# Lameness prevention as sales argument for spent grains at (beef) farms

## Introduction

In intensive beef finishing systems lameness is a problem. Severely lame animals have to be treated and housed separate to recover. This involves additional work (hassle) and cost for the farmer. Moreover severely lame animals may not be transported to the slaughterhouses according to animal welfare legislation. This leads to these animals having to be urgency slaughtered. In the Po valley of Italy the university of Padova conducted a research into among others the nutritional relationships between lameness and nutritional aspects. The findings were published in the Journal of Preventive Veterinary Medicine and can be found here:

[Risk factors for claw disorders in intensively finished Charolais beef cattle - ScienceDirect](https://www.sciencedirect.com/science/article/abs/pii/S0167587719304179?via%3Dihub)

## Summary

The study clearly confirms that nutrition has a significant impact on lameness. Higher NDF levels and lower water soluble carbohydrate (here mainly rapidly fermentable starch) levels result in less hoof problems. Interestingly both infectious hoof diseases, like Digital Dermatitis (Mortellaro) and noninfectious hoof diseases like very painful sole and wall ulcers are influenced by nutrition.

Not only on beef farms lameness is a problem. Also on dairy farms the same type of hoof diseases as investigated in the study occur. The level and variation in the significant parameters as found in the study is similar to levels found in dairy cow rations. Therefore it seems only logical that the outcome of the study on beef farms is also relevant for dairy farms.

## Overview of main significant findings

In below table the statistically significant risk factors, related to nutrition, as identified in the study are given:

|  |  |  |  |
| --- | --- | --- | --- |
| Significant risk factor | Hoof disorder | Relative risk | Remarks |
| Gender Bull | WLA | 3,09 | Bull are finished at an older age, are heavier, but are also fed with a higher energy density then heifers resulting in increased risk of acidosis. The relation with nutrition however cannot be proven from this parameter alone as multiple factors are at stake. |
| SH | 2,1 |
| Water soluble carbohydrates | WLA | 1,33 | Water soluble carbohydrates (mainly starch in this case) are fermented rapidly in the rumen causing rumen pH reduction and increased fluctuation.  |
| NILS | 1,49 |
| NDF | WLA | 0,9 | NDF (cell walls) is fermented more slowly in the rumen and contributes to rumination time. Increased rumination and slower fermentation speed leads to a higher, less fluctuating rumen pH.   |
| SH | 0,96 |
| ILS | 0,73 |
| Low density NDF | ILS | 0,88 | This is the fraction of the NDF that contributes to rumination. Increased rumination leads to a higher rumen pH |
| Mean particle length, Pennstate forage particle seperator | ILS | 3,79 | Higher particle length leads to increased selection (in a dry ration as is the case here) resulting in increased fluctuation of rumen pH. Long particles are often leftover and do not contribute to rumination. |
| Lower sieve 4mm, Pennstate forage particle seperator | ILS | 0,8 | This fraction contains smaller fragments of roughage which still contribute to rumination and rumen buffering |

Abbreviations:

WLA: White Line Abcess (Very painful ulcer in the wall)

NILS: Non Infectious Lesions Score (Very painful lesions/ulcers in sole or wall)

ILS: Infectious Lesions Score (among others Digital Dermatitis/Mortellaro)

SH: Sole Haemorrhage (Sole bleeding)

Other significant risk factors identified in the study:

|  |  |  |  |
| --- | --- | --- | --- |
| Significant risk factor | Hoof disorder | Relative risk | Remarks |
| Winter season | WLA | 3,54 | In winter the barn humidity is higher which increases infectious pressure and results in softer hoofs |
| NILS | 3,14 |
| ILS | 15,7 |
| No ventilation system | NILS | 2,01 |
| Concrete slats | ILS | 1,79 | A hard floor results on more pressure on the sole and hoofs are wetter then on deep litter system. |
| SH | 1,83 |

Significant ration parameters and their level as identified in the study:

|  |  |  |  |
| --- | --- | --- | --- |
| Nutrient | Mean | First quartile | Third quartile |
| NDF | 312 | 294 | 320 |
| Low density NDF, g/kg DM | 202 | 164 | 226 |
| Water soluble carbohydrates g/kg DM | 55 | 47,9 | 61,1 |
| Mean particle lenght, mm | 4,25 | 3,63 | 4,58 |
| Lower sieve 4mm, % TMR | 4,25 | 3,63 | 4,58 |

Above parameters are similar to what is encountered in dairy cow rations. Therefore the results found in the study are most likely also relevant for dairy cows.