17:00 Adaptation of Mediterranean bovine livestock to climate constraints.
Genetic diversity and breeding systems

Flori Laurence1,2, Moazami-Goudarzi Katayoun3, Lecomte Philippe1, Moulin Charles-Henri3,4, Thévenon Sophie1,4, Alary Véronique1, Casabianca Franois3,5, Lauvie Anne6, Boushba Nadjet8, Saidi-Mehar Nadhira6, Boujenane Ismail6, Araba Abdeselam7, Menni Dalal7, Pineau Olivier10, Ciampolini Roberta11, Osman Mona-Abdelzaher11, Rodellar Clemen12, Martinez Amparo13, Delgado Juan-Vicente13, Landi Vincenzo14, Hadjiapavlou Georgia15, Ligda Christina15, Gautier Mathieu16, Laloë Denis1

1INRA/AgroParisTech, GABI, 78352 Jouy-en-Josas, France
2Cirad, INTERTRYP, 34000 Montpellier, France
3Cirad, SELMET, 34000 Montpellier, France
4Montpellier SupAgro, SELMET, 34000 Montpellier, France
5INRA, LRDE, 20250 Corte, France
6Université des Sciences et de la Technologie d’Oran, Département de Génétique Moléculaire Appliquée, 31000 Oran, Algeria
7Institut Agronomique et Vétérinaire Hassan II, Département de Productions et de Biotechnologies Animales, 10101 Rabat, Morocco
8La Tour du Valat, 13204 Arles, France
9Dipartimenta di Scienze Veterinarie, LBG, 56124 Pisa, Italy
10APRI, Animal Breeding and Genetics, Cairo, Egypt
11Facultad de Veterinaria, Lagenbio, 50013 Zaragoza, Spain
12Animal Breeding Consulting SL, Laboratorio de Genetica Molecular Aplicada, 14071 Cordoba, Spain
13Agricultural Research Institute, 1010 Lefkosia, Cyprus
14Veterinary Research Institute, NAGREF, 57001 Thessaloniki, Greece
15INRA/IRD/Cirad/Montpellier SupAgro, CBGP, 34988 Montferrier-sur-Lozé, France

According to IPCC, Mediterranean countries will be particularly affected by global warming, with rising temperatures, reduced rainfall during summer months and recurrent heat waves and droughts; this climate is estimated to move inland. In this context, local Mediterranean cattle breeds, genetically selected to adapt to this harsh environment and breed with specific practices are valuable genetic resources.

In order to identify genotypes and breeding practices capable of coping with the environmental challenge induced by climate change, we propose an integrative approach combining genetic analysis of cattle populations, climate conditions and livestock systems. For this purpose, 21 breeds from three southern (Algeria, Egypt and Morocco), two eastern (Cyprus and Greece) and three northern (France, Italy and Spain) Mediterranean countries were genotyped at 41187 SNPs. These data were combined to those available on breeds from neighbouring areas (Massif Central, Alps). Bioclimatic data (annual trends, seasonality, extreme factors) was obtained from WorldClim, a database for ecological modelling. Meanwhile, we have characterized the breeding systems of these local breeds thanks to questionnaires proposed to experts, completed by several extensive case studies.

Model-based clustered methods and Principal Component Analysis were first performed to address the overall structuration of populations. Then a redundancy analysis was performed to describe how geographical and bioclimatic features shape the genetic variation among breeds. Breeds are clearly differentiated according to geography and climate (temperature, rainfall). Finally, genomic regions that contribute the most to the genetic variation associated to climate are identified. The main features of breeding practices in Mediterranean environment are also determined as well as the main animal traits that breeders associate to breeds’ adaptation.

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