

H2020 IMAGE project strategy to investigate local adaptation in European sheep

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The IMAGE H2020 project objective is the valuation of livestock and poultry gene banks and biodiversity. Among the case studies run within the project, one uses landscape genomics (LG) to investigate selective sweeps associated to adaptation to climatic conditions in local sheep populations and genetic collections. To select sheep individuals to analyse, 965 geo-referenced biological samples have been split into groups based on the environmental conditions at their sites of origin. Animals living in the most diverse environmental conditions have been identified by a Principal Component Analysis followed by hierarchical clustering performed on 24 climatic and bioclimatic variables, altitude as well as land cover. The target area covered Europe and the Mediterranean region, including Northern Africa and South-western Asia. Subsequently, each of the eight main environmental clusters we identified was further subdivided into 4 sub-clusters to allow a finer mapping of the diverse environmental conditions. The final set of 672 animals was selected so to ensure both the representativeness of the environmental sub-clusters and the within-breed variation. For all animals, high-density SNP genotypes have been obtained with the Illumina Ovine HD BeadChip and merged with data from 742 geo-referenced individuals available from IMAGE partners, previous research projects and public databases. The final dataset including 1,514 individual genotypes will be analysed by landscape genomics, selection signature and population structure approaches to describe the distribution of diversity across the study area and to detect signals of environment-driven selection.