



# ANALYSIS OF BRAVIA GOAT BREED GENEALOGY



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## ABSTRACT

The analysis of available genealogical data from the Bravia goat breed using ENDOG 4.8 revealed several key findings. Out of 65,292 animals analyzed, only 30.33% have a known mother and 7.63% have a known father, indicating a low level of pedigree completeness within the population. The mean inbreeding value for the entire population was calculated to be 3E-04%, suggesting minimal levels of inbreeding, and this may be the consequence of the low level of pedigree completeness within the population. However, the mean genetic conservation index for the entire population was 1.116, indicating that the genetic contribution from founders to the population is unbalanced and lacks significance. Recommendations include: (1) Continuously reviewing filiation attribution procedures. (2) Establishing a periodic monitoring routine to ensure the genealogy quality of registered animals. (3) Encouraging breeders to actively participate in filiation attributions to contribute to the conservation of the Bravia goat breed. By implementing these recommendations, it is possible to enhance the quality and completeness of genealogical data, ultimately supporting the conservation and preservation of the Bravia goat breed for future generations.

## INTRODUCTION

Assertive, brave, and rustic – these are the attributes of the animals of this goat breed, and they are reflected in the etymological meaning of its name ("bravia" translating to wild). The Bravia goat breed is one of six goat breeds native to Portugal, and the only one reared solely for meat production. Adapted to extensive production systems based on mountain grazing routes, the Bravia goat is inseparable from the mountainous landscapes of northern Portugal. Nowadays, there are approximately 12,500 animals from this breed, distributed among around 116 breeders. ANCABRA (Associação Nacional de Criadores de Cabra Bravia) is the Portuguese recognized entity for managing the Bravia Goat Breed Genealogical Logbook (LGCB Livro Genealógico da Cabra Bravia), and for the elaboration and execution of the Genetic Selection and Conservation Program. The objectives of this work were to: (1) assess the population structure with the available genealogical data, (2) draw conclusions about genetic conservation, and (3) propose measures and actions to ANCABRA to ensure the conservation of this breed.



## METHODOLOGY

The Bravia Goat Breed Genealogical Logbook was created in 1996, and until the end of 2023, the LGCB had in its records 65.292 breeding animals, with 95.2% females and 4.8% males, distributed by 328 groups (breeders/farms). After data cleaning, some data was excluded (missing sex records or birthdates), the data was then treated with ENDOG 4.8. (Gutiérrez et al., 2005), which allowed the computing of the following population parameters:

- Pedigree content completeness
- Individual inbreeding coefficient (F)
- Effective population size (Ne)
- Average relatedness coefficient (AR)
- Genetic conservation index (GCI)

