30%, and as poor in 5% of examined joints. Echogenity of the content did not differ between arthritic joints and joints of the partner claws (p > 0.05). Flow phenomena could be triggered in 18 DP of arthritic coffin joints (30%), yet they were not present in 42 DP of arthritic coffin joints (70%). None of the partner claws showed flow phenomena in the joint cavity. Compared to healthy coffin joints, the size of DP was larger in arthritic joints (p < 0.001). This parameter presented the highest sensitivity and specificity for the diagnosis of FACJ.

Conclusion
The ultrasonographic examination of the coffin joint is an appropriate non-invasive method to prove arthritis. The echogenic quality of the content of the pouches does not lead to an accurate diagnosis. Flow phenomena are a definite sign of arthritis, yet sensitivity is low. The crucial finding to prove arthritis is an enlarged DP of the coffin joint.

Normal Radiographic Evaluation of Manus and Pes in Camel

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Objective: To define normal radiographic evaluation of manus and pes in different positions in camel. Description of number, shape, size, position and density of the bones of fore and hind limb and also measuring the ratio between bone cortices and bone diameter (C/D) of metacarpal/metatarsal bones at the just proximal to their bifurcations and at the point that the cortices get parallel (mid shaft region), C/D of lateral and medial first phalanges of fore and hind limb at the middle of diaphysis.

Procedure: This study was conducted on 12 fore and hind limbs of adult Iranian one humped camel. Different Radiographs in different positions were taken. Then the number, shape, size, position and density of the bones of fore and hind limb were described and finally The ratio between bone cortices and bone diameter (C/D) of metacarpal/metatarsal bones at the just proximal to their bifurcations and at the point that the cortices get parallel (mid shaft region) were measured. C/D of lateral and medial first phalanges of fore and hind limb at the middle of diaphysis were measured too. This ratio could be used for evaluation of probable metabolic and nutritional disorders if occur.

Results: This study showed that the Carpal and Tarsal joints of camel consist of 7 and 6 bones respectively. The metacarpal/metatarsal bones consist of a large bone which is made from 3rd and 4th metacarpal bone (Mc 3+4) and there is no small metacarpal bone in camel. In the digits, medial digit is shorter than lateral digit and the longest and biggest phalanx is P1. Two pairs of sesamoid bones are located at palmar/plantar aspect of the distal metacarpal bone and there is no distal sesamoid bone in the palmar/plantar aspect of the distal interphalangeal joint. The same as Metacarpal bone, the metatarsal bone consist of a large bone which is made from 3rd and 4th metatarsal bone (Mc 3+4) and there is no small metacarpal bone in camel. In this study, the ratio between bone cortices and bone diameter (C/D) of metacarpal/metatarsal bones at the just proximal to their bifurcations and at the point that the cortices get parallel (mid shaft region) were measured. This ratio was measured in the mid shaft region of the lateral and medial first phalanges of fore and hind limb too.
CASE REPORT OF ECONOMICAL IMPACT OF CALCIUM DEFICIENCY ON FATTENING BULLS

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By mistake, animals in one Finnish feedlot farm received for six months only 60-70\% of the recommended calcium intake, while simultaneously receiving twice the amount of phosphorus recommended. Thus, the Ca/P ratio was severely distorted. Hazard in mineral supplementation was revealed when four fattening bulls were euthanized because of severe lameness and 15\% of other animals on the farm were having clinical lameness. Due to grouping the animals depending on the time of their arrival to the farm it was possible to identify three groups: two exposed and the control group (15 bulls) with balanced mineral diet. On exposed groups mineral deficiency happened at different growth phases; group 1 (20 bulls) had mineral imbalance from the age of 9 to 15 months, group 2 (16 bulls) received imbalanced minerals from the age of 4.6 to 11.6 months.

Leg bones were removed at the abattoir. Osteochondrosis (OC) lesions were abundant; over 80\% of the animals in groups 1 and 2 had at least one severe OC lesion. Even in the control group 30\% of animals had at least one severe OC lesion. Lesions in the trochea of the femur were particularly easy to identify and measure.

The hazard yielded to obvious economic losses. At least six animals were euthanized or sent to the slaughterhouse earlier than planned due to acute lameness. Because of differences in net weight gain per day in different groups and in carcass classification on the EUROPe system, animals in control group produced 20\% better income than animals in group 2 and over 30\% more money than animals in group 1.

DEVELOPMENT OF A LOCOMOTION SCORING TOOL FOR DESKTOP AND PDA APPLICATIONS

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Lameness identification is the first step in reducing this insidious disease. Locomotion scoring has proven to be an integral tool in the identification of lame cows. Easy identification of lame cows, recording of locomotion scores and the subsequent calculation of an economic impact is needed to heighten producer awareness. A software package was developed to allow trained observers to quickly locomotion score large groups of cows and then generate reports summarizing the scores with estimates of the economic impact of lameness on lost milk revenue and total cost of clinically lame cows (score 4 & 5).

The software was designed to run on personal computers with Microsoft Windows 2000 or later and PDA’s running Windows MobileTM 5.0 or later. Both versions run visually identical products that generate interchangeable reports. The software allows a user to input information for up to eight groups at one time. Group information recorded includes group name, number of animals, milk yield and locomotion scores of the animals within the group.

