# National Plan for the Management of AnGR in Portugal

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*NC - Portugal*





# Portugal

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

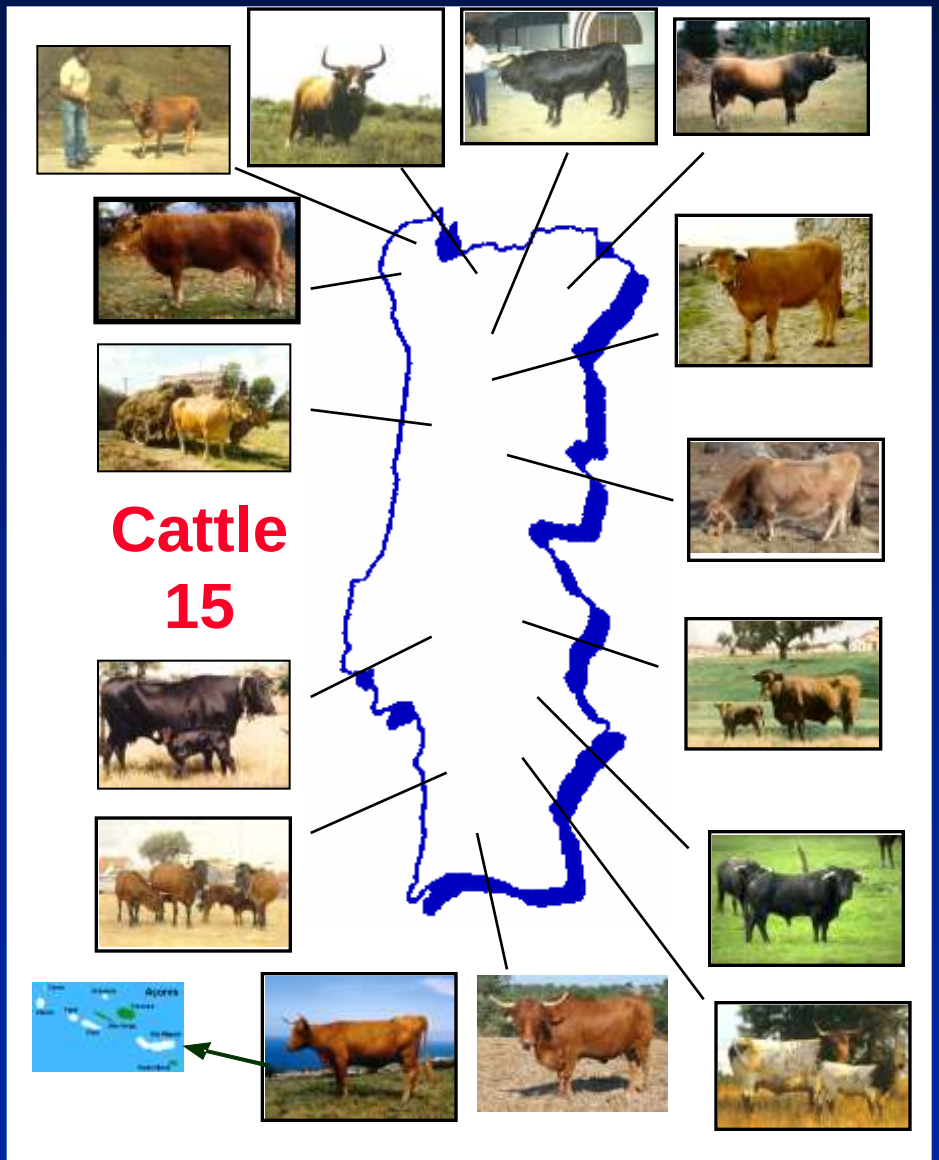
# Genetic diversity

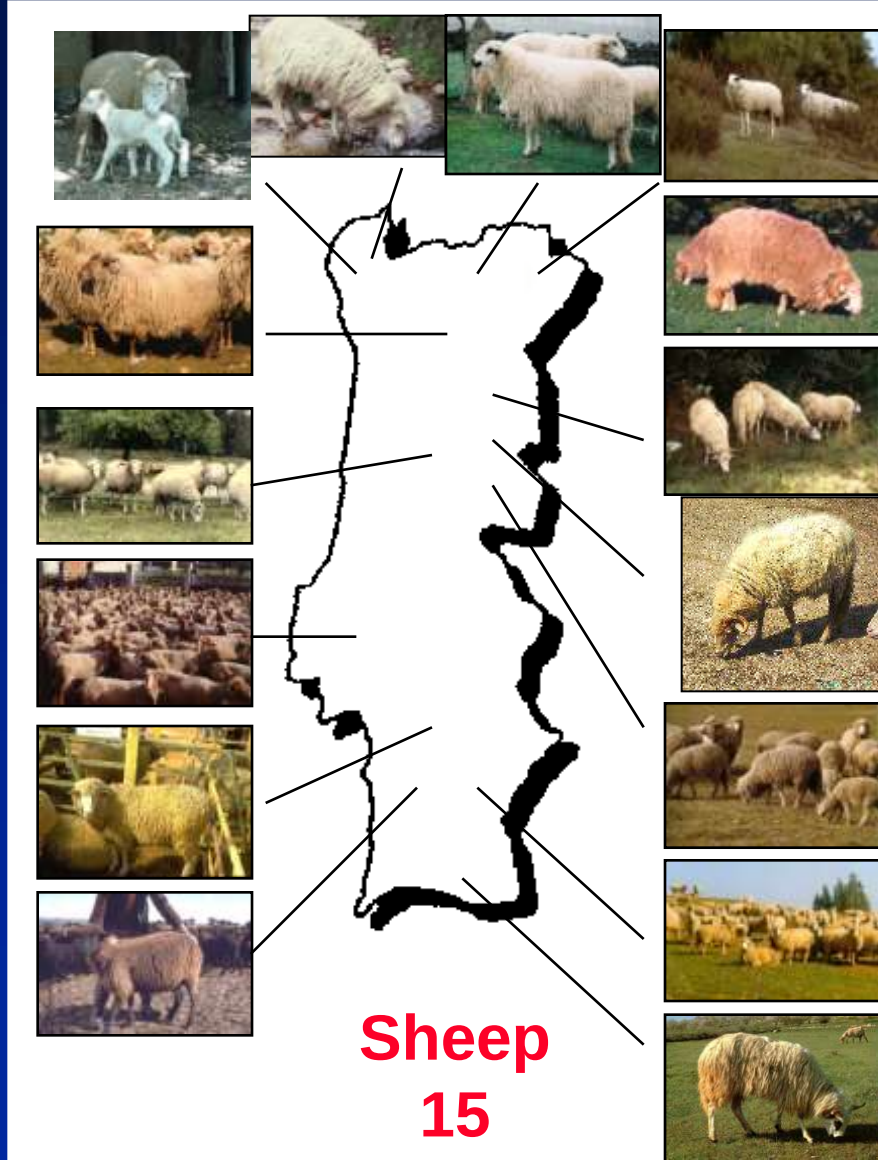
- Example of cattle

