

Does the Walloon Piétrain pig breed require preservation measures?

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The Piétrain breed is used worldwide as a terminal sire line in industrial crossbreeding schemes. This breed confers high leanness and muscling as well as good conformation to its progeny. Pure Piétrain breeding is done in two different contexts: 1- by breeding companies through private industrial lines; 2- by a low number of breeders, a community that continues to decrease. In the Walloon Region of Belgium, the population of purebred Piétrain, kept by breeders and used to obtain finishing pigs, is of very limited size. This implies that this breed may be endangered and requires preservation measures in Wallonia.

Objectives

- To investigate genetic diversity of Walloon Piétrain by using pedigree and phenotypic data
- To suggest preservation measures for the Walloon Piétrain

Currently in place

- Since 2007, Walloon genetic evaluations for Piétrain boars based on station performances of crossbred progeny
- Cryopreservation program "Belgian Piétrain" launched in 2017

Data

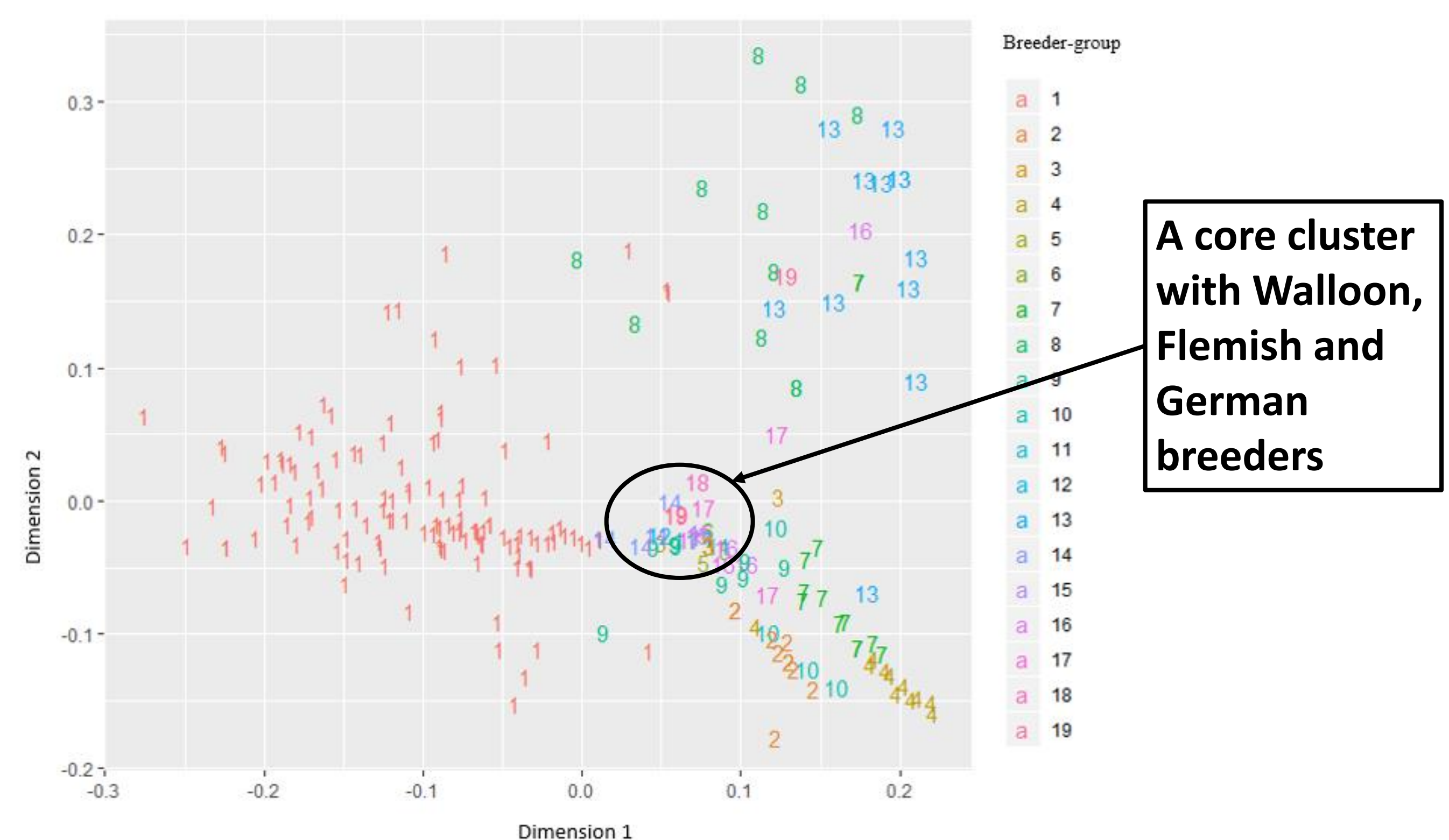
- Pedigree provided by the Walloon Breeding Association: 777,321 animals born between 1970 and 2018
- Estimated breeding values (EBV) from the Walloon genetic evaluations: 219 progeny tested boars

