Genetic parameters of disease traits and genetic correlations with traits included in Spanish net merit index

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The main aim of this study was to estimate the genetic parameters of seven disease traits recorded in Spanish Holstein dairy cattle within the framework of the health diseases recording project called I-SA, launched by CONAFE in 2015. Disease traits are Milk Fever (MFE), Displaced Abomasum (DAB), Clinical Ketosis (CKT), Clinical Mastitis (MAS), Metritis (MET), Retained Placenta (RPL), Lameness (LAM) and Subclinical Ketosis (SKT) diagnosed through BHB in milk. In addition, genetic correlations between disease traits and the main traits included in Spanish net merit index, Milk yield (MY), Fat yield (FY), Protein yield (PY), Somatic cell score (SCS), Days open (DO) and Functional herd life (FHL), were also estimated.

Health traits are being recorded by breeders through on-farm management program and then uploaded to the national database. In this study the data set included 55,099 lactations with information on health disorders recorded on 32,727 animals within 116 herds from 2016 to 2018. Incidence rates per lactation were 1% for MFE, 1.8% for DAB, 2% for CKT, 12.5% for MAS, 6% for MET, 5% for RPL, 11% for LAM and 30.7% for SKT. Genetic parameters were estimated by using multiple-traits animal model. Heritability's estimates, which were calculated on the observed scale, were 1% for MFE, 5% for DAB, 8.5% for CKT, 3.5% for MAS, 2.4% for MET, 2.8% for RPL, 2.7% for LAM and 6.6% for SKT. The strongest correlations were found between CKT and DAB (0.74), and between CKT and MET (0.60). Genetic correlations between production traits and health traits were low to moderate. Milk fever was the most correlated disorder with MY (0.43). Clinical mastitis was highly correlated with SCS (0.64). Metritis showed the higher correlation with DO (0.43). Metabolic disease traits presented low heritabilities and generally had positive genetic correlations with 305-d Milk yield traits and negative correlations with FHL, which indicates that high producing dairy cows were genetically more susceptible to disease, and consequently to a premature disposal. On the other hand, reproductive diseases as RPL and MET were positively correlated with more extended DO and clinical mastitis was highly correlated with high SCS, which undermine herd profitability. Although heritability estimates were low, results suggested that health traits should be genetically evaluated and included in the net merit index in order to reduce the incidence of diseases, increase efficiency and ensure a better animal welfare.

Keywords: health disorders, genetic parameters, genetic correlations, other traits