**Cachena**
MW = 250 kg

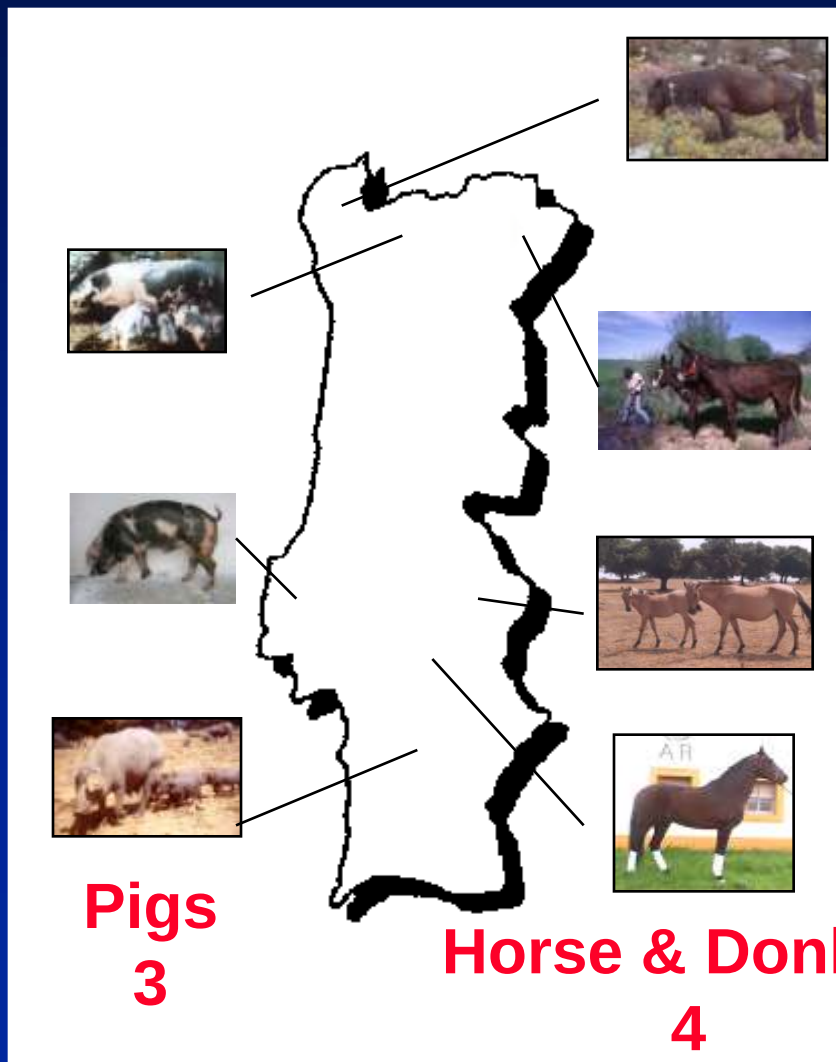
**Alentejana**
MW = 700 kg

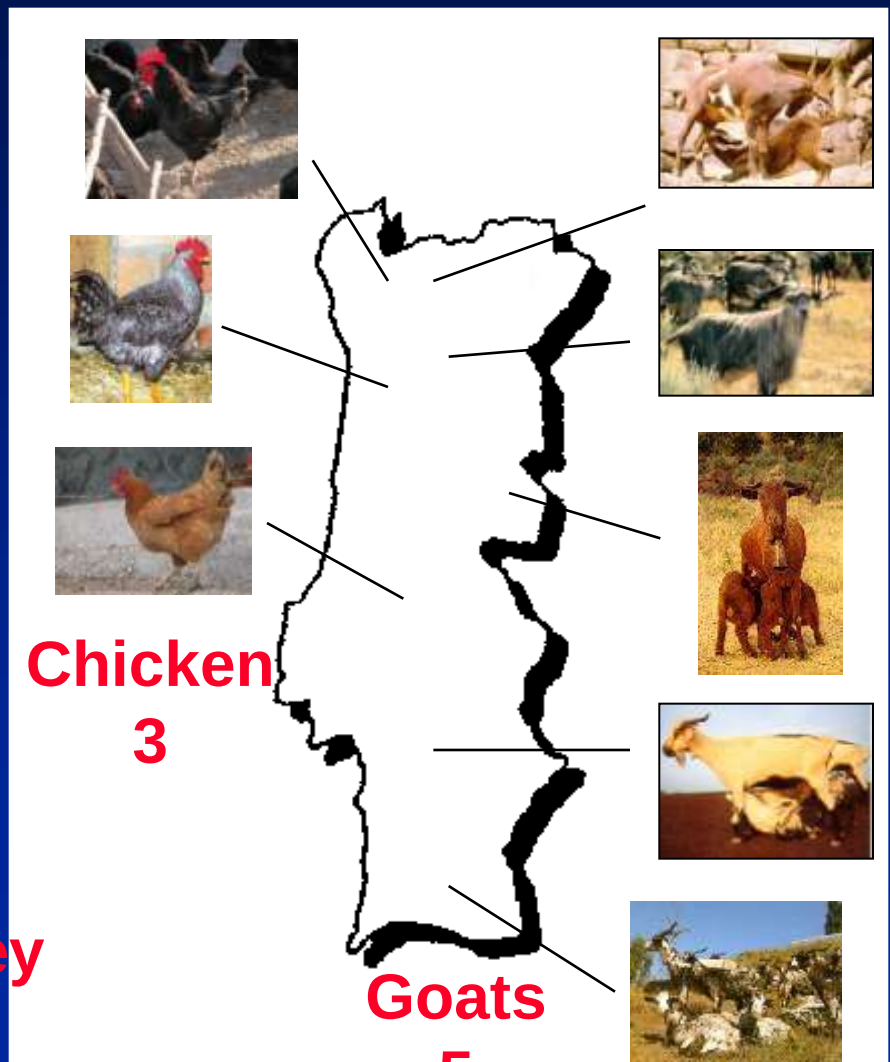
# Native breeds



# 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

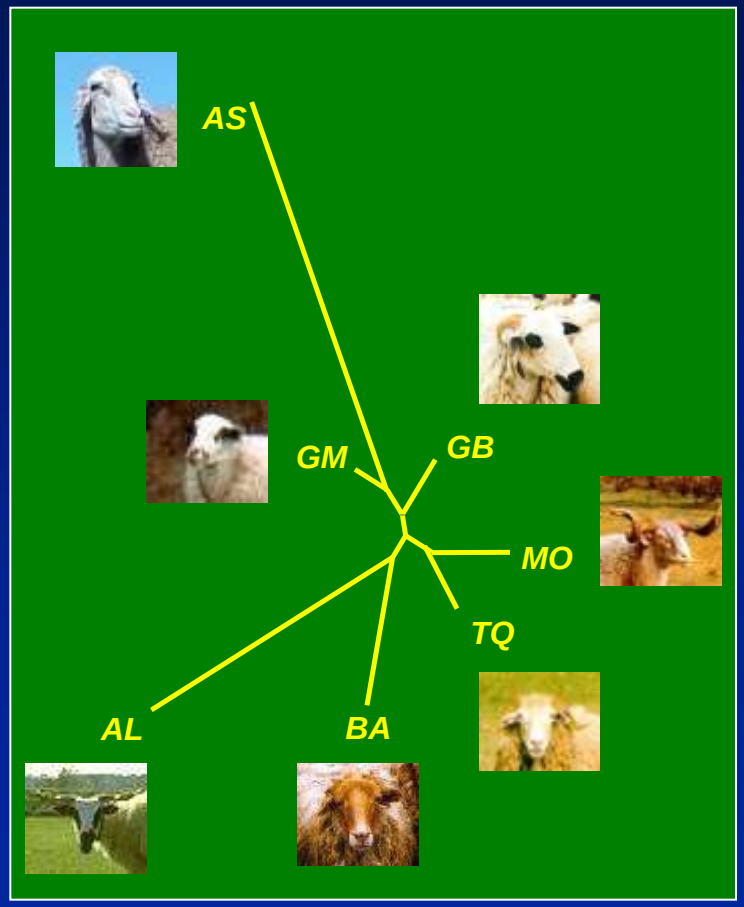
- **AnGR have been recognized as a strategic priority since the early 90's**
- **Over the last years, emphasis on:**
  - Characterization of local AnGr
  - Valorization of products
  - Conservation programs
    - Ex situ
    - In situ
  - Selection programs
- Legislation approved in 2008 with a package of incentives for breeders and breeders' associations




