CLIMATE-SMART Agriculture 2015

Global Science Conference

March 16-18, 2015
Le Corum, Montpellier France

Adaptation of Mediterranean livestock to climate constraints:

Genetic diversity and breeding systems

Flori L, Moazami-Goudarzi K, Lecomte P, Moulin C H, Thévenon S, Alary V, Casabianca F, Lauvie A, Boushaba N, Saïdi-Mehtar N, Boujenane I, Araba A, Menni D, Pineau O, Ciampolini R, Casu S, ElBeltagy A, Osman M A, Rodellar C, Martinez A, Delgado J V, Landi V, Hadjipavlou G, Ligda C, Mastrangelo S, Portolano B, Gautier M, Laloë D.

Montpellier

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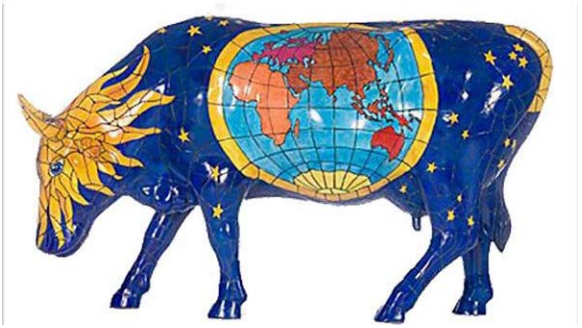
GALIMED project:

Genetics of adaptation of cattle livestock and production systems in the Mediterranean area

- Global climate change and ecosystems

  - Consequences on the mediterranean climate
  - Consequences on the livestock
  - Importance of adaptive traits
  - Modifications of breeding practices



Multidisciplinary approach that combines population genetics and knowledge of livestock production systems.

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Funded by INRA ACCAF Metaprogram

Objectives

• A global view of the genetic diversity of Mediterranean cattle breeds

•Identification of selection footprints in the bovine genome and identification of the selective driving forces.

•Analysis of breeders practices

•Analysis of the point of view of breeders about adaptation

A joint analysis of genetic, production systems and breeding practices through geographical and climatic parameters

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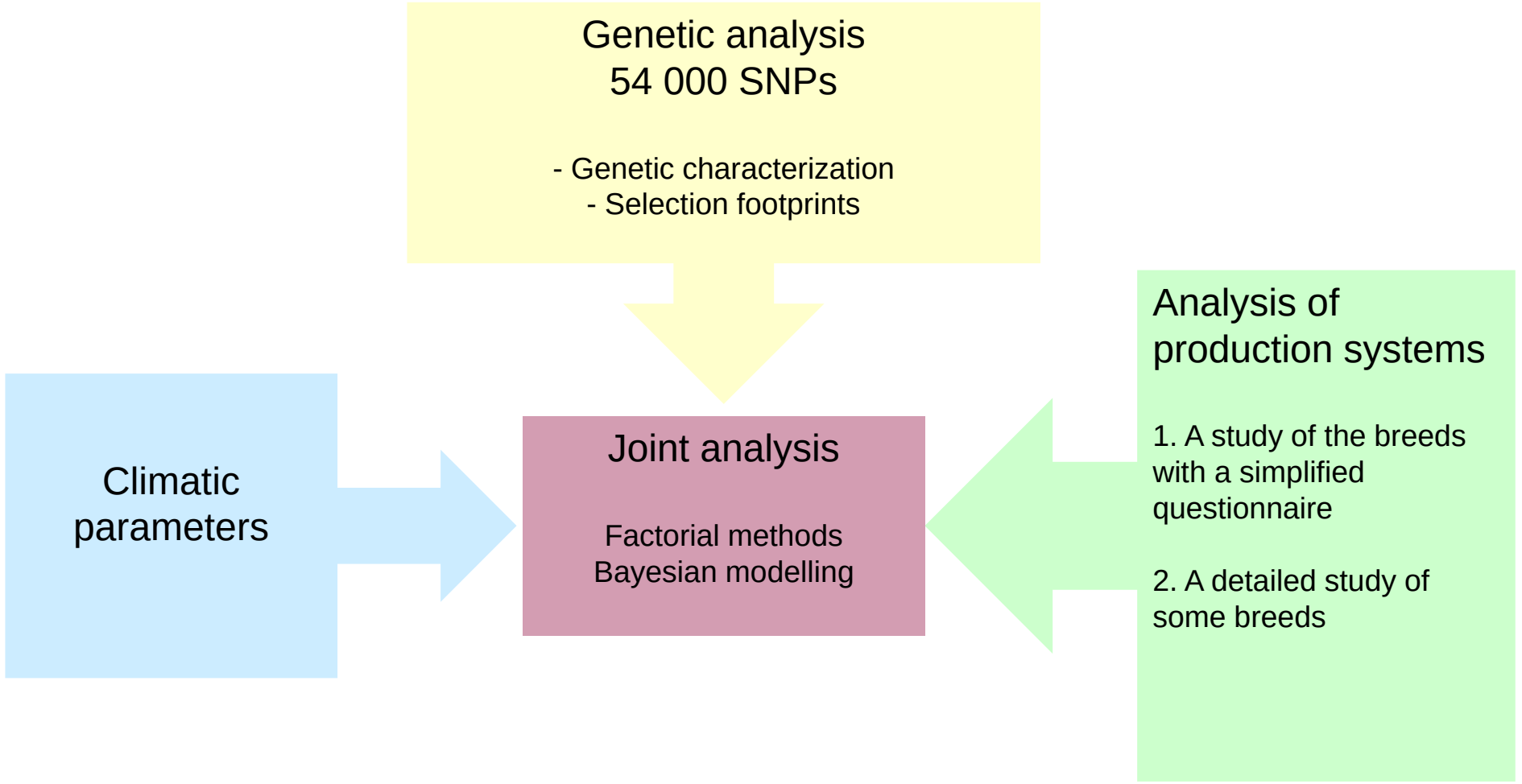
Approach



