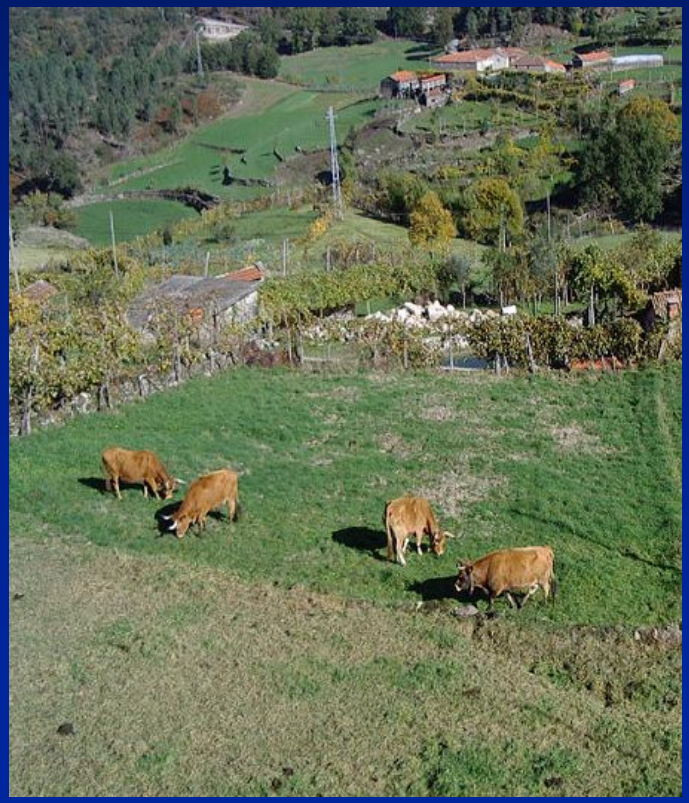
Conservation and improvement of native livestock breeds in Portugal

