EVALUATING BREEDING STRATEGIES IN THE SORRAIA HORSE ENDANGERED BREED BY PEDIGREE DATA ANALYSIS

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Objectives

To analyze the **breeding strategies effects** on the genetic and demographic evolution of the SORRAIA HORSE breed, in order to define breeding plans in the future.

Introduction

✓ The **Sorraia Horse** has been managed as a closed population since its recovering, in 1937. It is believed to represent a **primitive equine breed** with a continuous presence in the Iberian Peninsula since early Pleistocene, being an important Portuguese AnGR to preserve.

✓ With less than 150 breeding mares, it is listed as **"critical maintained risk status"** by FAO and the only equine considered as **"rare/particularly endangered"** by the Portuguese authorities.

✓ Previous studies have provided basic information on its genetic constitution using genetic markers, ethological and morphological data analysis. Molecular markers showed a **DECREASED GENETIC VARIATION**, indicating that the genome has been widely affected by founder effect, genetic drift and inbreeding.

✓ The official **studbook** was published in 2004 and includes **complete pedigrees** of registered animals traced back to the founders.

Methodology

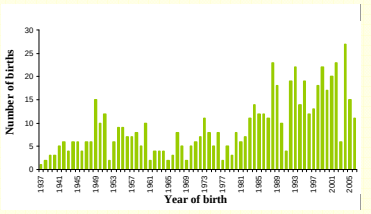
✓ Genealogical data were recorded in **SPARKS** software for studbook management and genetic and demographic analysis was complemented by **ENDOG 4.5** and **PM2000** computer programs.

✓ The dataset comprised a total of **653 animals** registered since the breed's foundation until 2006. A reference population constituted by the 206 living animals was considered for some calculations.

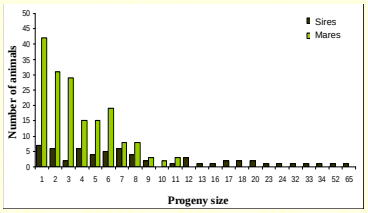
Final remarks

The number of births registered in the studbook strongly increased in the last 2 decades and the average values of F and AR tended to stabilize and even decrease in the recent past. The gathered results make it clear that an efficient conservation plan is essential to insure the maintenance of this singular breed. Appropriated management measures should, then, be implemented as a way to preserve the genetic diversity still present in the population. Minimizing inbreeding and mK, and using a larger number of stallions have shown to be possible and adequate breeding priorities.

Results



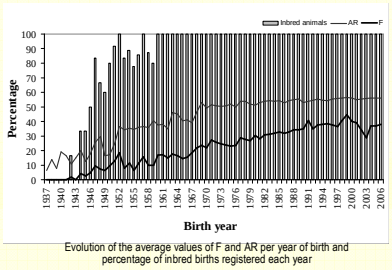
Number of births registered each year in the Sorraia horse studbook from the breed's foundation, in 1937, till 2006



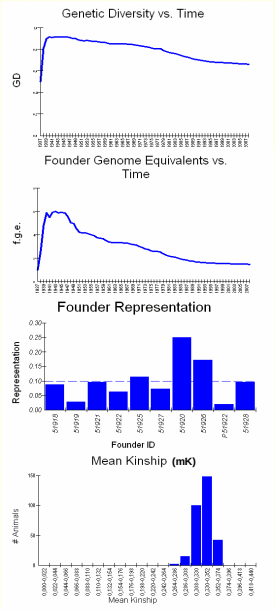
Distribution of the sires and mares registered in the Sorraia horse studbook by means of their progeny size.

Total number of animals	653
Number of founder animals	13
Effective number of founder animals (f_a)	7.46
Effective number of ancestors (f_e)	4
Number of ancestors explaining 100%	15
Number of ancestors explaining 50%	2
Mean inbreeding (%) (F)	26.99
Mean average relatedness (%) (AR)	46.26

Main genealogical parameters



Evolution of the average values of F and AR per year of birth and percentage of inbred births registered each year



✓ Pedigree analyses, mostly including **11 generations**, indicate a low N_e value (11,48 mean over past 8,18 generations) and revealed low levels of diversity in the Sorraia horse population, being consistent with the results obtained from molecular analyses.

✓ Only 36.1% of the registered animals produced offspring. This **reproductive fitness unbalance** is even more evident when we consider each sex separately: 52.2% of the females became dams and only 19.3% of males became sires.

✓ The inadequate breeding strategies practiced during most part of the breed's history justify the **low values of f_e and f_a** found, with a limited number of animals being necessary to explain the overall genetic diversity. Two of the 12 founders are no longer represented in the living population.

✓ The average levels of **AR, mK and F registered are extremely high** and far from the values reported for several other breeds. All living animals exhibit AR ≥ 50%, mK ≥ 0.25, and only 6 of the living animals have F values lower than 25%, from an average of 36.9%.