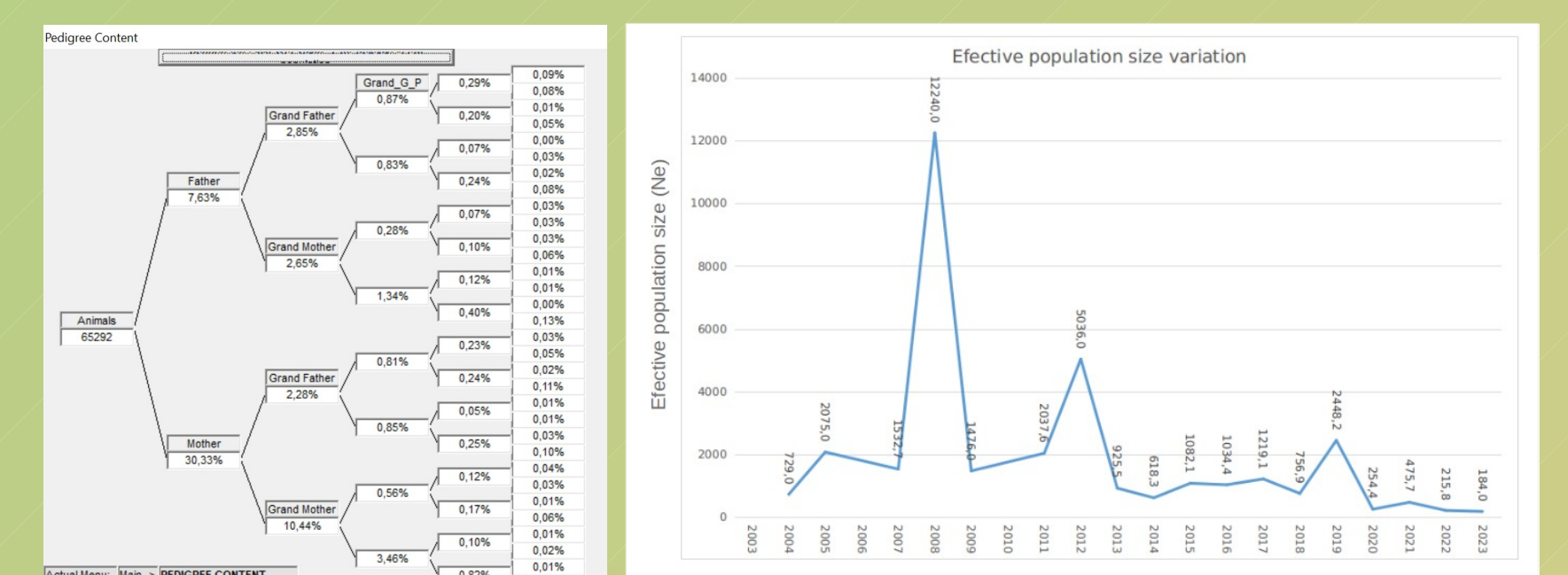
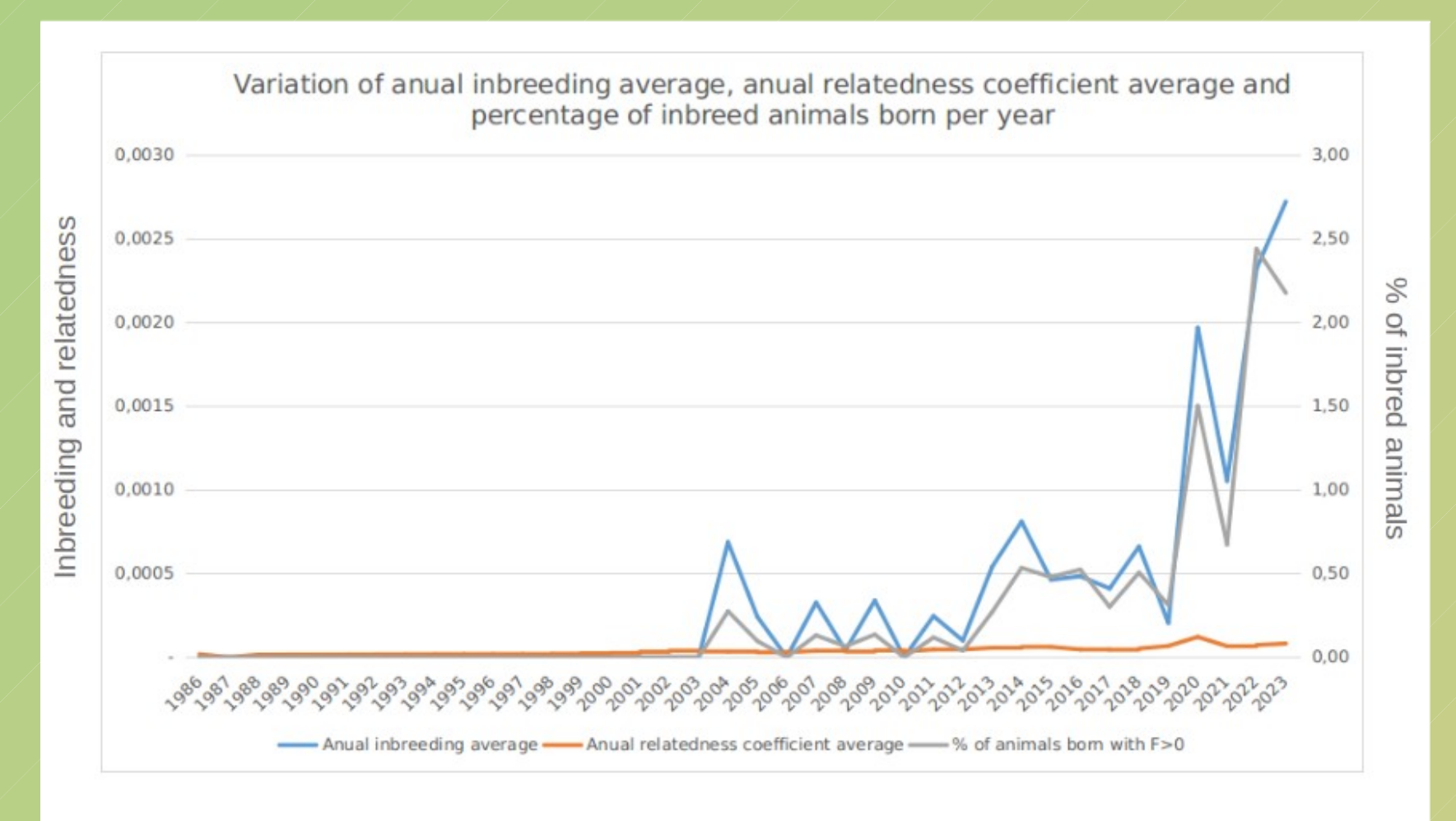
## RESULTS