Luis T. Gama

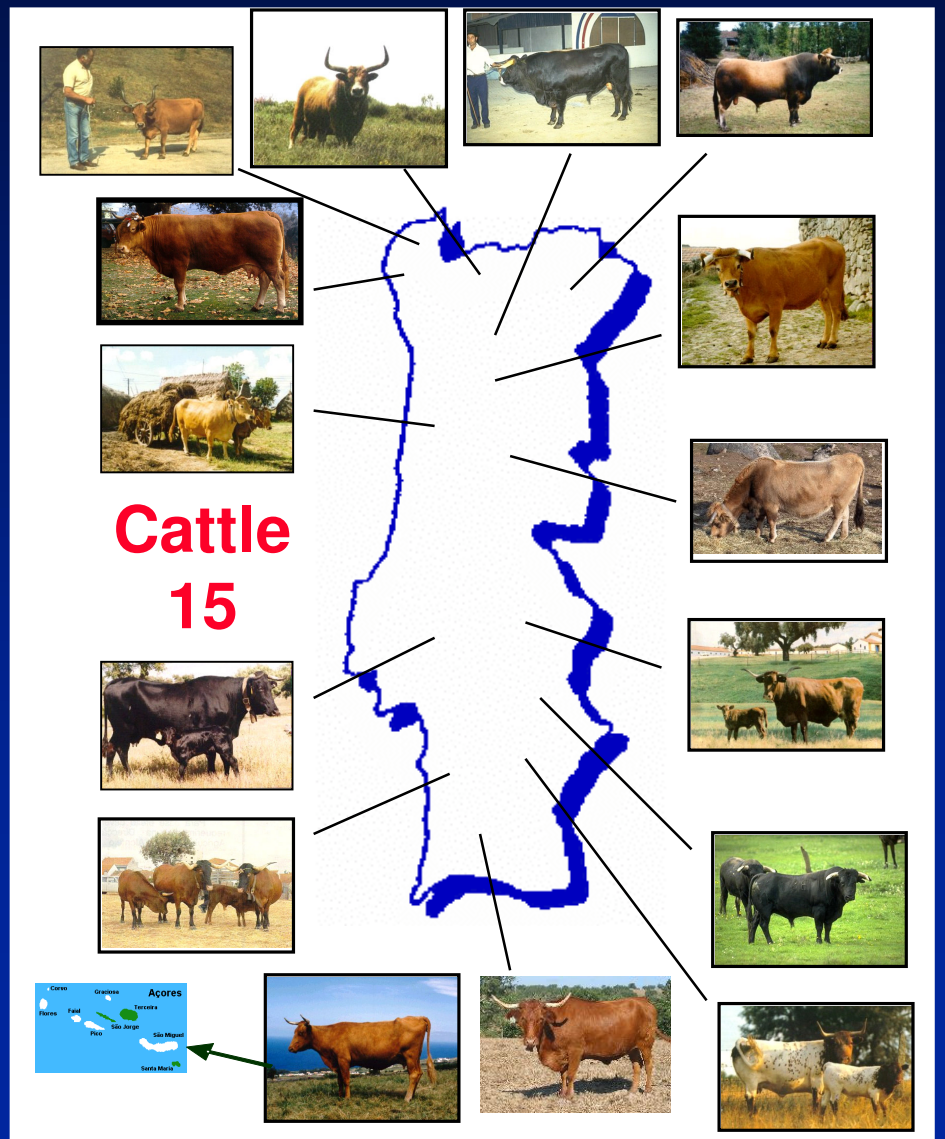
INRB and FMV-UTL

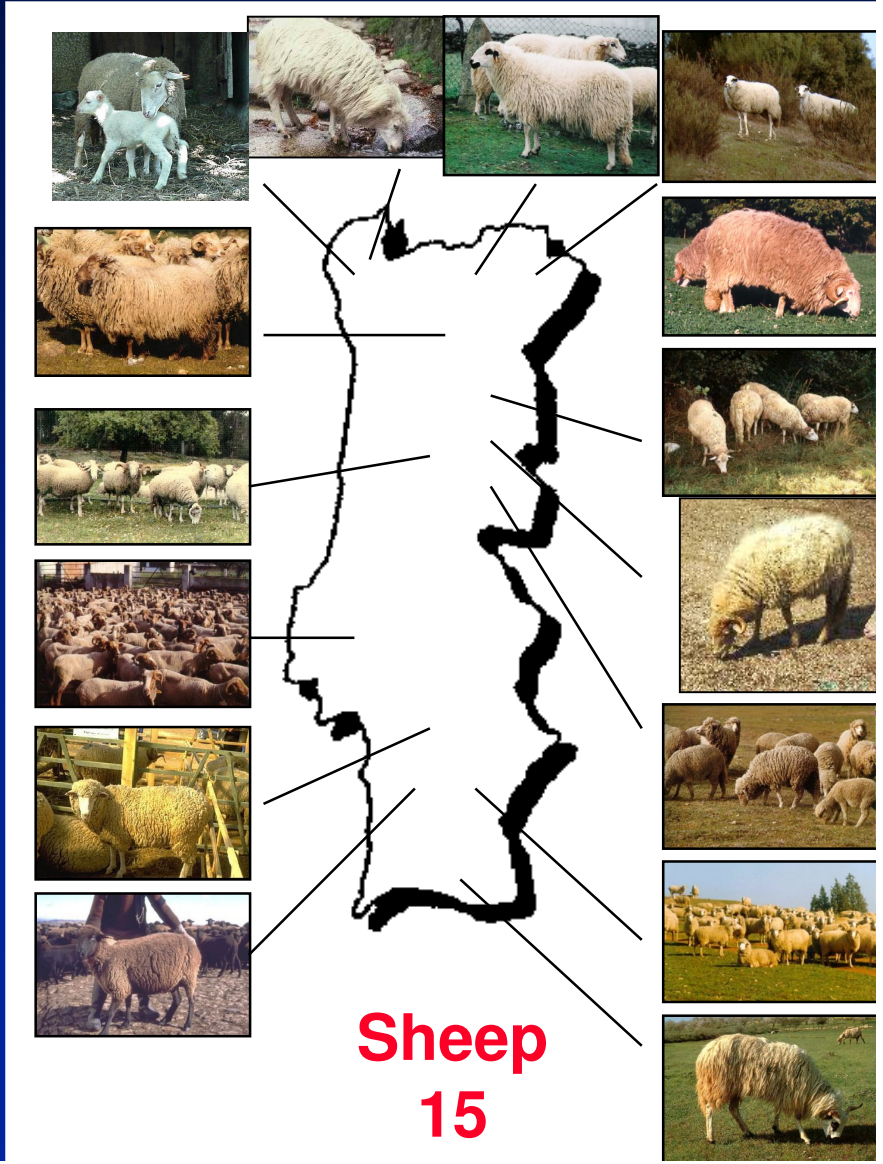
Portugal

- Small surface
  - Heterogeneity of climate, orography, farm structure, etc.
  - High levels of diversity in AnGR