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Countries/Organizations

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Some of the breeds involved in Galimed

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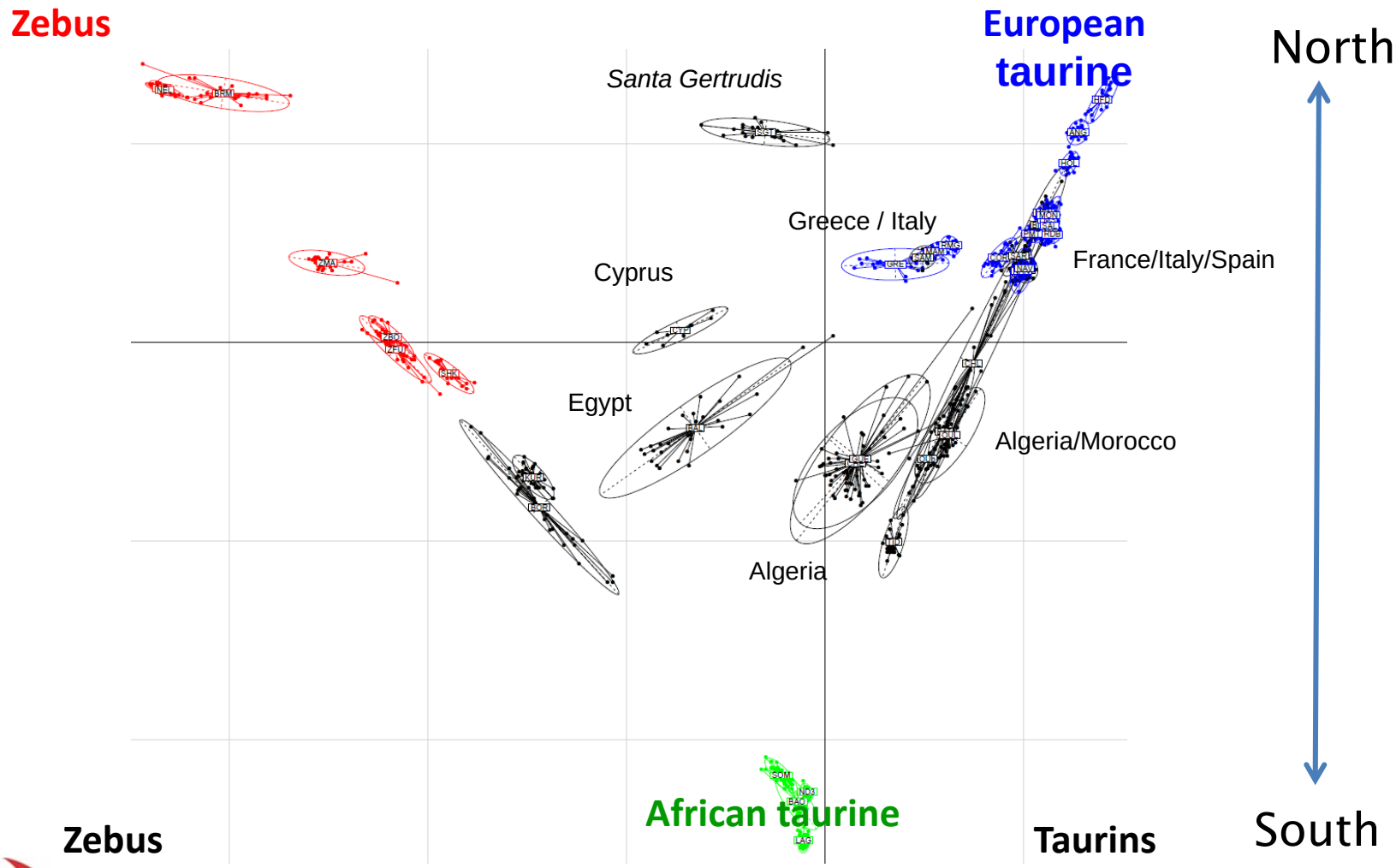
Genetic diversity of Mediterranean cattle breeds