The analysis reveals that within the LGCB, some animals have pedigrees traced back to the 4th generation. Among the 65,292 animals, 30.33% have a known mother and 7.63% have a known father. Pedigree content diminishes as we ascend the ancestry tree, reaching near 0% by the 4th generation.

The average individual inbreeding was calculated at 0.0003%, with observations indicating that before 2003, the annual individual inbreeding average remained at 0%. However, after 2003, the LGCB began recording inbred animals, peaking in 2014 and 2020, followed by a sharp decline in 2021. Subsequently, there was a recovery in the trend.

The estimation of effective population size (Ne) per year aligns with the concept that as inbreeding increases, effective population size decreases. In 2023, the Ne was estimated to be 184.

The average genetic conservation index was determined to be 1.116.



## DISCUSSION

The quality of the available data appears to have significantly improved compared to the previous genealogy analysis conducted by Rio Costa et al. (2019). There is now almost double the number of animals with a known father (7.63% now compared to 4.66% in 2019). The data clearly shows that the average individual inbreeding over the past two years is significantly higher than in previous years. This increase may directly result from the implementation of recommendations made by Rio Costa et al. (2019), particularly the review of filiation procedures. According to ANCABRA, in 2020, a filiation attribution system based on Single Nucleotide Polymorphisms (SNP's) genotyping was implemented for all animals logged in the LGCB as breeders, resulting in increased genealogy data. By the end of 2020, there was a change in the public subsidy policy for the conservation of domestic biodiversity in Portugal, leading to multiple requests to join the LGCB from previously unlogged breeders. As a result, there was roughly a 10% increase in animals in the LGCB, the majority of which lacked genealogy information. This explains the abrupt decline in the average individual inbreeding in 2021. Despite these advancements, the average Genetic Conservation Index (GCI) remains low at 1.116, indicating an unbalanced and insignificant genetic contribution from the founders to the population. Echoing Rio Costa et al. (2019), it is crucial to focus on improving the quality of data logged by the LGCB, particularly regarding genealogical data. Recommendations include: (1) Continuously reviewing filiation attribution procedures. (2) Establishing a periodic monitoring routine to ensure the genealogy quality of registered animals. (3) Encouraging breeders to actively participate in filiation attributions to contribute to the conservation of the Bravia goat breed.

## REFERENCES

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- Rio Costa, H., Martins, A., Silvestre, A. (2019). ANÁLISE DA GENEALOGIA DA RAÇA CAPRINA BRAVIA. XXI ZOOTECA - Congresso Nacional de Zootecnia'19, APEZ/Universidade de Évora.

## ACKNOWLEDGEMENTS

To all the Bravia goat breeders, because they are the ones that really define, with a simple word, the essence of this animal. That word is "Bravia". A cabra puxa sempre para o monte... (The goat always pulls to the mountain...)



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