# Characterization

- Genetic
- Demographic
- Productive

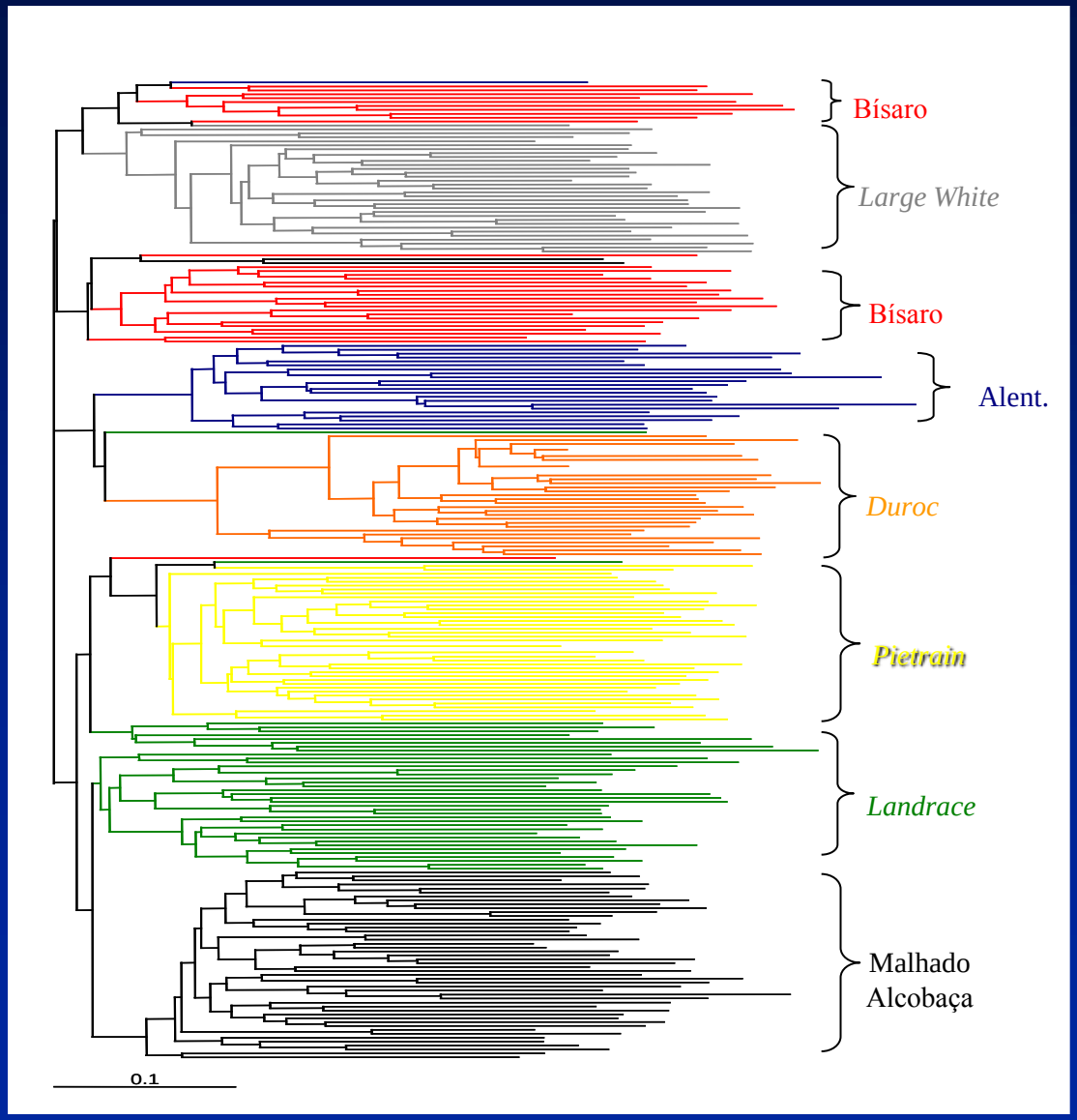
# Sheep – Churra breeds




7 breeds
22 microsats

*Santos-Silva et al., 2008*

# Characterization – pig breeds



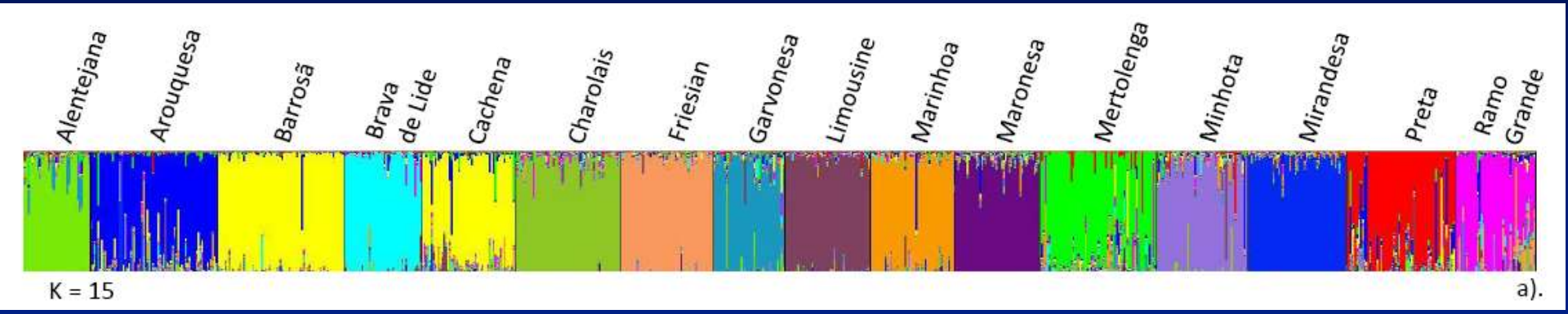

*Tree of individuals*

7 breeds
22 microsats

Journal of Animal Science

*Vicente et al., 2008*

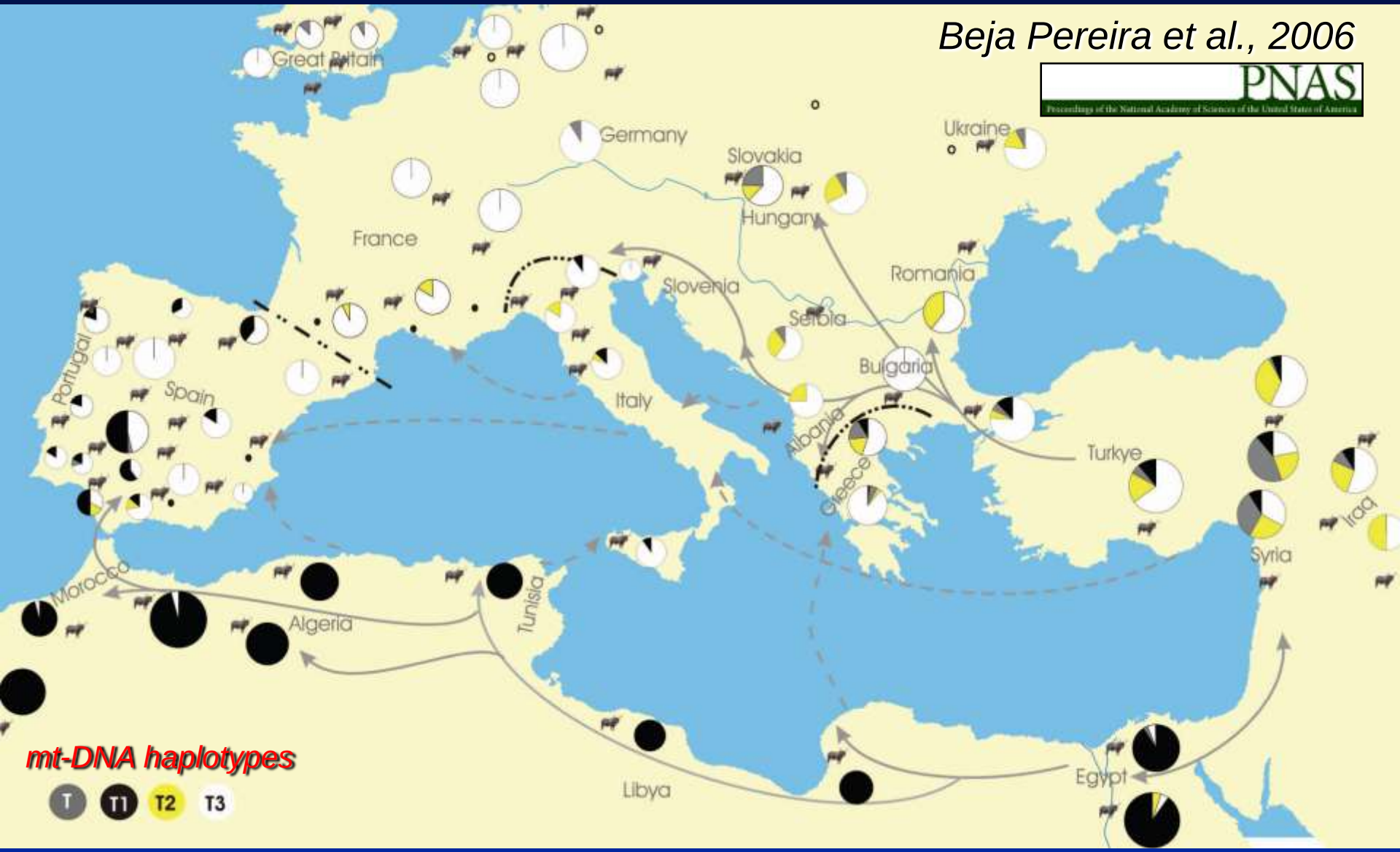
# Cattle: Portuguese breeds




16 breeds
38 microsats

*Ginja et al., 2009*
*J. Heredity (in press)*

# mt-DNA: Mediterranean cattle breeds



# Cattle - Ibero-american breeds

- Large study underway