Locomotion scores are quickly recorded on the PDA by simply tapping the appropriate score on the screen. Herd information required includes milk price, average cost of dairy replacements, average cull cow value, cost per day not pregnant, lame cow treatment cost/hd and additional labor charges. A summary report includes estimates of lost milk revenue and total cost of clinically lame animals by group and herd. The PC version produces the printed report in addition to histograms for each group and the herd indicating the percent of cows in each locomotion score (1 to 5). This software may be beneficial in recording whole herd incidence of lameness and as a means of evaluating changes in housing, feeding and management and establishing the impact of lameness on herd profitability.
EFFECT OF FOOTROT ON FEEDLOT CATTLE PERFORMANCE


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Performance records of 7,132 steers from the U.S. Meat Animal Research Center feedlot (1993 through 2000) were analyzed to evaluate the impact of footrot on average daily gain (ADG) and total days on feed (DOF). A total of 459 steers were identified as having a single footrot incidence and no additional morbidities. Time of footrot diagnosis was assigned to one of three production periods; starting (0 to 60 d; n=75), growing (61 to 120 d; n=215) and finishing (121 d to harvest; n=169). Data were analyzed using the General Linear Models Procedure of SAS. Onset of lameness period (starting, growing or finishing), ADG and DOF were evaluated as dependent variables. Cattle with a single footrot incidence had lower (P=0.03) ADG, 1.27 kg, compared to non-affected cattle, 1.30 kg. Total DOF increased (P<0.01) from 262 to 267 d for cattle diagnosed with footrot. The production period of footrot onset impacted both ADG and DOF. Steers diagnosed with footrot during the starting period gained 0.032 kg per day more (P=0.083) than non-affected steers, and DOF were decreased (P<0.01) 9.9 d. During the growing period, ADG and DOF were similar for affected and non-affected steers. Steers diagnosed with footrot during the finishing period gained 0.049 kg per day less (P<0.01) and DOF were increased (P<0.01) 14.3 d. Footrot can increase production costs due to lower ADG, more DOF and treatment expense. Onset of footrot in later periods appeared to have greater impact than cases occurring during the starting period.

BEEF FEEDLOT LAMENESS DIAGNOSIS AND MANAGEMENT EDUCATIONAL POSTER

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Lameness is estimated to affect over 1.5 million beef cattle yearly in United States feedlots. Annually, the leading cause for culling feedlot cattle reaches approximately 250,000 head; of which the majority is due to lameness. Over 90 percent of observed lameness is located in the feet. The majority of foot problems affects the soft tissue of the interdigital space, or develops into infections inside the claw that started as abrasions at the anterior juncture between the claw wall and sole (white line). In addition to footrot and toe abscess, remaining causes of lameness include septic joints, foot injury, upper leg injury and laminitis. Early detection, correct identification and administration of effective treatments by cattle caretakers are critical to minimize economic losses due to lameness. Future losses may also be decreased through prevention. To help feedlot employees responsible for animal care, an educational poster was designed to help them identify, treat and prevent foot problems in beef feedlot production facilities. The chute-side poster contains photographs and descriptions that address six primary causes of lameness in feedlot cattle. In addition, a presentation has been developed for use by veterinarians to aid in training cattle caretakers to properly respond to lame cattle and consider preventative measures as applicable for each lameness type. Emphasis of the educational materials is to allow cattle caretakers to rapidly identify the correct cause of lameness and properly initiate care.
DEVELOPMENT OF HOOF PATHOLOGIES IN DAIRY CATTLE WITH AND WITHOUT ACCESS TO PASTURE

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Hoof pathologies are a major concern in dairy production and lameness is considered to be one of the top three reasons for involuntary culling of lactating dairy cattle. The aim of this study was to test the effect of a period of access to pasture before calving, versus continuous freestall housing, on the incidence of sole lesions, dermatitis and heel erosion in dairy cattle during the months that follow calving. The hind hooves of all animals were scored for severe sole lesions, dermatitis and heel erosion pre-calving (200 to 0 days prior to calving), in early lactation (0 to 100 DIM), and in mid-lactation (100 to 200 DIM). Over the course of the study, 41 out of 57 animals were diagnosed with severe lesions, 39 out of 57 animals were diagnosed with dermatitis, and 50 out of 57 animals were diagnosed with severe heel erosion. Multiparous cows were more affected by severe sole lesions than were primiparous animals during the pre-calving period (32 vs. 0 %) but not the mid-lactation period (37 vs. 63 %). Cows housed continuously in freestalls tended to be more affected by dermatitis than were pasture animals in both early lactation (53 vs. 32 %) and mid-lactation periods (41 vs. 24 %). There were no other effects of the pasture treatment. These results indicate that a period of access to pasture before calving, alone, had only minor effects on hoof health, and suggest that together with pasture, other approaches are necessary to address these common pathologies in dairy cattle.

A POST-MORTEM RADIOGRAPHIC STUDY OF THE DIGITS OF BOVINE RAISED IN NATURAL GRAZING ENVIRONMENT

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Healthy hooves are of the utmost importance for bovine performance and economical production. In order to describe radiographic features of feet, ninety male bovine digits, including metacarpophalangeal (metatarsophalangeal) joints, were radiographed using dorsopalmar (dorsoplantar) and lateromedial views after clinical examination. Twenty digits had not apparent injuries and seventy had different external injuries. Limbs had been gotten in slaughterhouses. The results were evaluated by means of frequency distribution. The most frequent clinical disorders was hardship groove (47%), pododermatitis septic (38,5%) and inflammation of coronary band by Tunga penetrans (27,1%). Others lesions observed were erosion of heel, ulcerative digital dermatitis and interdigital dermatitis being, each one, in 25,7% of the cases. A proliferative digital dermatitis and abnormalities of the claws occurred in 20% and interdigital hyperplasia in 10% of cases. Radiographic examination revealed that osteitis (58%), aseptic physisis (32%) and periostitis (31%) were the predominant changes. Soft tissue swelling (26%) was present, with or without multiple foci of gas. Calcification of the proximal insertions of the cruciate ligaments accounted for 18% and septic arthritis (12%) of cases. In a radiographyc exams of 90 limbs, no one alterations was observed 12,2% of this. However, all the twenty feet without external injury presented radiographyc alterations such as aseptic physisis and osteitis (65% each), periostitis (25%) and calcification of the distal insertions of the cruciate ligaments (20%). From 70 limbs with external lesion nine had radiographyc alterations such as inflammation of coronary band by Tunga penetrans (89%), hardship groove (45%), septic pododermatitis (33,5%) and erosion of heel (33,5%). It is conclude that the radiographyc examination was important to establish the relation between the external and internal exposure of the digits and thus to consider more adequate prognostics and treatments aiming to minimize costs and to prevent premature animal discardings.
PRODUCTIVE AND REPRODUCTIVE ASPECTS OF CROSS-BREED FEMALE BOVINES (GIR X HOLSTEIN) WITH DIGITAL DERMATITIS