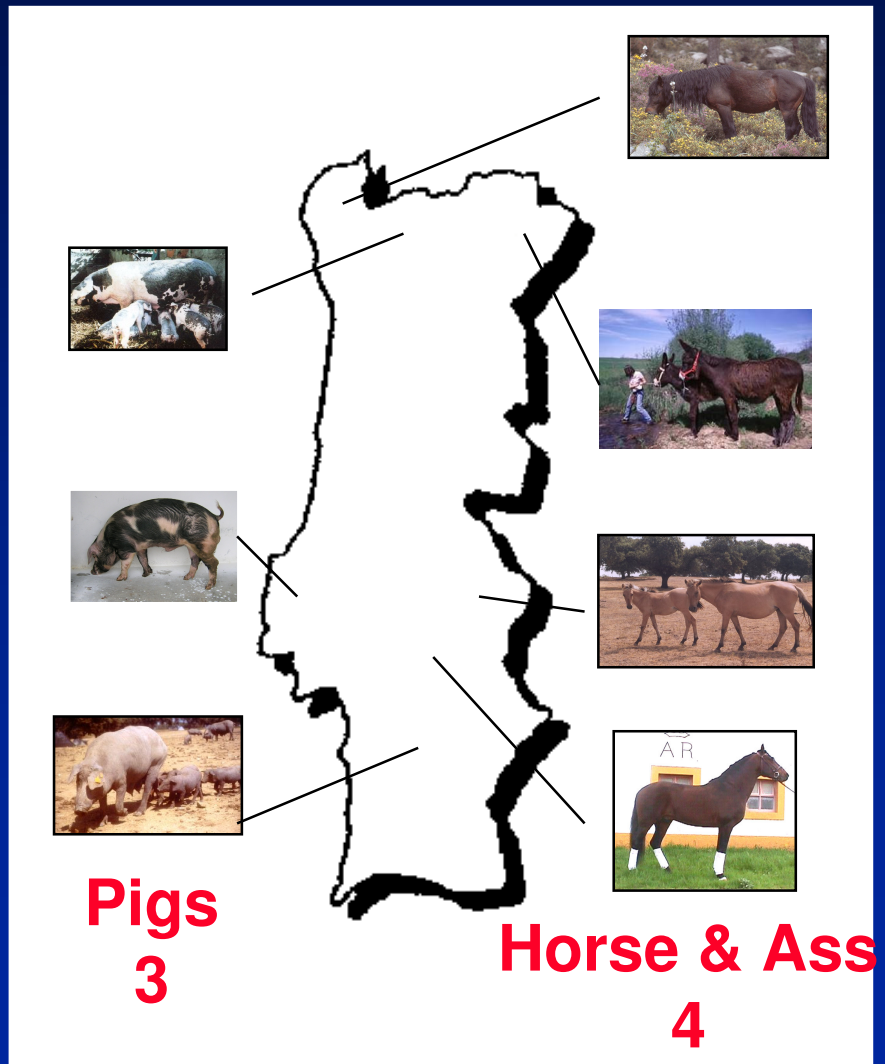


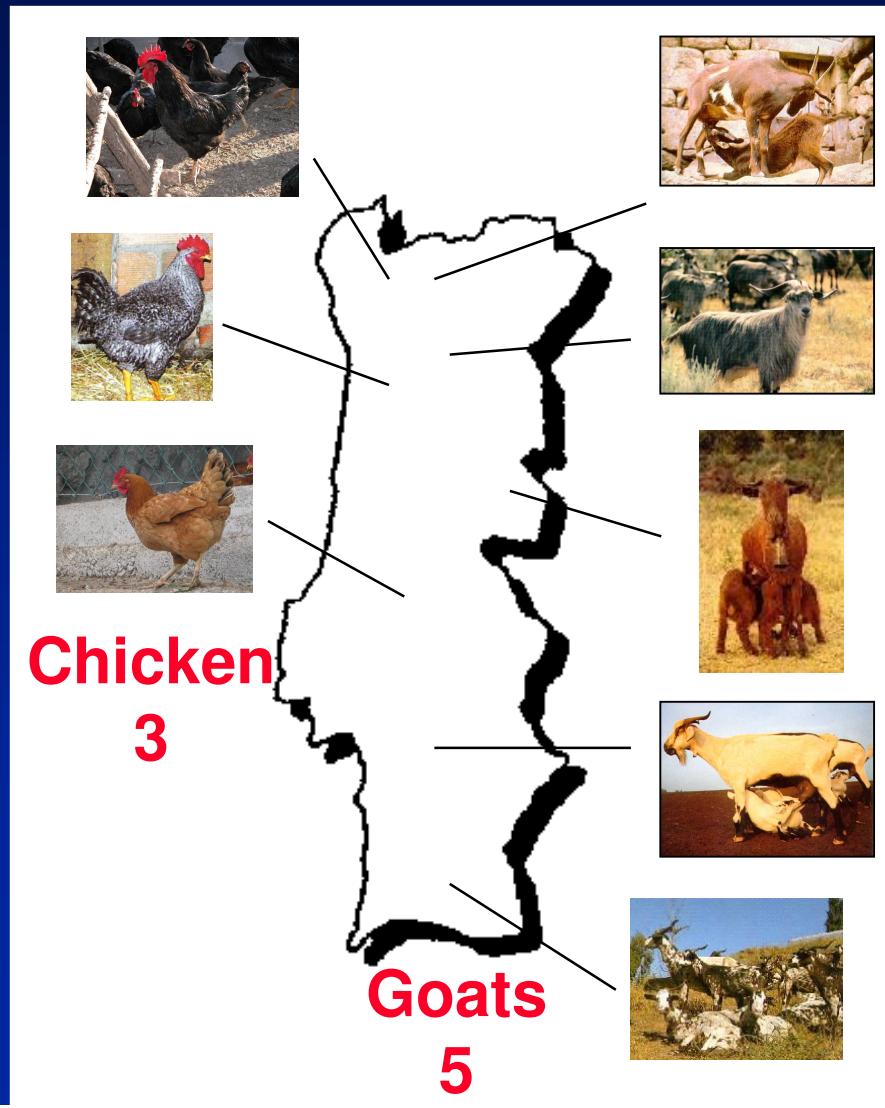
Native breeds





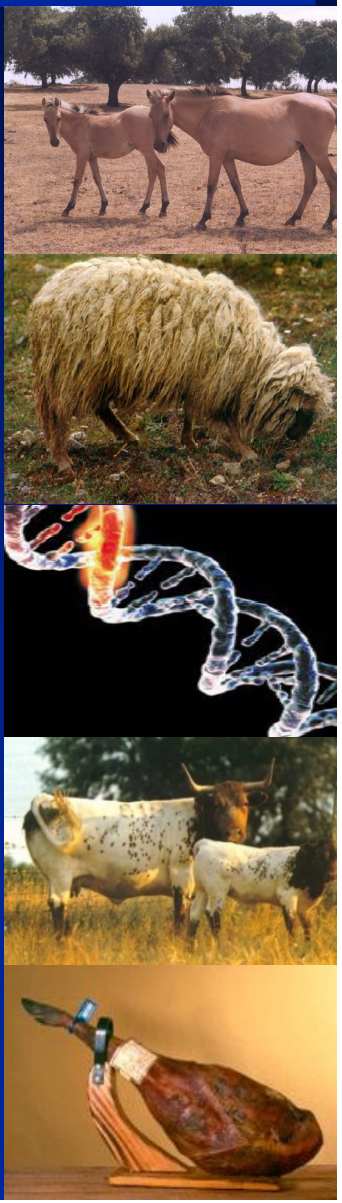
Native breeds





Native breeds

- Overall
  - 45 native breeds
  - 38 in risk of extinction!
    - EU criteria
- Need for:
  - Characterization
  - Conservation
  - Sustainable utilization
    - Selection → ↑competitiveness



Portugal

- Historical links with different regions of the world
  - Possible influence on AnGR

Similarity of breeds

Portugal, Spain and Latin America


Moxotó - BR


Nilo - BR


Crioulo Lageano - BR


Criollo - AR


Serpentina - PT


Alentejano - PT


Mertolenga - PT


Mirandesa - PT

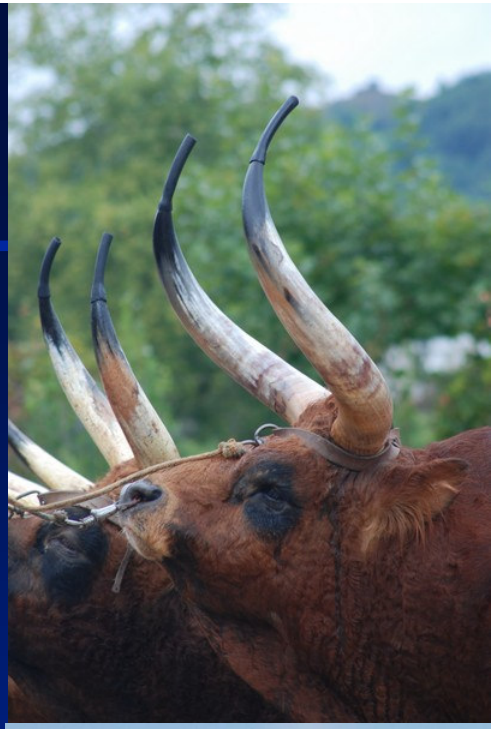
National policy

- **Over the last few years, emphasis on:**
  - Characterization of local AnGr
  - Valorization of products
  - Conservation programs
    - Ex situ
    - In situ
  - Selection programs