- Involving
  - 85 breeds
  - 15 countries
- Common set of microsats
- mt-DNA
- Y chromosome

# Cattle - Ibero-american breeds

*Y chromosome*

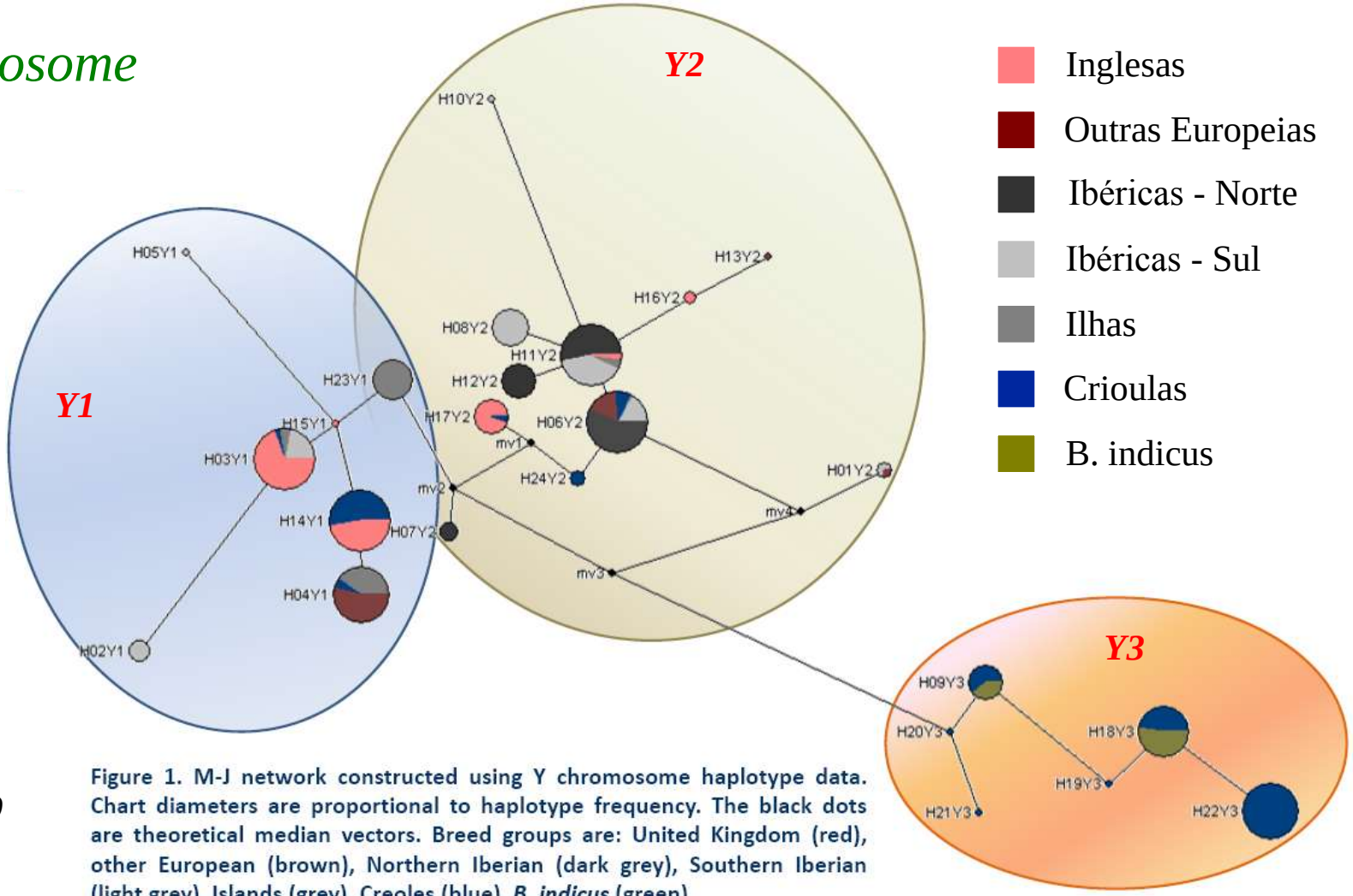



Figure 1. M-J network constructed using Y chromosome haplotype data. Chart diameters are proportional to haplotype frequency. The black dots are theoretical median vectors. Breed groups are: United Kingdom (red), other European (brown), Northern Iberian (dark grey), Southern Iberian (light grey), Islands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