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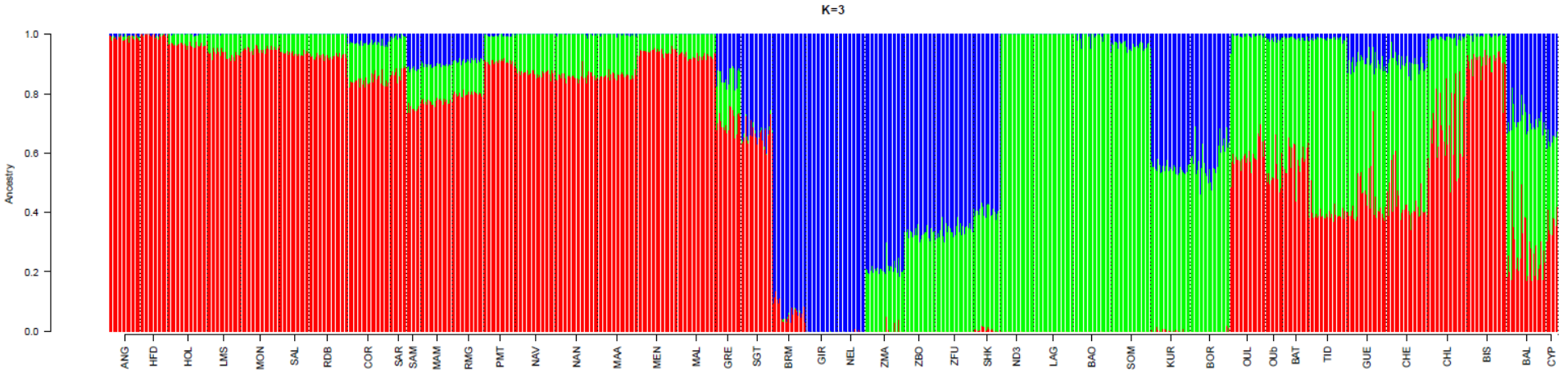
Genetic characterization of Mediterranean cattle breeds



