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Towards a genomic evaluation of cheese-making traits including candidate SNP in Montbéliarde cows

Dr Marie-Pierre Sanchez

Biography:
Marie-Pierre Sanchez, engineer at INRA-GABI in France since 2000, is a quantitative geneticist by training. She first worked in pig genetics and joined the Bovine Genetics and Genomics team (G2B) in 2012. She finished a PhD on "Genetic analysis of milk protein composition and cheese-making properties predicted from MIR spectra" in 2019. She has a broad experience in genome-wide association studies. She has published 35 scientific articles (h-index = 14).

In the From'MIR project, milk cheese-making and composition traits were predicted from 6.6 million mid-infrared (MIR) spectra in 410,622 Montbéliarde cows (19,862 with genotypes). GWAS on imputed whole genome sequences revealed candidate SNP that were designed on the EuroG10K BeadChip. Here, we assess the reliability of Single-Step GBLUP breeding values (ssEBV) from test-day records of the first three lactations for cheese yields, coagulation traits, casein and calcium contents. The available data were split in two independent training and validation sets that respectively contained cows with the oldest and the most recent lactations. The training set, including 155,961 cows (12,850 with genotypes), was used to predict ssEBV of 2,125 validation genotyped cows. For each trait, the reliability of ssEBV was estimated considering: 1) SNP of the Illumina BovineSNP50 BeadChip with equal effect variances (50K), 2) 50K and candidate SNP with equal effect variances (50K+) and 3) 50K and candidate SNP with increased effect variances for 5 to 14 candidate SNP, depending on the trait (CAND). The 50K+ and CAND scenarios led to similar mean reliabilities (67%) and both outperformed the 50K scenario (65%). The CAND scenario gave the less biased ssEBV. These results led to the implementation of a genomic evaluation for cheese-making traits predicted from MIR spectra in Montbéliarde breed. This study was funded by the French Ministry of Agriculture, Agro-food and Forest (CASDAR), the French Dairy Interbranch Organization (CNIEL), the Regional Union of Protected Designation cheeses of Franche-Comté (URFAC) and the Regional Council of Bourgogne-Franche-Comté, under the project From'MIR.