*Ginja et al., 2009*
*Anim. Genet. (in press)*

# Demographic characterization - Example

## Malhado de Alcobaça

200 Fêmeas; 1 Criador

## Mertolenga

21000 Fêmeas; 250 Criadores

## Lusitano

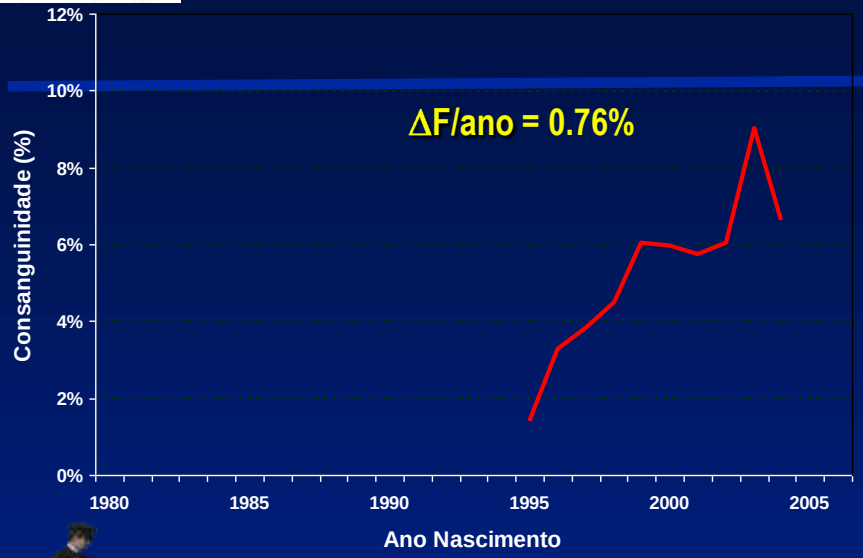
4000 Fêmeas; 300 Criadores

## Brava de Lide

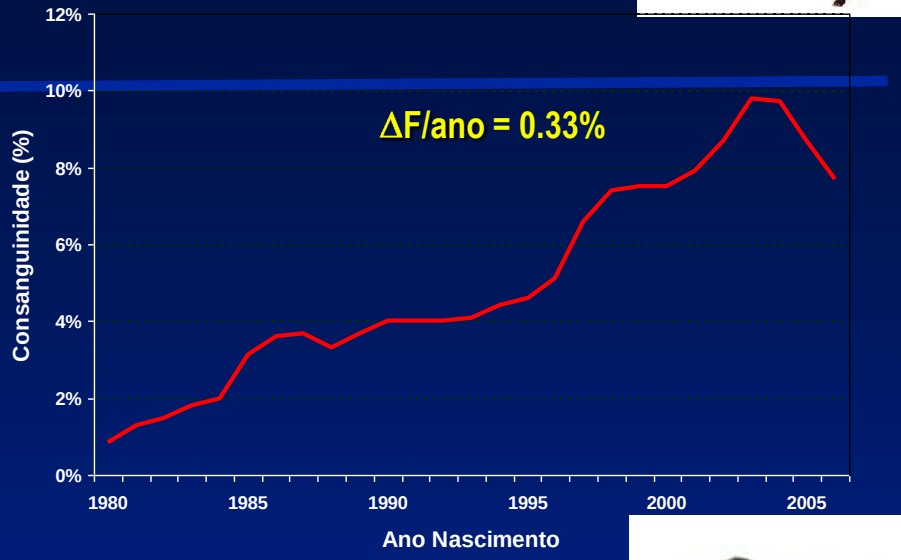
9000 Fêmeas; 93 Criadores

# Evolution of inbreeding

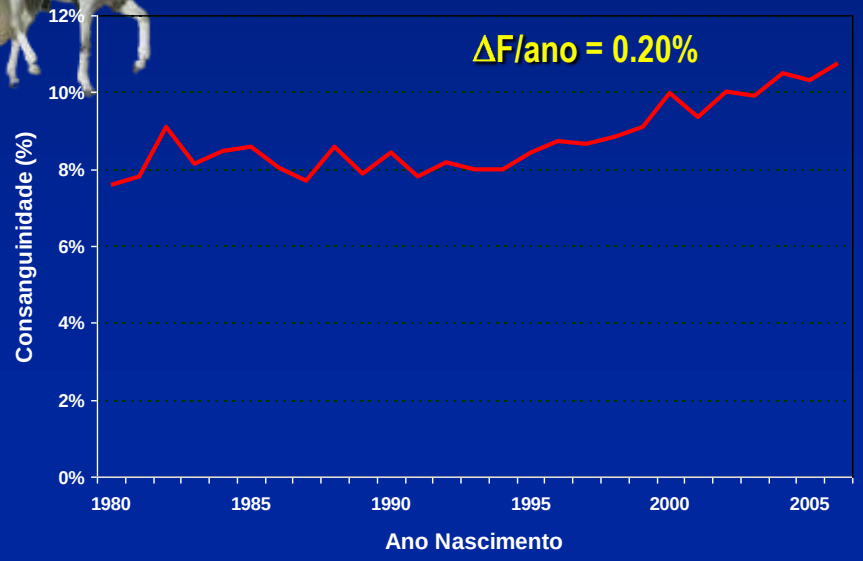
## Malhado de Alcobaça



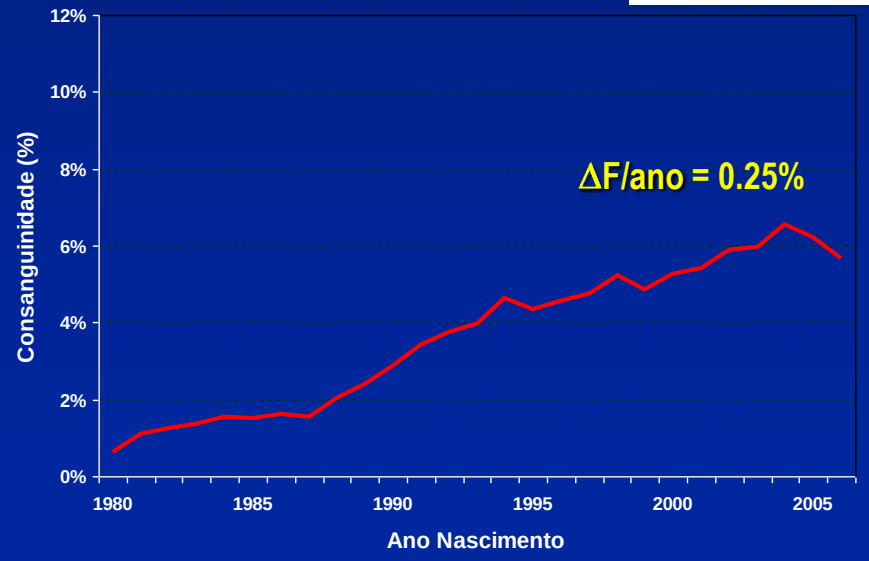