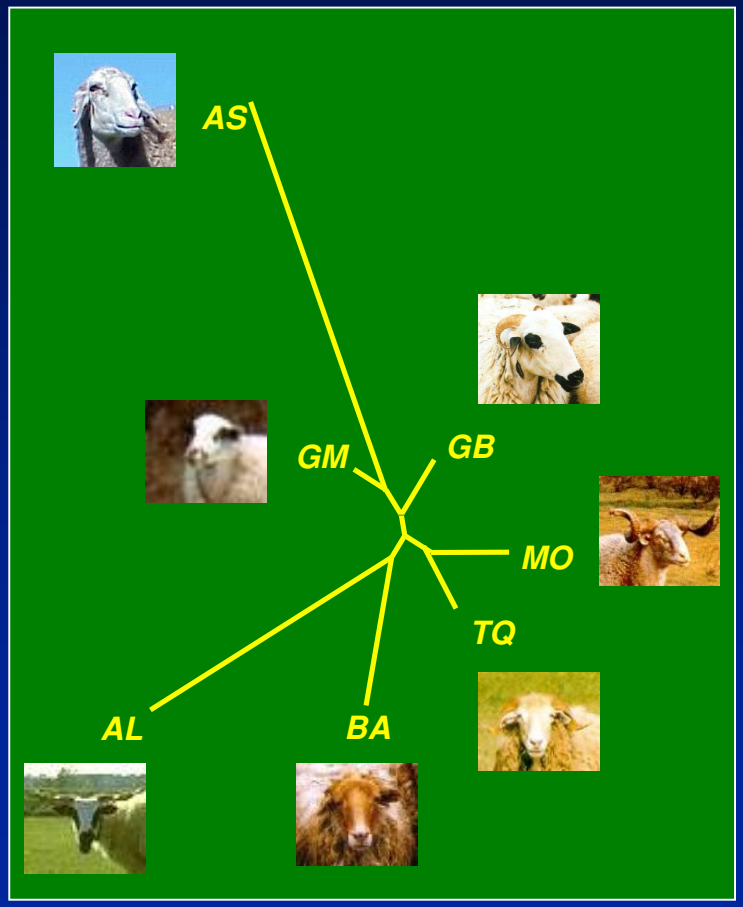



Characterization

- Genetic
- Demographic
- Productive



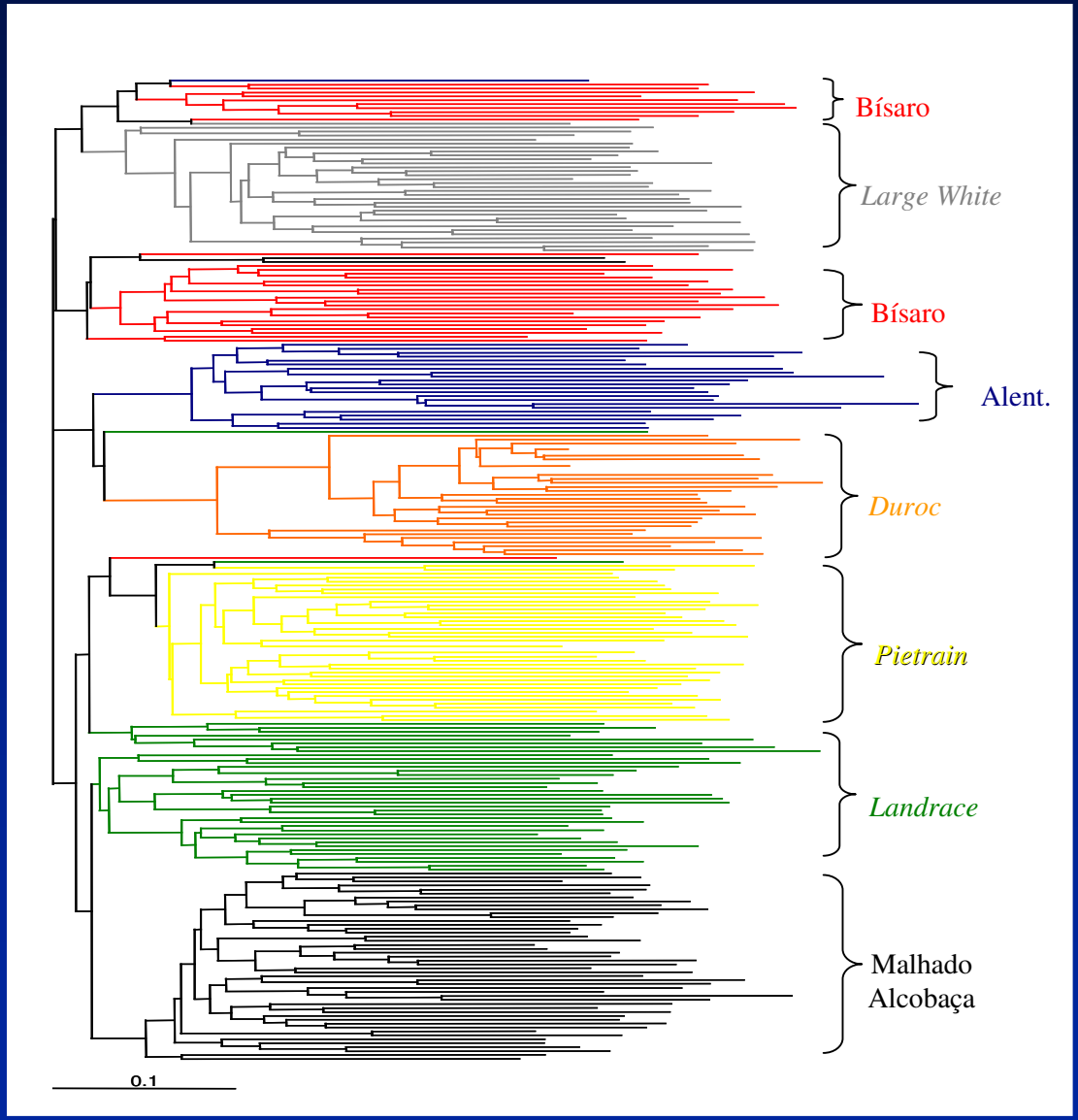
Sheep – Churra breeds



7 breeds
22 microsats

Santos-Silva et al., 2008

Characterization – pig breeds



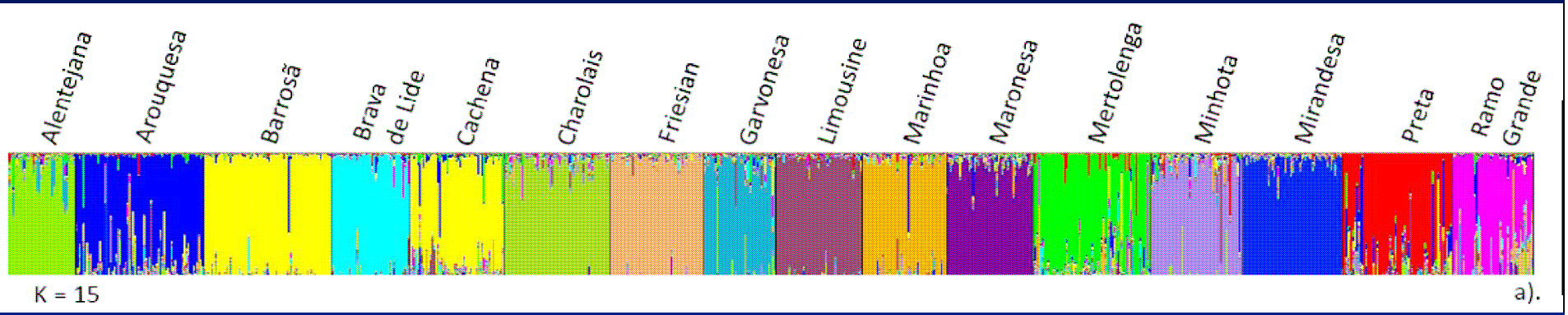
Tree of individuals

7 breeds
22 microsats

Journal of Animal Science

Vicente et al., 2008

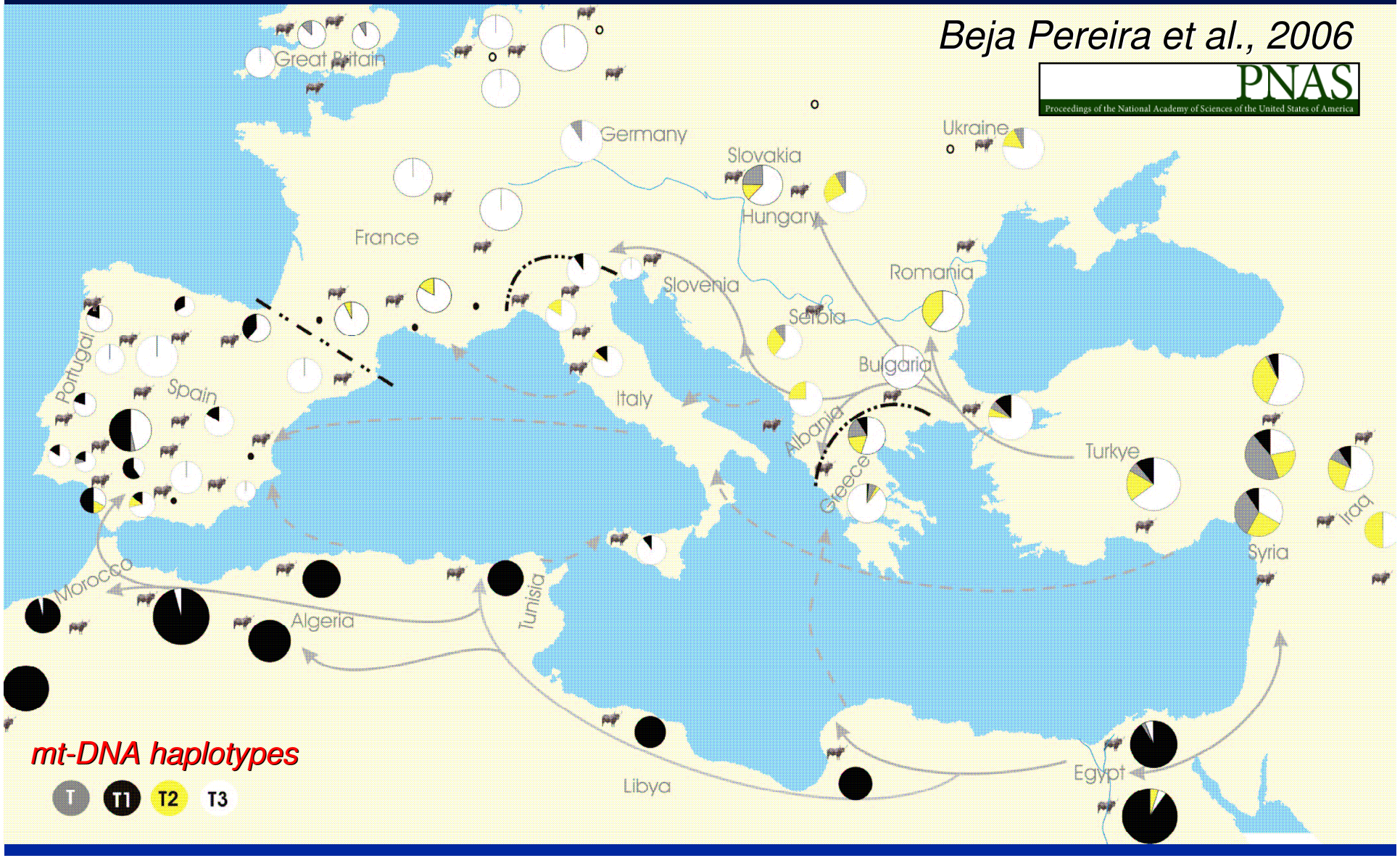
Cattle: Portuguese breeds



16 breeds
38 microsats

Ginja et al., 2009