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Introduction
Bovine digital dermatitis is considered one of the main economic and productive barriers to the cattle breeding and lead to corporal score and milk production decrease, premature culling, high treatment cost and reproductive performance interference. According to PEELER et al. (1994), the will to ingest food, destined for the cow’s production and maintenance, can be reduced due to digital disease, which also can lead to anestrous. Additionally, SHELDON (1997) described that disorders of bovines’ distal limb extremities are considered important stressing factors. Thus, decrease on the fertility and pregnancy rates are reported. PESCE et al. (1992) affirmed that a female bovine owning digital disease may present about 5-20% milk production decrease during total lactating period. According to the relates of NOCEK (1993), additionally to the corporal score loss, reproductive performance interference occurs. The aim of this study was to evaluate productive and reproductive aspects of female bovines (Gir X Holstein) with digital dermatitis.

Material and Methods
This study was developed in a single breeding farm on Goiás State, Brazil, during 12 months, when the productive and reproductive behavior were evaluated in 30 female cross-breed bovines (Gir X Holstein), between 26 and 96 month-old. The animals were included in the experiment right after the parturition. The bovines were divided in two groups (GI and GII) of 15 animals. The group GI was composed by bovines with erosive or verrucosa digital dermatitis and the group GII, by clinically healthy animals. The service period, visible signs of estrous, presence of ovarian follicle or cyst, cervix dilatation, vaginal mucus secretion, valvular alterations such as hyperthermia and intumescence, symmetry and consistency of the uterine horn and presence or not of fetus. The obtained results were evaluated descriptively.

Results and Discussion
Among the bovines from GI, three (20%) presented, approximately, 140 days of service period, two (13,3%) 180 days, four (26,6%) 260 days, two (13,3%) 320 days and four (26,6%) did not revealed estrous. In two of them, ovarian cyst was diagnosed. In this group, seven animals (46,6%) presented smooth ova and flaccid uterine horn, especially by the evaluation on day 240 after parturition, and nine (60%) got pregnant after a mean of 2,1 services per animal. From all non-pregnant female bovines from this group, placenta retention was diagnosed in two (13,3%) and metritis in one animal (6,6%). The mean service time of the bovines from GII was 114 days, which five (33,3%) showed estrous between 130 and 210 days. In only two bovines (13,3%), no pregnancy was confirmed and in one of them (6,6%), the uterine horns were flaccid and the ovaries were smaller and absent of follicles. In the other one, the first estrous occurred after 150 days of parturition, however it was observed a total of six estrous reoccurrence at the following months. In this case, it was attributed to placenta retention and posterior metritis after distocic parturition. According to relates of GRUNERT & BERCHTOLD (1995), placenta retention in bovines leads to the establishing of purporeal metritis. NILSSON (1963) affirmed that histamine in metritis uterine environment due to placenta retention may lead to laminitis. BOOSMAN et al. (1991) added that endotoxines produced in these cases are related to the etiopathogeny of digital disorders. The bovines from GII were given 1,4 services per animal to get pregnant. For RAMOS et al. (2001), there is significant difference related to the mean time between parturition and new pregnancy, fertility rate after first service and the number of animals destined to culling, when compared clinically healthy bovines to digital dermatitis owners. Among the animals from GI, three (20%) cases of subclinic mastitis were diagnosed and in one (6,6%) there was clinic mastitis. In the animals from GII, this disorder was diagnosed in only two (13,3%) in subclinic form. According to PEELER et al. (1994), there is an association between digital infirmities and mastitis, however they have not revealed its score. The production was 13% lower in GI and inferior corporal scores in the bovines were also observed. Although, SILVA et al. (2004) showed that factors such as different cattle managing systems in distinct breeding farms also influenced on the appearance of digital disease additionally to clinic mastitis and metritis. The bovine digital dermatitis interferes negatively on the productive and reproductive behavior of cross-breed female bovines.

Key words: estral cycle; digital disease; bovines; service time.

References

PHENOTYPIC AND GENETIC RELATIONSHIP BETWEEN CLAW DISORDERS, PRODUCTION AND OTHER HEALTH TRAITS IN DAIRY CATTLE

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The study is based on data of 5634 Holstein cows kept in 9 large-scale dairy farms in Eastern Germany. If a cow had the health problem in one or both rear legs, she was given a score of 1, otherwise she was given a score 0. Production traits were averaged from the first two test days of cows after calving. This was done to define the production level in early lactation. Because disorders were treated as binary traits, logistic models were applied for statistical and genetic analysis. Incidences disregarding repeated measurements for digital dermatitis (DD), sole ulceration (SU), wall disorder (WD) and interdigital hyperplasia (IH) in rear legs were 13.2%, 16.1%, 9.6% and 6.3%. Estimates of heritability were 0.073 for DD, 0.086 for SU, 0.104 for WD and 0.115 for IH. Genetically, health problems appear to occur in clusters, i.e. a cow showing one disease has an increased genetic risk to show another claw disease. This phenomenon was also observed between claw and foot disorders and the somatic cell score. High milk yield in early lactation stratified for different parities was also associated with higher incidences for claw disorders on the phenotypic scale (P<0.05). Genetic correlations between milk yield in early lactation and disorders were 0.240 for DD, 0.057 for SU, 0.270 for WD, and 0.336 for IH indicating a physiological antagonism. Correlations between breeding values for claw disorders of bulls and official breeding values for functional type traits were mostly favorable.

