
Genetic Differences in Milk Composition between Traditional Cattle Breeds

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The proposed PhD study will be part of the EU funded project OPTIBOV which aims to investigate the optimal use of traditional genetic resources and to further improve their performance while maintaining longevity. Traditional cattle breeds are undervalued in many countries because they are low production breeds. However, their unique characteristics such as tolerance to specific disease vectors and high-temperature tolerance make them a valuable biological resource. Moreover, commercial high production breeds do not perform well under harsh conditions. These environmental conditions are increasingly likely to become an issue for the commercial breeds in more moderate climatic areas due to climate change. The adaptation to harsh conditions of traditional/local breeds is poorly studied. Bovine milk provides fat, protein, carbohydrates, vitamins and bioactive compounds, and substantially contributes to the human diet. Traditional breeds produce less milk than improved breeds. However, differences in milk composition are not well studied between cattle breeds in a larger perspective across the continents. The proposed thesis research considers both genomic and phenotypic differences in milk. The first step of the project is to investigate genetic variation in milk related genes of traditional/local cattle breeds from 6 different countries across Europe and Africa. This will help us to obtain a better comprehension of the unique genetic differences between a large number of unique breeds. The second step is revealing differences in the detailed milk composition of these traditional breeds. The third step is to identify expression Quantitative Trait Loci (eQTLs) in Dutch traditional cattle based on RNA-seq derived from milk samples. The fourth step is to identify selective sweeps in the genomes of traditional/local cattle breeds in Africa and Europe which might be related to local adaptation. The results of these studies at the genomic and phenotypic level will be integrated to facilitate the identification of adaptive traits and improve milk production of local/traditional cattle breeds.