Submmited to An. Gen.

mt-DNA: Mediterranean cattle breeds



Cattle - Ibero-american breeds

Y chromosome

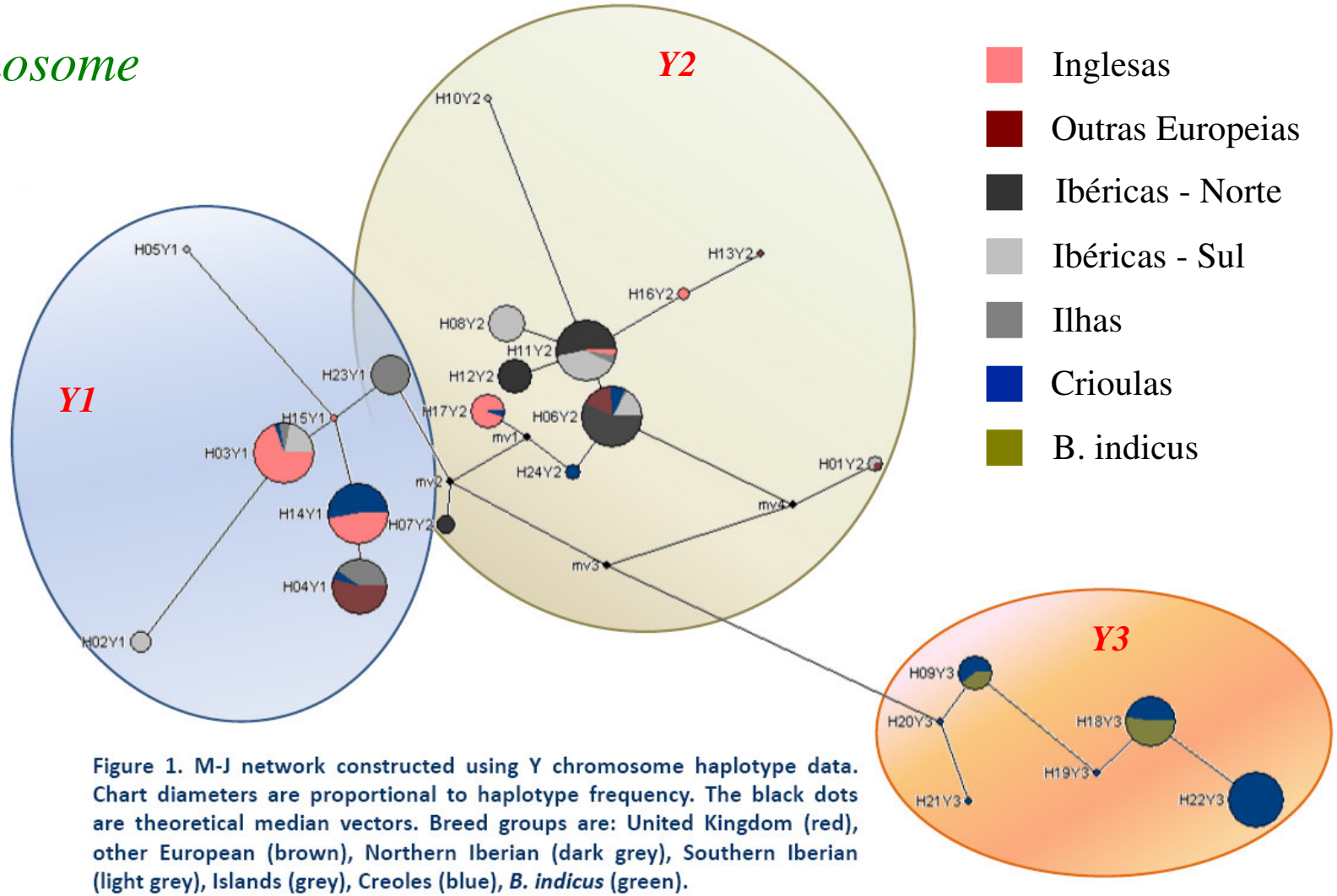


Figure 1. M-J network constructed using Y chromosome haplotype data. Chart diameters are proportional to haplotype frequency. The black dots are theoretical median vectors. Breed groups are: United Kingdom (red), other European (brown), Northern Iberian (dark grey), Southern Iberian (light grey), Islands (grey), Creoles (blue), *B. indicus* (green).