In conclusion, routine recording of claw data will be a new chance to improve claw health within the population as was elaborated by different scenarios applying selection index procedures.
In dairy herds receiving regular routine visits from a hoof-trimmer, it becomes challenging keeping track of lesion and treatment records for individual cows. In particular, it is common for trimmers to see a few chronically lame cows repeatedly at each visit, with no history of treatment.

In order to facilitate management of TRIM and LAME events, a system was developed in DairyComp305.

LAME cows are recruited using locomotion scoring. In small herds, all of the cows are scored routinely every 1-2 months. In large herds, a herdsman identifies cows with abnormal gait by walking 1-2 pens each week. TRIM cows are recruited based on stage of lactation. Typically, heifers are trimmed 30 days prior to first calving, mature cows are trimmed at dry off and at around 110-160 days in milk. The remark line of the LAME and TRIM event is used to store the predominant lesion affecting the cow, the limb(s) affected and the treatment (block or wrap).

An event called FOOTREMARK is used to identify those cows with severe lesions and hoof blocks for recheck after 30 days. Cows receiving more than three LAME events at intervals of 30 days or more are examined and designated '90 day cows' if they require frequent trimming to prevent problems occurring, or they are culled if an incurable lesion is identified. 90 day cows are usually housed in the pen closest to the parlor.

By isolating lame events from routine trim events we are able to track the relative frequency of both types of event, the timing of the first LAME event by lesion type, the frequency of re-treatment for the same lesion, and identify cows with chronic abnormal gait, so that they can receive the attention that they need, when they need it.

These trends can be used to help identify risk factors for lesion development and assist the herd in developing an effective lameness prevention program.
The Impact of Free Stall Remodeling on Milk Production and Lameness

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This study aimed to demonstrate improvements in health and productivity as a result of improved cow comfort.

Free stalls were remodeled in a three times a day milked, TMR fed, 300 cow Holstein dairy herd, housed in a 6-row barn with drive through feeding. The original stalls were 44 inches wide on center, with 32 inch interior diameter divider loops mounted on transverse mounting bars. Neck rails were mounted 43 inches high and 63 inches horizontally from a line directly above the rear lip of the curb. The stall surface consisted of a rubber crumb filled geotextile mattress, and the surface was bedded three times a week with sawdust.

In February 2003, stalls in three mature cow pens were widened to 48 inches on center, and the neck rails moved forward to 70 inches from the rear curb along the horizontal. The first lactation heifer pen was left unchanged.

Mature equivalent (ME) 305 day milk production estimates were made by parity for the subsequent 2 years. The herd was visited by a hoof trimmer each month for routine trimming at dry off and in mid-lactation. The frequency of cows wrapped for digital dermatitis infection and hoof blocked for the treatment of claw horn lesions at each visit was monitored.

First lactation heifer ME305 milk data increased by 1.8% and 4.2% in year 1 and year 2 respectively. In comparison, second lactation ME305 increased by 8.1% in year 1 and 7.2% in year 2. Third lactation ME305 improvements were even more pronounced with a 12.1% improvement year 1 and 10.5% in year 2. The frequency of cows being blocked fell from around 17% cows trimmed to less than 5%.

Improvements in cow comfort appear to improve the health and productivity of older mature cows by reducing the prevalence of lameness requiring hoof block treatment.

Effects of Pain Due to Lameness on Feeding and Standing Behaviour in Dairy Cattle: Responses to Ketoprofen

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The non-steroidal anti-inflammatory drug ketoprofen has been shown to improve gait in lame dairy cattle. Our study was designed to assess if this treatment also resulted in changes in eating and standing behaviour.

We used a switchback design (each cow was her own control), testing 46 cows assigned to either 3 or 6 d of treatment with ketoprofen (3 mg/kg IM, balanced for initial gait score, DIM, parity, projected 305-d milk). The 3-d and 6-d treatment groups had 13 and 15 cows, respectively. Individual cow feeding and drinking behaviour were monitored electronically. Standing behaviours were monitored using video. Individual daily milk production was also recorded. In addition to the treatment phase, all cows were monitored 3 d pre-test and 3 d post-test to generate one baseline value per cow. Lame cows lay down less often (7.91±0.40 versus 9.77±0.51 number/d; P=.006), spent less time lying down (557.4±19.80 versus 626.7±24.71 min/d; P=.03), and spent more time standing partially in the stall (39.5±7.25 versus 20.8 ± 9.05 min/d; P=0.005) than sound cows. Lame cows were also higher milk producers than sound cows (40.2±1.34 and 35.1±1.68 kg/d; P=0.02) and consumed more feed (24.5±0.49 and 23.0 ± 0.61 kg DM/d). During the treatment phase cows spent more time drinking (24.2±2.20 and 21.7±2.20 kg/d; P=0.01), and tended to spend less time standing partially in the stall (27.6±5.97 and 32.6±5.97 min/d; P = .08) compared to baseline. However, there was no effect of treatment on other behaviours or on measures of intake or milk production. In summary, although treatment with ketoprofen resulted in some modest improvements in drinking and standing behaviour, this treatment has little beneficial effects on other behaviours of lame dairy cows.
LOCOMOTORY BEHAVIOUR IN DAIRY CATTLE: IMPLICATIONS OF WALKING SURFACES FOR CLAW LOAD AND LOCOMOTION.

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Introduction
Lameness cause serious animal welfare problems in terms of pain, discomfort and restricted behaviour. New floors have come available, designed to promote good locomotory health in dairy cattle and here the impact of such floors was evaluated.