European taurine

Mediterranean breeds South Europa

Zebu

African taurine

Mediterranean breeds Maghreb

Egyptian breed

Cyprus breed

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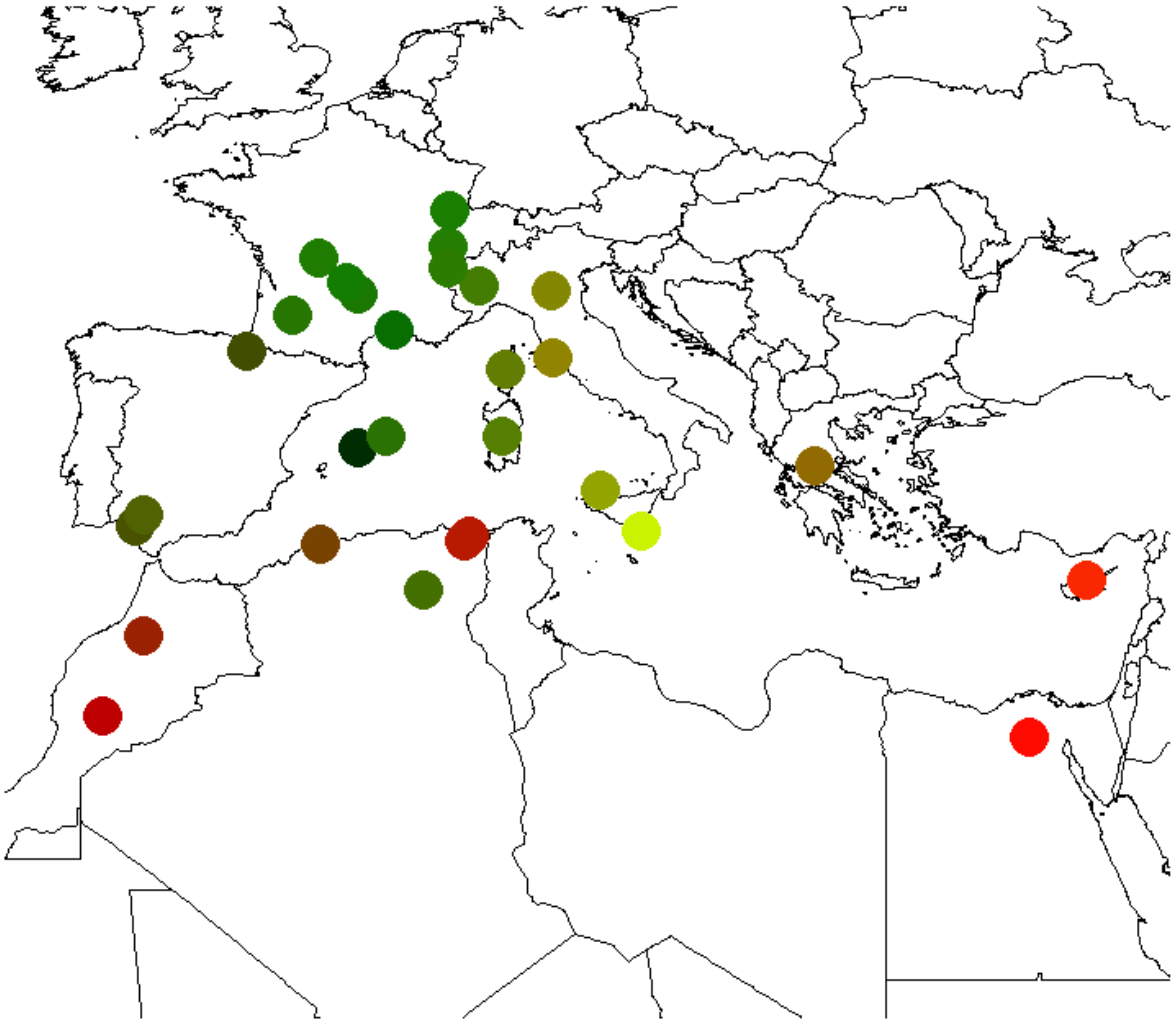
Spatial Principal Component Analysis
(Geography + Genetics)