Ginja et al., 2008

Demographic characterization - Example

Malhado de Alcobaça

200 Fêmeas; 1 Criador

Mertolenga

21000 Fêmeas; 250 Criadores

Lusitano

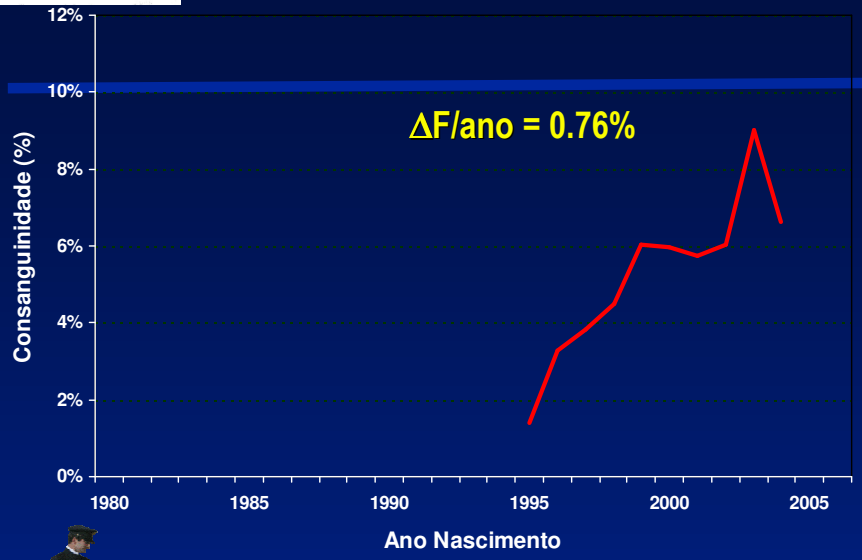
4000 Fêmeas; 300 Criadores

Brava de Lide

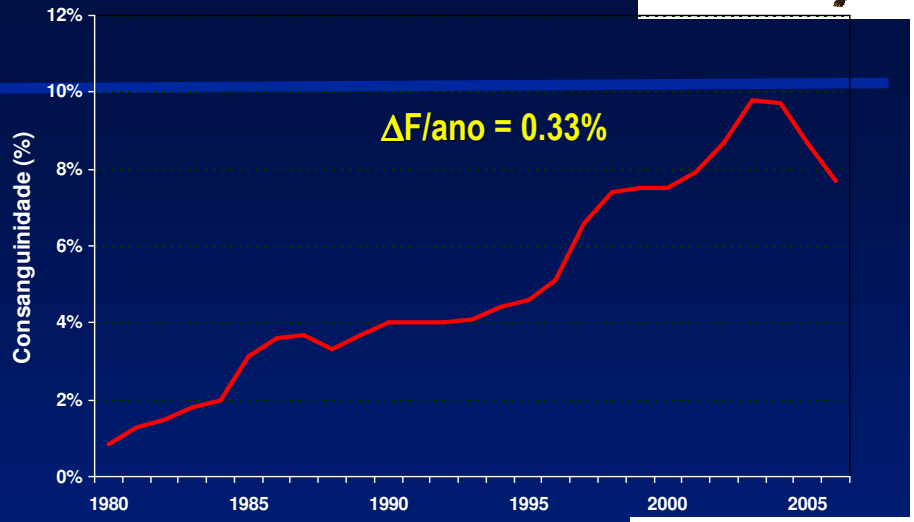
9000 Fêmeas; 93 Criadores

Evolução da Consanguinidade

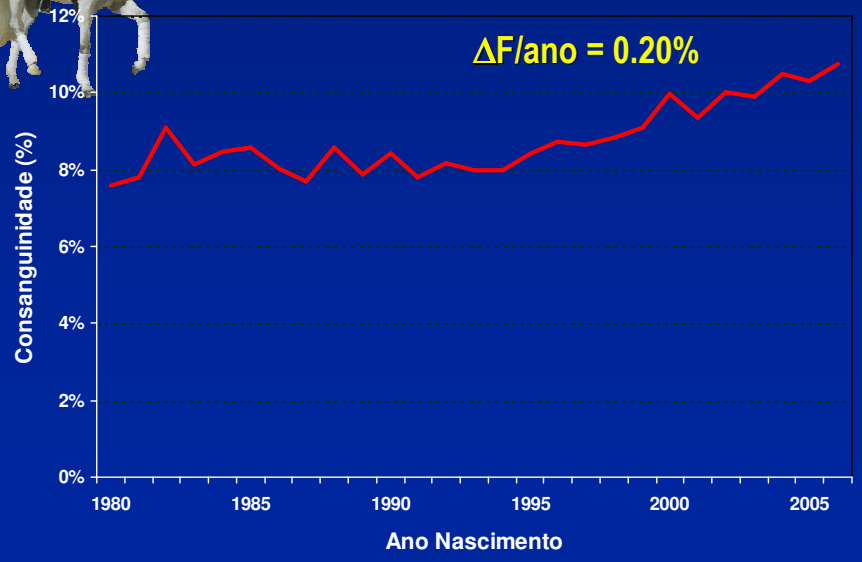
Malhado de Alcobaça



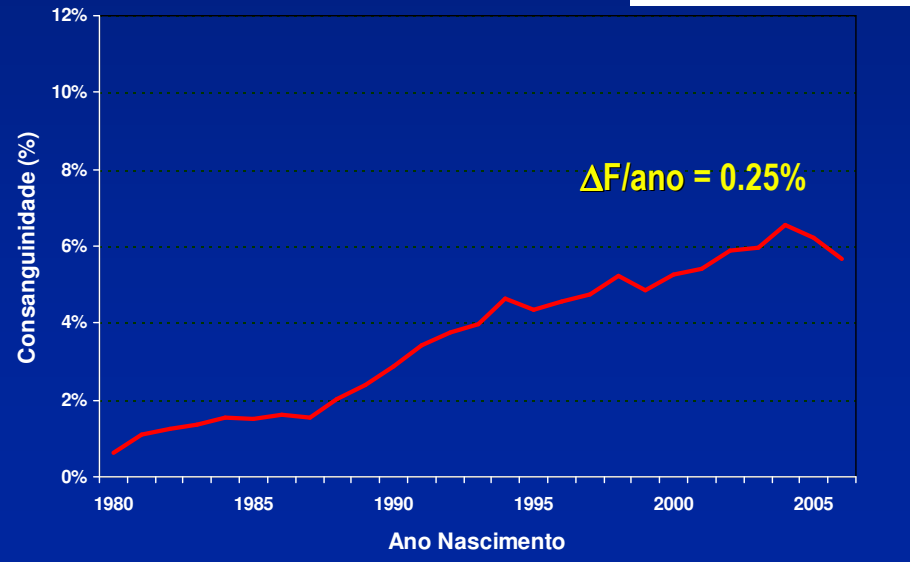
Mertolenga



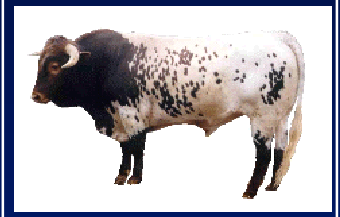
Lusitano



Brava

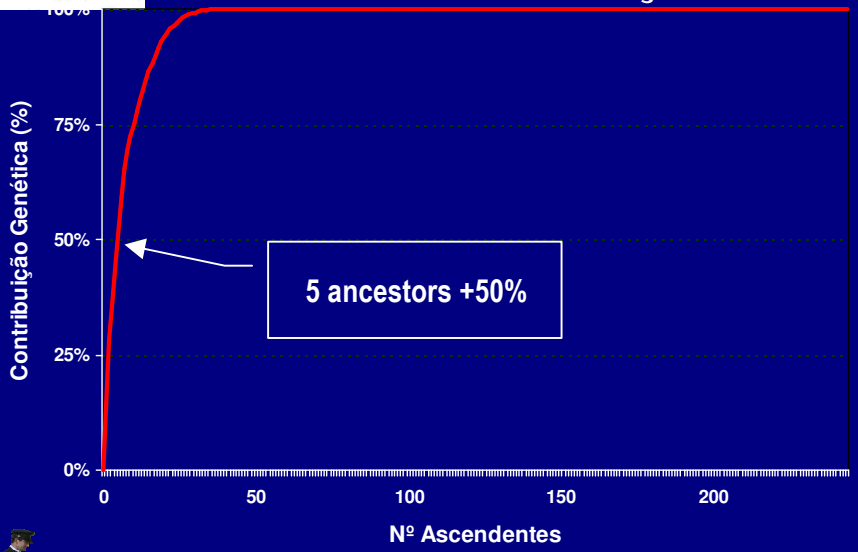


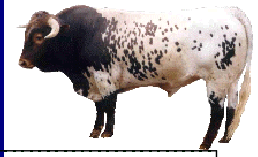
Demographic characterization

				
	Malhado de Alcobaça	Mertolenga	Lusitano	Brava
Nº ♀	200	21000	4000	9000
ΔF/ano	0.76%	0.33%	0.20%	0.25%
L	2.62	6.00	10.40	8.60
ΔF/gera.	1.99%	2.00%	2.08%	2.15%
N_e	25.1	25.0	24.5	23.3
f_a	12.7	80.3	13.8	211.9
f_e	13.1	125.0	37.5	262.3