Material and Method
We monitored locomotory functions of 72 HF loose housed cows that were kept on four different floors for a period of 24 weeks. A conventional concrete slatted floor (SC) was compared with floors of profiled solid cement (PC), slatted rubber (SR) and solid rubber (FR). In weeks 0, 6, 12, 18 and 24 the cows gaits were monitored with a pressure distribution plate (RsScan International, Olen, Belgium). Claw loadings (sampling rate of 175 Hz, sensor sizes of 0.5 x 0.76 mm), were recalculated into a set of parameters and analyzed with Restricted Maximum Likelihood type analyses using ASReml. Fixed effects in the model included parity and weeks on floor x type of floor. Random effects accounted for repeated measurements, both in time and for legs of one cow.

Results and Discussion
On average the cows exerted 2574 ± 113 N of force to the front limbs and 2370 ± 113 to the hind limbs. The ratio between hind and front limbs forces on PC, SC and FR (but not SR) increased in time. It seems that cows developed a locomotion pattern of exerting more weight to the hind limbs to generate sufficient propulsive force. At week 24, the claw area that touched the floor during a step was relatively large for cows on SC floors. At rubber, a distinct weight-bearing wall developed, while on SC cows had overgrown hooves, likely due to its abrasive character. Insufficient traction seem to cause that cows transfer more of their weight to the hind limbs, which are relatively prone to disorders anyway.

EFFECTS OF PAIN DUE TO LAMENESS ON COW GAIT: A DOSE-DEPENDENT RESPONSE TO KETOPROFEN

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Abstract
Changes in gait of lame cows are thought to be due in part to pain experienced while walking. The aim of this study was to identify which specific gait behaviours are associated with pain by recording changes in behaviour when a pain-relieving non-steroidal anti-inflammatory drug (NSAID) was administered. Cows (n=24) were randomly assigned to dose (0.3, 1.5 & 3 mg/kg IM), balancing for initial gait score. The experiment consisted of 3 phases: before, during and after ketoprofen treatment, each phase lasting 3 days. Cows were video recorded while walking along a 9 m corridor every day. Overall gait (scored 1-5), and specific gait behaviours (back arch, head bob, reluctance to bear weight, asymmetric steps, tracking-up, and joint flexion; each evaluated on a 100-unit continuous scale) were assessed from video. Observations were averaged to form one value per cow for treatment and baseline (mean of before and after) phases. The effect of treatment was evaluated by calculating the difference between treatment and baseline values. Differences were tested using a general linear model that included ketoprofen dose as a continuous effect. Overall gait showed a modest improvement due to ketoprofen (0.2 ± 0.04 at 3 mg/kg; P<0.005). A similar dose-dependent improvement occurred for tracking-up (12 ± 2 at 3 mg/kg; P<0.005). A similar dose-dependent improvement occurred for tracking-up (12 ± 2 at 3 mg/kg; P<0.005), but other specific gait behaviours showed no response to the ketoprofen. This study indicates that tracking-up may be particularly useful in recognizing pain mediated changes in cattle gait.
INFLUENCE OF LYING TIME ON THE DEVELOPMENT OF CLAW HAEMORRHAGES IN DAIRY COWS

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The first weeks after calving are a critical period for the health and welfare of dairy cows. We investigated the influence of lying time early in lactation on the development of claw haemorrhages during the first three months after calving.

Twenty-nine Canadian Holstein-Frisian cows were housed in sand-bedded cubicles with solid concrete passages. Lying time was recorded using data loggers and instantaneous scan sampling from video. Lying data were pooled for every week after calving and Spearman correlations calculated with claws scores one, five, nine and 13 weeks after calving.

Lying time during weeks 1 and 2 was negatively correlated with haemorrhage scores at 9 and 13 weeks. The highest correlations were between minimum daily lying times in weeks 1 versus severe haemorrhages in week 9 (rS=-0.498, p=0.026, n=20) and minimum daily lying times in week 2 and severe haemorrhages in week 13 (rS=-0.611, p<0.001, n=29). For example, cows with an average 2.1 ± 1.3 severe haemorrhages at 13 weeks had daily minimum lying times of 7.3 ± 2.1 hours/24h in WIM 1 (n=18), while cows with no haemorrhages at 13 weeks in the same period had minimum lying times of 10.2 ± 2.2 h/24h (n=11).

These results confirm the importance of low lying times in the postpartum period as a risk factor for haemorrhage development.

GROWTH, WEAR AND NET GROWTH OF CLAW HORN AND CLAW HEALTH ON RUBBER MAT FLOORING COMPARED TO CONCRETE FLOORING IN DAIRY COWS

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Introduction
Rubber mat flooring is expected to improve claw health in indoor kept dairy cows. However, it can be expected that growth, wear and thereby net growth of claw horn is affected by changing flooring conditions.

Objective
Aim of the study was to examine net growth, horn hardness, claw conformation, performance data and incidence rates of claw diseases of dairy cows kept either on rubber mat or concrete flooring.

Study design
Prospective; Observation period was 1.5 years. Experimental animals: 100 German HF cows of a research farm kept in a free stall with cubicles and slatted concrete flooring were split into two groups of equal size. Cows were matched by lactation number, performance in previous lactation and stage of lactation.

Housing: The control group was kept continuously on same slatted concrete floor. For the test group half of the same barn was covered by commercially available rubber mats.

Feeding: Both groups were fed same conventional TMR ration based on corn and grass silage, concentrate, mineral, vitamin and trace element supplements.

Functional claw trimming in all cows was performed before cows were moved to rubber mats and in the further course biannually. Parameter obtained: Claw horn growth and wear by setting different measuring points, net growth calculated, claw conformation, shore D, records of incidence and severity of claw disorders, milk yield, milk constituents, and fertility data.