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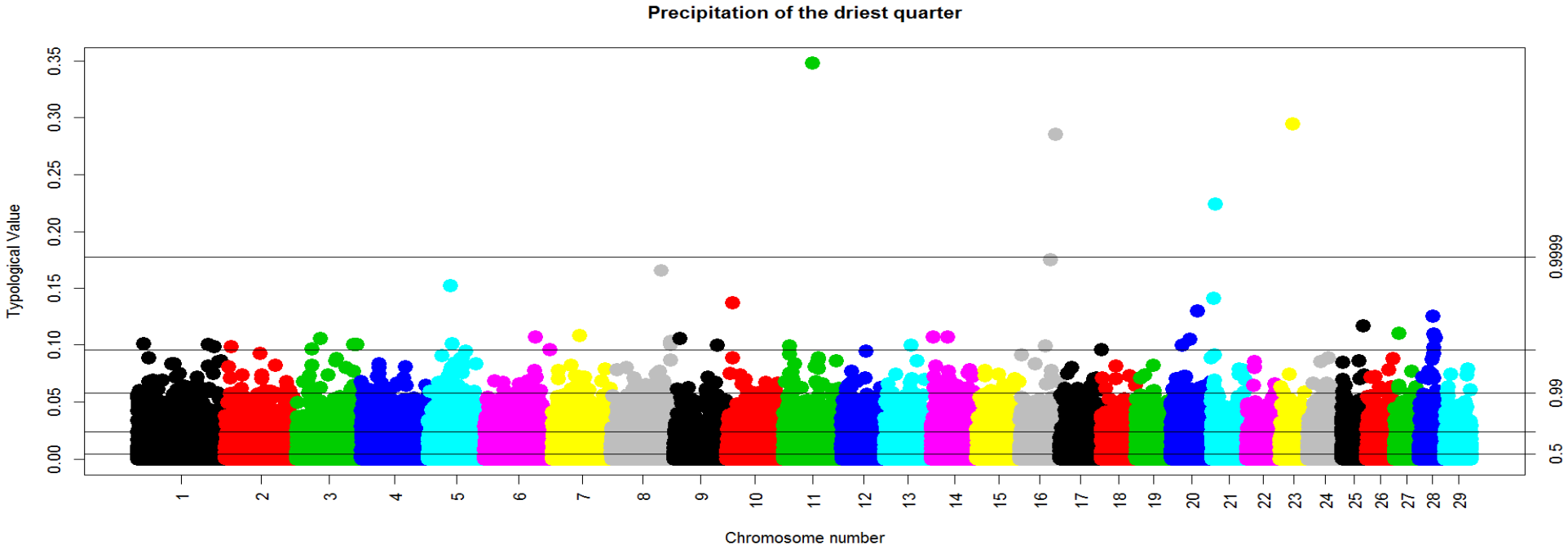
Environment and Genetics

Identification of the loci underlying local adaptation using environmental variables

Which SNPs contribute the most to the differentiation according to an environmental variable ?

SNPs contribution (Fst-like) to the genetic variability according to Drought



Why and how to take into account farming and breeding systems?

Farmers -> farming and breeding practices

- Farmers develop **strategies** to deal with climate and other environmental or supply chain constraints
- Farming **practices** contribute to the orientation of the genetic resources

What are the main categories of systems/practices in each situation?

For all the breeds of the study: questionnaire to some experts on the main features

How breeders consider adaptation of their breed / what are the main abilities of the animals?

For a few cases: semi structured interviews to a diversity of breeders

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The main characteristics of farming systems : a questionnaire to experts

Expert questionnaires

with 3 themes and 11 subthemes

Answers coded:

attribution of a quantitative code for each modality

Joint analysis :

quantitative code,

genetic data,

climate data

- **Diversity of farming environments**
- Adaptative criteria motivate the choice of breeds;

Resistance to climate, to diseases,

Good responses to underfeeding

Use of areas and resources other breeds cannot use

- **Main commodities :**

Meat and milk / only meat / games and meat

How farmers consider adaptation of their breed?

a focus on Corsica (France) and Tuscany (Italy)

Corsican cattle (Corsica)
20 farmers

Maremmana cattle(Tuscany)
8 farmers

Interviews recorded -> integral retranscription for the part on adaptation

History

Farming system

Point of view on adaptation

Collective actions

Identification of themes and subthemes from breeders' speeches

Codage and count for each interview

Similar themes in both cases :

feeding capacities, reproduction, morphology, behaviour, resistance, adaptation to territory, meat quality

- In Corsica, **« feeding autonomy »**

  sub themes: few needs, feeding behaviour, body condition, consequences and causes of this autonomy

Coherence with most extensive systems where human intervention is limited

- In Italy, quotation of various themes more homogeneous

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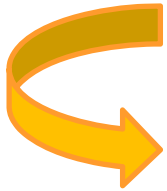
Conclusion

- Main characteristics of farming systems (resistance, underfeeding, use of specific areas)

- High genetic diversity of Mediterranean cattle breeds
- Genetic fits with geography and environment



Identification of loci involved in local adaptation of mediterranean breeds to climate and links with Livestock Farming Systems

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