Analysis

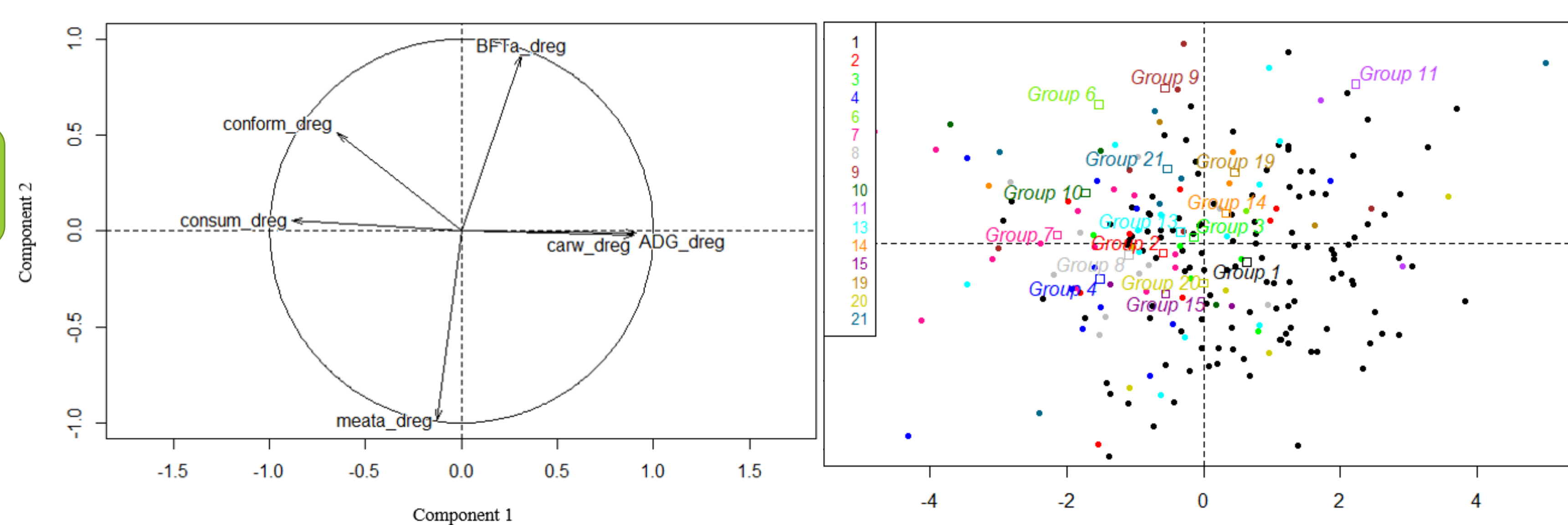
- Pedigree
- Classical Multi-Dimensional Scaling (MDS):
 - Based on 1-kinship coefficients
- Principal Component Analysis (PCA):
 - Six deregressed EBV: average daily gain (ADG), carcass weight (carw), consumption index (consum), meat % (meata), backfat thickness (BFTa) and conformation index (conform)
 - Animals weighted by mean reliabilities

Results

- 14 Walloon breeders
- 5 Flemish breeders
- 1 German breeders group
- Mean inbreeding coefficient: 2.74%
- Genetic diversity: 97.96%
- Effective population size: 223



- MDS with 4 main clusters
- 55% provided by a single Walloon breeder (red dots)



- PCA variables factor map
- PCA individuals factor map
- Growth or meat performance trends
- "Belgian Piétrain" program (group 21) seems to choose well-conformed boars
- Genetically close animals (MDS) are not necessarily close on the PCA

Preservation recommendations

- Representative semen sampling to keep genetic and phenotypic diversity
- Transfer of animals among groups taking into account breeder specificity, e.g. by using breeding circles
- Use of pedigree and phenotypes simultaneously as they provide complementary information
- Needed: further investigation of genomic diversity within Walloon and across Piétrain populations in Europe