Statistics were calculated by SAS.

Results
Compared to controls kept on concrete following significant results were obtained in test cows: decreased horn growth, decreased wear, increased net growth, increased concavity of dorsal wall, increased sole angle, decreased Shore D at sole horn, increased incidence of Limax, digital dermatitis and white line / lateral wall defects. Other claw diseases occurred in equal frequency in both groups. No group differences were found in milk performance and fertility data.
THE EFFECT OF THE 2001 FMD OUTBREAK ON RATES OF TREATMENT FOR LAMENESS OF UK DAIRY CATTLE

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Background
One area of concern during the 2001 FMD outbreak was that movement and access restrictions would increase lameness, due to less culling and reduced veterinary treatment. This paper uses the NADIS database to assess the effect of FMD on veterinary treatments for lameness.

Materials and methods
The mean number of monthly NADIS reports and lameness reports were collated for 2001 and for the years 1997-2004 excluding 2001 from veterinary field diagnoses. These data were then compared using confidence intervals for data outwith 2001.

Summary
All but two of the ten months following the outbreak had total reports below the 99% confidence interval for the same months in 1997-2004 (excluding 2001). The impact on lameness treatments was less marked; only four months had totals outwith the 99% confidence interval. The percentage of NADIS cattle reports which involved lameness was higher in 2001 (15.4%) than in any other year.

For the three main causes of lameness (white line disease, sole ulcer, and digital dermatitis) report totals were lower in 2001 than 2000, but higher than 2002. Sole ulcer treatment rates (2.8% of all cases) were higher in 2001 than any other year. The proportions of lameness cases which were sole ulcer or white line disease were higher in 2001 than 2000, whereas those of digital dermatitis or foul-in-the-foot were lower.

The number of lame cows treated in 2002 (5014) were less than that treated in 2001 (5095).

Conclusions
3) Although FMD had a significant impact on veterinary input on farm, the impact was less for lameness than for overall veterinary input
4) Claw horn disease treatment was prioritised compared to infectious disease treatment.
5) Lameness did not increase after FMD, suggesting that the FMD outbreak did not result in an increased number of untreated lame cows that were not culled.

Animal welfare
ULTRASONOGRAPHIC DIAGNOSIS OF FIBRINOPURULENT ARTHRITIS OF THE COFFIN JOINT IN CATTLE

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Introduction:
The clinical diagnosis of the fibrinopurulent arthritis of the coffin joint (FACJ) is often difficult. Especially in cases with covered injuries or inflammation of the corium, paracentesis of the joint is necessary to arrive at an accurate diagnosis. Not always is it possible to extract synovia. Here, the ultrasonographic examination is a valuable diagnostic procedure.

Objective:
The aim of this study was to examine whether FACJ is characterised by definite ultrasonographic findings and whether ultrasonography is a means to achieve a precise diagnosis.

Study design:
60 Holstein-Friesian cows suffering from FACJ were examined by ultrasonography (7.5 MHZ; linear probe). FACJ was confirmed clinically, arthrocentesis, radiographically, and surgically. As controls served the partner claws of affected claws and claws from 18 healthy HF cows. Studied parameter were dimensions of the joint cavity, and echogenity and flow phenomena of the contents of the dorsal pouches (DP). Results were evaluated statistically by SAS by means of parametric and non-parametric tests, calculating sensitivity and specificity of test results and using receiver operating characteristics to determine threshold values.

Results:
Quality of ultrasonographic images was characterized as good in 64%, as moderate in 30%, and as poor in 5% of examined joints. Echogenity of the content did not differ between arthritic joints and joints of the partner claws (p ≥ 0.05). Flow phenomena could be triggered in 18 DP of arthritic coffin joints (30%), yet they were not present in 42 DP of arthritic coffin joints (70%). None of the partner claws showed flow phenomena in the joint cavity. Compared to healthy coffin joints, the size of DP was larger in arthritic joints (p < 0.001). This parameter presented the highest sensitivity and specificity for the diagnosis of FACJ.

Conclusion:
The ultrasonographic examination of the coffin joint is an appropriate non-invasive method to prove arthritis. The echogenic quality of the content of the pouches does not lead to an accurate diagnosis. Flow phenomena are a definite sign of arthritis, yet sensitivity is low. The crucial finding to prove arthritis is an enlarged DP of the coffin joint.
INCIDENCE OF HOOF PROBLEMS IN FIVE SHEEP FLOCKS IN THE FIRST PLATEAU OF THE STATE OF PARANA - BRAZIL.

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The first plateau in Paraná State, the sheep raising has been practiced in small flocks, explored in an intensive way, thus the hooves problems that take to the lameness and to the reduction of the productive performance, consequently, are a concern for the owners and veterinarians. The aim of this study was to identify the trimmed more frequent problems in this region of Paraná State, in spring and in the summer seasons. Five flocks at the average of 80.4 animals had been used in spring and 70.6 in the summer, each season at a time, all sheeps of each property had its hooves examined and the alterations written down in proper files, following the methodology described by RIMBAUD, E. The examination showed that 21.63% of the animals had presented some type of alteration, which 18.15% in spring and 25.77% in the summer. The main problem was the extreme growth of hoof, representing 95.73%, the incidence of this problem in spring was 97.26% and in the summer it was 94.5%. The animals that had presented evident lameness had been 2.24% of the total amount examined in the two seasons, which 1.49% in spring and 3.11% in the summer. The main problem was the extreme growth of hoof, representing 95.73%, the incidence of this problem in spring was 97.26% and in the summer it was 94.5%. The animals that had presented evident lameness had been 2.24% of the total amount examined in the two seasons, which 1.49% in spring and 3.11% in the summer. The lameness causes directly related to the hoof in spring was only the extreme growth of toes of hoof, its axial and abaxial parts of hoof wall and bulb of heel, observed in four animals. Eight animals presented lame related to the hoof in the summer, which six sheep had presented extreme growth toes of hoof, its axial and abaxial parts of hoof wall and bulb of heel. The total amount of lameness animals, five cases were not directly related to the hoof, which three were related to the case of breakings and two of traumas. Because of that, we can conclude that in the region, the lameness incidence is low and the problems are more related to the handling than to the infectious causes.