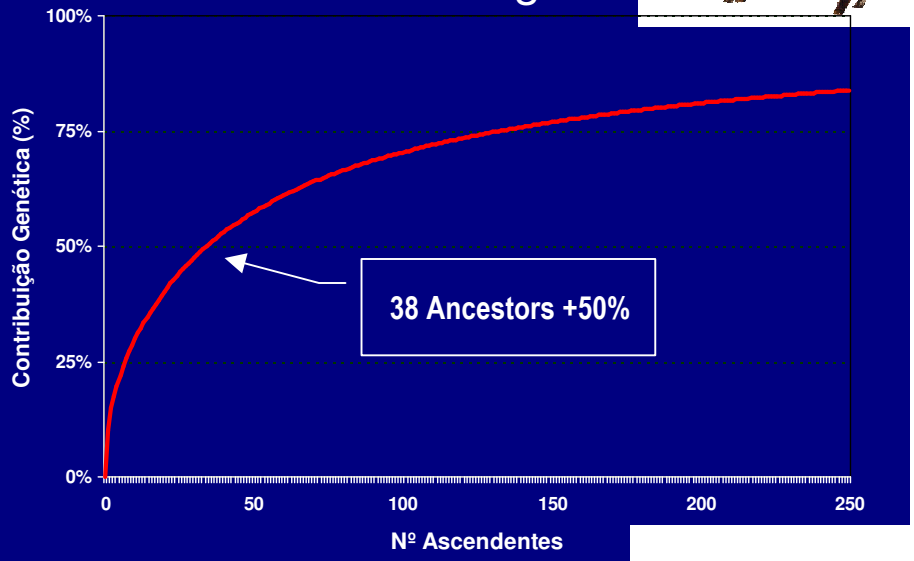
Genetic contribution of ancestors

Malhado de Alcobaça

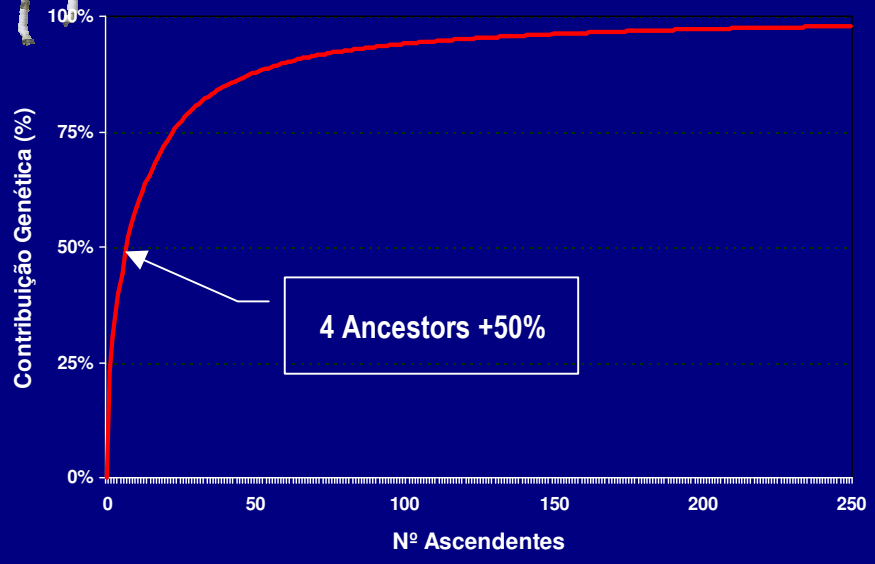




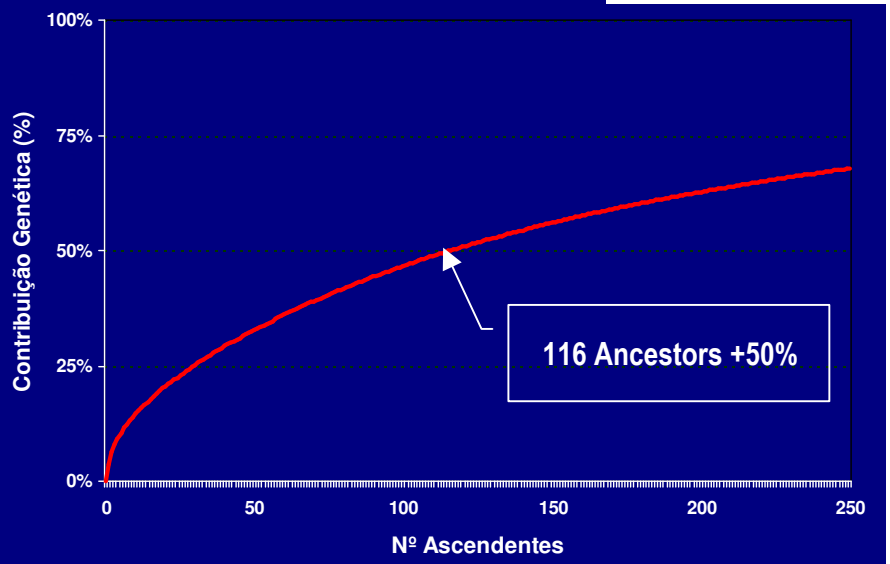
Mertolenga



Lusitano



Brava



Demographic analyses

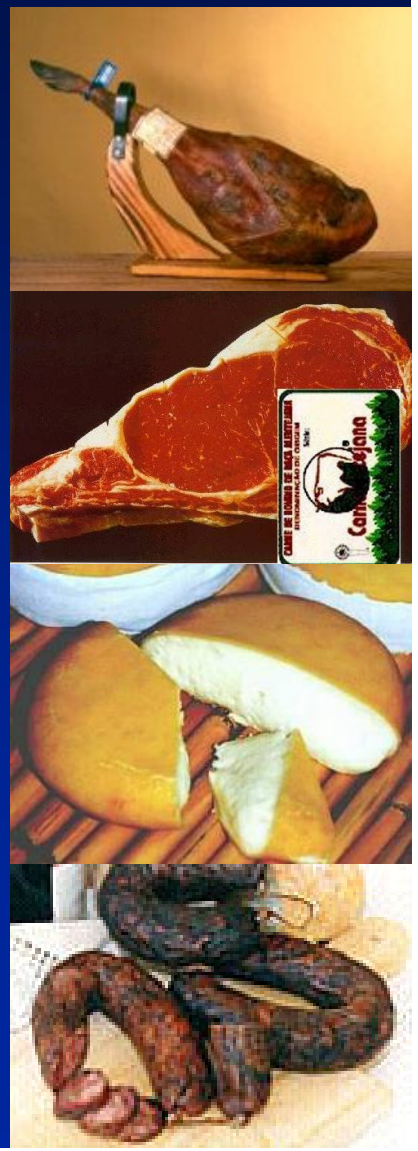
- Need for:
  - Approriate assessment criteria
  - Development of recommendations
- Probably different depending on:
  - Species
  - Genetic management

