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Implementation of SCC breeding values in Italian Jersey breed

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In the framework of the LATTeco project, ANAFIJ (Associazione Nazionale Allevatori della Razza Frisona e Jersey Italiana) has been working on improving animal welfare, biodiversity and sustainability. Focusing on animal welfare, ANAFIJ has implemented a genetic evaluation for somatic cell count (SCC) in the Italian Jersey population. The aim of this study is to describe this implementation which became official in December 2020. It is expected that breeding values for SCC will help farmers to produce a progeny more resistant to mastitis, with a consequent reduction of veterinary costs and a valorisation of milk in quality payment systems. The dataset included 284,904 records of SCC collected on 19,305 cows belonging to 774 herds during the official test day milk recording program. Data ranged from 2005 to 2016. Means of SCC and somatic cell score (SCS), calculated as $3 + \log2(SCC/100)$, were 277.47 ± 677.43 cells/µL and 3.14 ± 1.76. Bulls' breeding values were estimated using a repeatability animal model which included the fixed effects of parity (first, second and third lactation), the season of calving (4 classes, 3 moths each), days in milk (10 classes of 30-d each, ranged from 4 to 305 d), and herd-test-day (26.866 records) as a contemporary group. The random effects were an additive genetic animal, permanent environment and the residual. Breeding values for 187 bulls with a minimum of 10 daughters in at least 10 herds were estimated and they were referred to ANAFIJ genetic base, which is updated every 5 years and at the moment of the study, included animals born between 2010 and 2015. Somatic cell score was standardised to mean 100 and standard deviation 5. Breeding values reliability averaged 0.80 ± 0.13 and the mean of daughters' phenotype for SCC was equal to 275.41 ± 92.81 cells/µL. Bulls were divided into 3 groups according to their breeding values for SCS: as expected, bulls with higher ebvs had lower mean SCC; while a decrease in ebvs was associated with increased SCC. In January 2021, the new breeding value was submitted to Interbull for the test-run routine to validate it; this will allow ANAFIJ to have an international result for the SCC breeding value of the Italian Jersey population.

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Development of a selection index for resistance to subclinical ketosis in Holstein Friesian dairy cows

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At the onset of lactation, high-yielding dairy cows could often experience a period of negative energy balance. This is reflected in a loss of body condition, due to body fat mobilization, and an increase of circulating ketone bodies, particularly β-hydroxybutyrate (BHB). This condition, known as hyperketonaemia, can result in (sub) clinical ketosis with negative implications on cow productivity and functionality, including health and fertility. The objective of the present study was to develop a genetic evaluation of resistance to subclinical ketosis for Holstein dairy cattle using data routinely available from the national milk recording system and linear classification. Milk BHB and fat-to-protein ratio (FPR) was available on more than 2.2 million test-days records belonging to Holstein cows in the first 90 days-in-milk from first up to the third lactation. These records were subsequently matched to the closest linear classification date when body condition score (BCS) was measured by an expert evaluator. The pedigree of cows has traced back up to 6 generations. (Co)variance components were estimated using trivariate linear mixed models; in particular, for BHB and FPR the fixed effects of herd-test-day, the two-way interaction between the week of lactation and parity, and the three-way interaction between classes of age at calving, parity and year of calving were considered. The linear model for BCS included the fixed effects of herd-year-round of classification, year of calving and the two-way interaction between age at calving and stage of lactation. The additive genetic effect and, only for BHB and FPR, the permanent environment were the two random terms. Due to computational constraints, (co)variance components were estimated on ten different subsets including 400 herds each, and subsequently averaged. Milk BHB and FPR and BCS averaged 0.056, 1.152 and 2.99, respectively. Heritability estimates were 0.093, 0.090 and 0.157 for BHB, PFR and BCS, while repeatability estimates were 0.179 (BHB) and 0.209 (FPR). The genetic (phenotypic in parenthesis) correlations were 0.159 (0.279; BHB vs. FRP), −0.161 (−0.038; BHB vs. BCS) and −0.140 (−0.049; FPR vs. BCS). The present study suggests that an exploitable additive genetic variation exists for milk BHB, and it could be used to set up breeding strategies aiming at improving resistance to subclinical ketosis through genetic selection.