LAMENESS IN SMALL RUMINANTS RAISED IN EXTENSIVE SYSTEM OF MANAGEMENT IN NIGERIA

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ABSTRACT

Livestock husbandry in Nigeria has generally been of open range grazing and as such animals are constantly exposed to predisposing conditions to various diseases. This study was aimed at investigating disease conditions affecting the feet of small ruminants and their prevalence in relation to management systems and seasons.

A total of 6, 256 small ruminants from 38 herds in North-western Nigerian were studied over a five year period. The animals were from 2 institutional farms and 15 privately owned farms semi-intensive managed; and 21 nomadic Fulani herds on traditional extensive system.

The overall prevalence rate of lameness was 25.5%. Of the 1, 595 lameness conditions recorded, tick bite lameness and overgrown hoof were the most common as observed in 406 (25.5%) and 306 (19.2%) respectively. Other conditions includes inter-digital abscess 257 (16.1%), foot rot 167 (10.6%), hoof lacerations 141 (8.8%), contagious ecthyma 90 (5.6%), fracture 87 (5.4%), arthritis 67 (4.2%), dermatophilosis 40 (2.5) and nutritional deficiency 34 (2.1%).

Lameness occurred significantly (t<0.05) more in animals raised on extensive (nomadic) management system. These were more prevalent (t< 0.05) in the rainy season (May – October) than in the dry season (November – April).

The nomadic (extensive) system of small ruminants’ management exposed the animals more to the predisposing factors of lameness than the intensive and semi-intensive systems. This is due to exposure of animals to harsh climatic conditions due to inadequate housing, poor nutrition and poor accessibility to veterinary care.
THE STUDY OF DIGITAL LESIONS OF SHEEP IN WEST OF IRAN (RADIOLOGICAL AND GROSS PATHOLOGICAL EVALUATION)

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Lameness and foot disorders are frequently seen in sheep. Lameness in sheep is of great importance to the sheep industry because of economic and animal welfare implications. This study was designed to recognize clinically and radiographically digital disorders on one hundred claws with gross abnormalities, collected from Hamedan slaughterhouse (West of Iran). The samples were cleaned, examined and gross abnormalities were recorded, and then at least two radiographs were taken from each sample. The observed gross pathology of hoof abnormalities were as follows:

Hyperkeratosis (2%), over growth of hoof (32%), fractures of hoofs wall (5%), phalange rotation (18%), and erosion of hoof (43%). Interpretation of radiographic signs consisted of 54 percent without any radiographic signs, complete luxation of third phalanx (3%), incomplete luxation of third phalanx (9%), fracture of third phalanx (5%), degenerative changes of coffin joint and third phalanx (15%), interdigital calcification (2%), osteolytic changes of third phalanx (8%) and new bone formation in fetlock joint and 2nd and 3rd phalanx (4%).

It is concluded that the lesions seen in this study was related to environment and management factors and both must be considered.
Lameness Scoring in Dairy Cattle

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Introduction

Lameness is an important economic problem resulting in loss of milk production, reproductive failure and premature culling. Herdsmen often underestimate lameness prevalence because they become desensitized to lameness or fail to understand its production consequences (Wells, 1993). Ward 1994, found herdsmen and farmers are generally unable to identify early lameness but that on the other hand knowledgeable farmers had significantly less lameness. Lameness scoring is yet to become a widely used management tool in the US dairy industry. One of the reasons is that many dairy operations lack good facilities to adequately deal with lameness problems. Another reason is that lameness-scoring systems in general are subjective based on biomechanical alterations in posture and gait and behavioral changes causing interobserver variation.

Lameness scoring systems

Limb posture
Rear view hind limb posture (Toussaint Raven, 1989)

Posture and gait
Manson and Lever locomotion score (MLLS) (Manson & Lever 1988)
Modification of MLLS (Wells 1993)
Six point numerical rating scale (Whay 1997)
Five point lameness score based on back posture and gait (Sprecher 1996)
Modification of the Sprecher lameness score (Gabarino 2004)

Weight bearing
Lameness score based on alterations in weight bearing (ground reaction forces) of all four limbs measured by single axis load cell system (Dyer 2004)

Locomotion activity
Pedometers. Decreased activity used as indicator for presence of lameness.

Description of lameness scoring systems
Rear view hind limb posture (Leg Score System (LS)).

The system identifies the need for whole herd trimming.

Research demonstrated a correlation between hind limb posture seen from the rear and condition of the claws. In normal non-lame cows without horn overgrown the back legs are straight and parallel. As the outer claw of the rear leg becomes more overgrown particularly at the heel and sole the cow becomes progressively more cow-hocked in an attempt to displace more weight on the inner claw.

Leg score is determined by the angle of the spine in relation to the interdigital space and graded as 1 = normal (no deviation) 2 = 17 – 240 deviation and 3 = > 240 deviation.

Application of the leg score system is as follows:

Whole herd trimming is indicated if: Less that 40% of the herd attains a 1 score; More than 20% of cows attain a score 3; and more than 50% of cows attain scores 2 or 3.

Holtzauer, 2004 examined leg score reproducibility and inter-rater repeatability. In that study the score was performed twice within 30minutes on 2 dairy farms with 62 and 50 cows respectively by 11 observers. Only 11% of the cows were assigned the same score by all observers. However observer interaction with the cows and period of restraint were not taken into account.