## Mertolenga




## Lusitano




## Brava

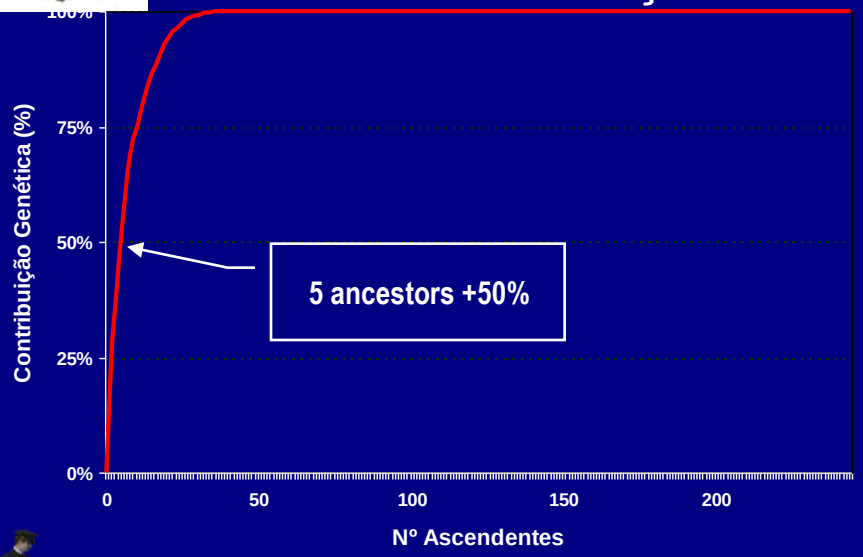


# Demographic characterization

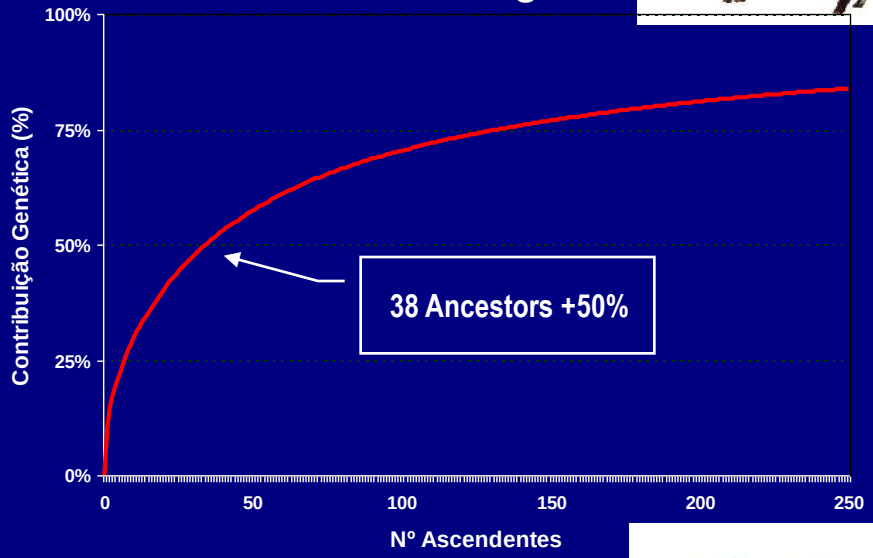
| |  |  |  |  |
|---|---|---|---|---|
| | Malhado de Alcobaça | Mertolenga | Lusitano | Brava |
| Nº ♀ | 200 | 21000 | 4000 | 9000 |
| ΔF/ano | 0.76% | 0.33% | 0.20% | 0.25% |
| L | 2.62 | 6.00 | 10.40 | 8.60 |
| ΔF/gera. | 1.99% | 2.00% | 2.08% | 2.15% |
| $N_e$ | 25.1 | 25.0 | 24.5 | 23.3 |
| $f_a$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