Valorization of products

Valorization of products

- **Certified products in Portugal**

Type	n
Beef	10
Pork	2
Lamb	10
Kid	5
Cheese	13
Sausage	36



- Represent <5% of total consumption
- Price is ~20-50% higher than generic product

Conservation of AnGR

Ex situ conservation

- National Animal Germplasm Bank

	Semen		Embryos	
	No. breeds	No. sires	No. breeds	No. dams
Cattle	10	178	-	-
Sheep	10	59	3	32
Goats	5	36	3	7

In situ conservation

- **Support to breeds in risk of abandonment**
  - EU regulations 1698/2005 and 1974/2006

Status	Maximum number					Support €/std head
	Cattle	Sheep Goats	Pigs	Horse	Chicken	
Rare	500	3 000	1 000	500	2 000	**200**
Highly threatened	2 500	5 000	5 000	2 000	10 000	**170**
Threatened	6 000	8 000	12 000	4 000	20 000	**110**
At risk	7 500	10 000	15 000	5 000	25 000	**90**

How many breeds qualify for support?

- **Support to breeds in risk of abandonment**
  - EU regulations 1698/2005 and 1974/2006

Status	No. breeds covered					No. breeds
	Cattle	Sheep Goats	Pigs	Horse	Chicken	
Rare	3	3	1	1	3	**11**
Highly threatened	3	4	1	2	-	**10**
Threatened	4	6	1	1		**12**
At risk	2	3	-	-	-	**5**
Total supported	12	16	3	4	3	**38**
Total no. breeds	15	20	3	4	3	**45**

In addition…

- Conservation herds/flocks kept in state farms for some of the highly endangered breeds

Garvonesa

Sorraia

Churra do Campo

Churra Algarvia

Breeding programs

Breeding programs - Objective

- To increase competitiveness of local breeds
  - Selection for production traits
  - Maintenance of genetic diversity
- Programs managed by breed associations
  - Plans approved in 2008
  - Scientific support by researchers
- Final goal (2010)
  - Conservation program underway
  - Genetic evaluation

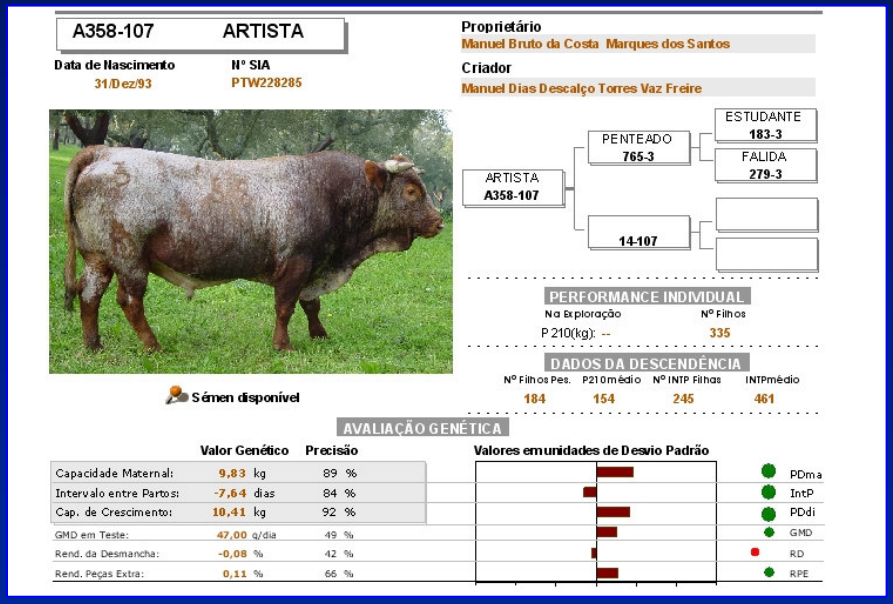
Support to native AnGR

- Support to Breed Associations (cattle)

	Support (€)	Per
Registration in Herdbook	9	Animal
Parentage testing	18.5	Animal
Genetic characterization	20	Animal
Demographic characterization	3500	Breed
Ex situ conservation	800	Year
Artificial insemination	3000	Year
Carcass and meat quality traits	800	Year
Performance recording	12	Animal
Breed promotion	3250	Year
Genetic evaluation	3500	Year
Milk recording (sheep)	12	Animal

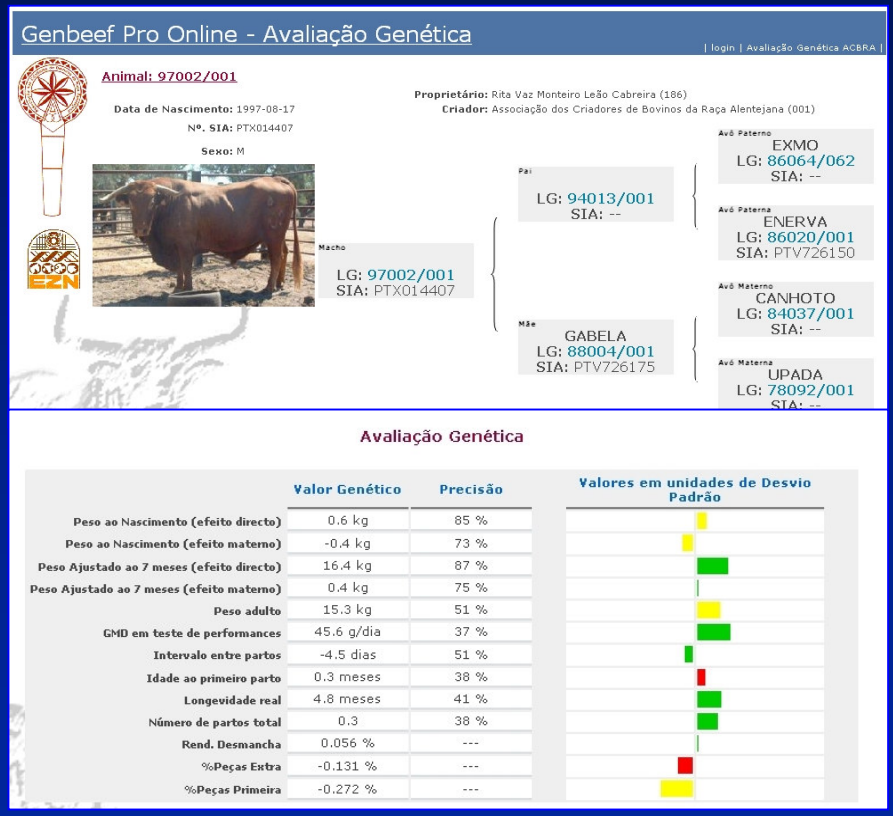
Examples

Mertolenga



6 traits
125729 records
122 bulls

Alentejana



13 traits
100562 records
192 bulls

Conclusion

- Breed associations are at a turning point
- Either:
  - set up conservation program
  - establish selection program yielding a genetic evaluation
  - or else…