Lameness scoring based on posture and stride
Normal locomotion.

The animal should have a flat back, even gait and normal stride, which consists of lifting and swinging (hanging phase) and heel strike and push off (supporting phase) each of which should represent 50% of the stride. Some abduction and adduction of the limbs is present during normal locomotion. Hind foot placement follows fore feet (tracking) and feet point in the direction of travel. During turning the limbs on the outside are abducted and those on the inside adducted.

The following factors should be taken into account when systems based on posture and stride are used:

· A flat surface with adequate traction properties should be used.
· Clear view from the side and behind for at least ten paces is necessary to evaluate back and leg posture and gait abnormalities.
· Cows should be allowed to walk at their own pace (speed comfort zone = 0.6 – 1.0 m/sec)
· In general concrete floors do not provide enough friction to allow normal locomotion (van der Tol, 2005) and floor surface can cause significant alterations in stride and pressure exerted on individual claws.
1.0 Minimal abduction/adduction, no unevenness of gait, no tenderness
1.5 Slight abduction/adduction present, no unevenness or tenderness
2.0 Abduction/adduction present, uneven gait, perhaps tenderness of feet
2.5 Abduction/adduction present, uneven gait and tenderness of feet
3.0 Slight lameness not affecting behavior
3.5 Obvious lameness, some difficulty in turning, behavior not affected
4.0 Obvious lameness, some difficulty in turning, behavior affected
4.5 Some difficulty in rising, difficulty in walking, behavior affected
5.0 Extreme difficulty in rising, difficulty in walking, adverse affects on behavior pattern

Numerical Rating System (NRS)

More suitable for on farm use:
1.0 Sound

2.0 Imperfect locomotion
3.0 Mildly lame
4.0 Moderate lameness
5.0 Severe lameness
6.0 As lame as possible while remaining upright

(Neveux et. al., 2006) found that discomfort of weight bearing on one of the rear legs resulted in redistribution of the majority of the weight onto the contralateral back foot without changing the weight distribution on their front feet. With discomfort in one of the front feet, weight is shifted to the contralateral front and ipsilateral back foot.

Older cows (4+) lactations have higher lameness score

Logue 1994 found a significant correlation between lameness scoring and claw horn lesions such as sole ulcer. However many lesions lack sufficient pain to generate lameness resulting in poor correlation between lameness scoring and lesion by type and or location.

Biomechanical and behavioral changes associated with lameness

Spinal arching; head carriage; rotation of limb or digit; abduction; uneven gait; changes in stride length and stride angle

Supporting limb lameness – shortened supporting and swinging phases

Manson & Lever nine-point scale

This system allows for a wide spread in the assessment to accommodate subjectivity:

1.0 Normal
2.0 Imperfect locomotion
3.0 Mildly lame
4.0 Moderate lameness
5.0 Severe lameness
6.0 As lame as possible while remaining upright

Both the Manson and Lever and NMR systems showed high inter- and intraobserver repeatability.

Lameness scoring using back posture and gait

1. Lameness scoring system with emphasis on back posture (Sprecher, 1997)

Description:

Score 1 Normal
Stands and walks normally. All feet placed with purpose

Score 2 Mildly lame
Stands with flat back but arches when walks. Slightly abnormal gait

Score 3 Moderately lame
Stands and walks with an arched back. Short strides with one or more legs

Score 4. Lame
Arched back standing and walking. One or more limbs favored but at least partially weight bearing

Score 5. Severely lame
Arched back. Refuses to bear weight on one limb. May refuse or have great difficulty moving from lying position

This system might be more convenient for larger dairies where close observation of the gait is not practical. However the correlation between actual lameness, or the presence of a claw lesion is 69% and 52% respectively. This may lead to increased pressure on claw health personnel due to oversupply of “lame” cows. It may also play a role in the over trimming of cows, which appears to become more of a problem.

2. Lameness scoring with emphasis on back posture (Gabarino, 2004).

Gabarino, 2004, used the above system to investigate the effect of lameness on reproductive failure. Results of this investigation found that 32% of cows had an arched back during standing and walking but no gait abnormalities. Based on these findings he proposed the introduction of an additional score (Score 2) which will fit between Scores 1 & 2 on the above system (Sprecher, 1997)

Load cell system

A lameness scoring system based on alterations in weight bearing of all four limbs measured by single axis load cell system has been developed for on farm application but not ready for general use.

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The Relationship between Locomotion
scores and Lameness Lesions in dairy
cattle.

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Currently, a variety of locomotion scoring systems are used to
assess lameness, few of these systems have correlated the score
assigned to a cow with lesions in her hooves. The objective of
this project was to evaluate the association between locomotion
scoring and lesions found at the time of hoof trimming.

A sample of 5 hoof trimmers were trained and asked to record
lesions on a standardized form for all cows they trimmed in 38
herds. In these herds, locomotion scoring was carried out 1-2
weeks prior to the hoof-trimming visit. Locomotion scoring was
done using a 4-point scale. In tie stall herds, cows were given
a leg score that evaluates the angle between the spine and the
interdigital space. A total of 2420 cows were scored in 21 tie
stall and 17 free stall herds.

Mean prevalence of cows with a severe leg score was 13%.
Overall, 28% of the locomotion scored cows were either
moderately or severely lame. Only for infectious lesions was
there a significant association between leg score and lesions. For
the locomotion scoring system there was increased likelihood
of lesion presence in both moderate and severe cows. Cows
with either a moderate or severe score were 2.7 and 8.7 times
as likely to have a severe non-infectious lesion than normal or
mildly lame cows. Locomotion scores did not accurately predict
the presence of infectious lesions.

These results show that locomotion scoring systems do not
accurately identify all lesions and this should be considered
when implementing lameness detection programs.