# Genetic contribution of ancestors

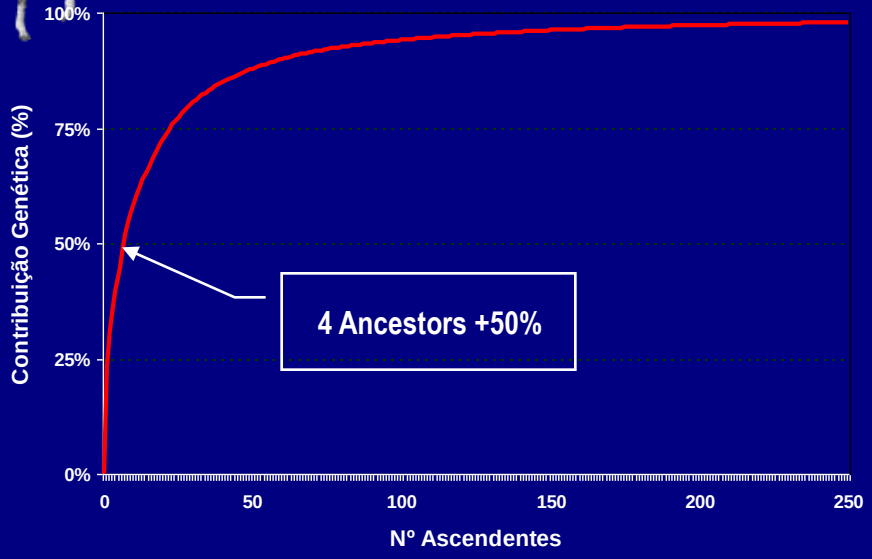
## Malhado de Alcobaça



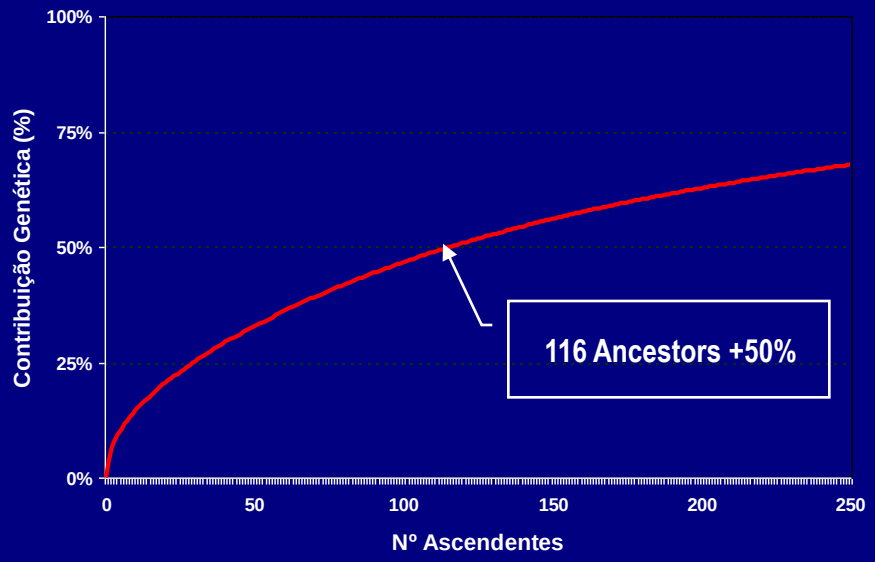

## Mertolenga




## Lusitano




## Brava



# Demographic analyses

- Need for:
  - Approriate assessment criteria
  - Development of recommendations
- Probably different depending on:
  - Species
  - Genetic management
- Perhaps this could be an interesting topic for the ERFP (joint research project?)

# 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/adaptation traits
  - Maintenance of genetic diversity
- Programs managed by breed associations
  - Plans approved in 2008
  - Scientific support by research groups
- Final goal (2010)
  - Conservation program underway
  - Genetic evaluation

# Support to native AnGR

- Support to Breed Associations (cattle)

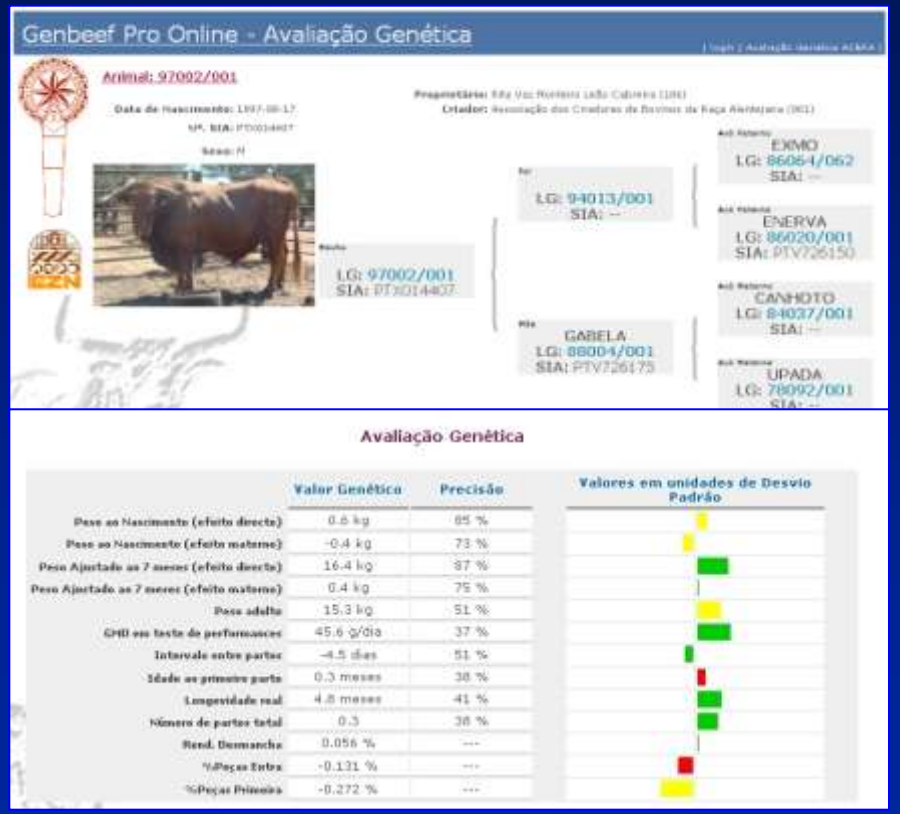
| | Support (€) | Per |
|---|---|---|
| **Registration in Herdbook** | 9 | Animal |
| **Parentage testing** | 18.5 | Animal |
| **Genetic characterization** | 20 | Animal |
| **Demographic characterization** | 3500 | Breed |
| **Ex situ conservation** | 800 | Year |
| **Artificial insemination** | 3000 | 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…