Linear type traits show pronounced phenotypic relationships to foot and claw health

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Worldwide, the awareness of the relevance of a properly functioning locomotor system in cattle has been raised lately. In Austria, problems relating to feet and legs rank third among the most important disposal reasons in cows. Apart from economics, welfare related aspects have to be considered as these diseases may cause severe pain. Besides veterinarian diagnoses and hoof trimmers' records, data on linear scorings of feet and leg traits may also contribute towards improved cow health. As a first step, phenotypic relationships between linearly scored feet and legs traits, claw diagnoses and observations, and lameness were analysed in about 4,000 Fleckvieh (FV) and 1,500 Brown Swiss (BS) cows kept in herds across Austria. Within the project EfficientCow, all veterinarian diagnoses and observations of professional hoof trimmers were recorded during the year 2014. Additionally, cows' lameness was scored on a scale of 1 (not lame) to 5 (severly lame) in the course of each performance testing (approx. 8-11 times/year and cow). Once a year, linear scoring took place independent from lactation number. After pre-correction of several conformation traits, their partly non-linear relationship to claw health and lameness was analysed by additionally fitting the random effect of herd and the fixed effects lactation number, calving year and month, and alternatively type of recording (diagnoses), hoof trimmer or evaluator (lameness). In both breeds, animals with higher overall feet and legs scores were less prone to claw diseases and lameness. Within single linear type traits, animals of both breeds having a somewhat straighter hock angle (scores around 4; 1 = straight, 9 = extremely sickled) had significantly less feet and legs problems while no effect of hock quality could be found. Slightly steeper foot angles also resulted in reduced lameness. Next steps will include genetic analyses of all traits involved. However, non-linear relationships may complicate the interpretation of genetic correlations.

Genetic parameters for hoof disorders in dairy cattle

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Lameness is a major factor influencing animal welfare as well as the productivity, profitability and competitiveness of the Irish dairy industry. The objective of this study was to quantify the contribution of additive genetics to the incidence of different hoof disorders and their genetic correlation with mobility score (MS). Hoof trimming was undertaken by professional trimmers on 7,533 lactating Irish dairy cows from 51 dairy herds during the year 2015; the presence and intensity (i.e. score of 0 to 3 or 0 to 5) of overgrown (OG), sole hemorrhage (SH) and white line (WL) was recorded for both back feet by two operators. Prior to hoof trimming, MS (i.e. score of 0 to 3) was undertaken on 4,700 cows. Animals purchased during 2015 and animals with a most recent calving event >365 days prior to hoof trimming were discarded. Furthermore, only animals with a known sire in a herd-year-season of calving contemporary group (CG) of ≥5 animals were retained. After all data edits, 7,087 animals in 222 contemporary groups from 51 herds remained. (Co)variance components were estimated using animal linear mixed models. Fixed effects included in the models were CG, parity, age relative to parity median, stage of lactation at trimming, hoof disorder recorder × trimming date interaction and heterosis and recombination coefficients; animal was included as a random effect. The direct heritability (standard error in parenthesis) for MS and susceptibility to OG, SH and WL as an ordinal scale trait was 0.08 (0.03), 0.12 (0.02), 0.22 (0.03) and 0.19 (0.03), respectively; the genetic standard deviation for MS, OG, SH and WL was 0.16, 0.65, 0.27 and 0.60 standard deviation units, respectively. Considering OG, SH and WL as a binary trait, the respective heritability estimates were 0.12 (0.02), 0.18 (0.03) and 0.11 (0.02); the genetic standard deviation for OG, SH and WL was 0.12, 0.19 and 0.15 standard deviation units, respectively. The genetic correlation between MS and hoof disorders, ranged from 0.10 to 0.22 but the standard errors were large (0.18 to 0.20). This study indicates that genetic variation exists in susceptibility to hoof disorders.