The current situation of regional cattle breeds within the Netherlands

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Background

- Cattle farming over the last decades
  - From dual purpose (beef and dairy) to more specialized farming
  - Use of highly selected bulls
  - Introgression of the Holstein Friesian (HF) cattle in the early seventies
- Consequences for local breeds
  - Demographic
  - Genetically

Research questions

- **1** Changes in population size in the MRY and the FH cattle breed populations over the last three decades?
- **2** Changes in genetic diversity in MRY and FH cattle breed populations over the last three decades?
- **3** Which part of the total genetic diversity of the FH-breed is already stored in the genebank?

Methods

- Data

  Pedigree data with 4,446,561 MRY- and 7,318,522 FH (purebred + crossbred)

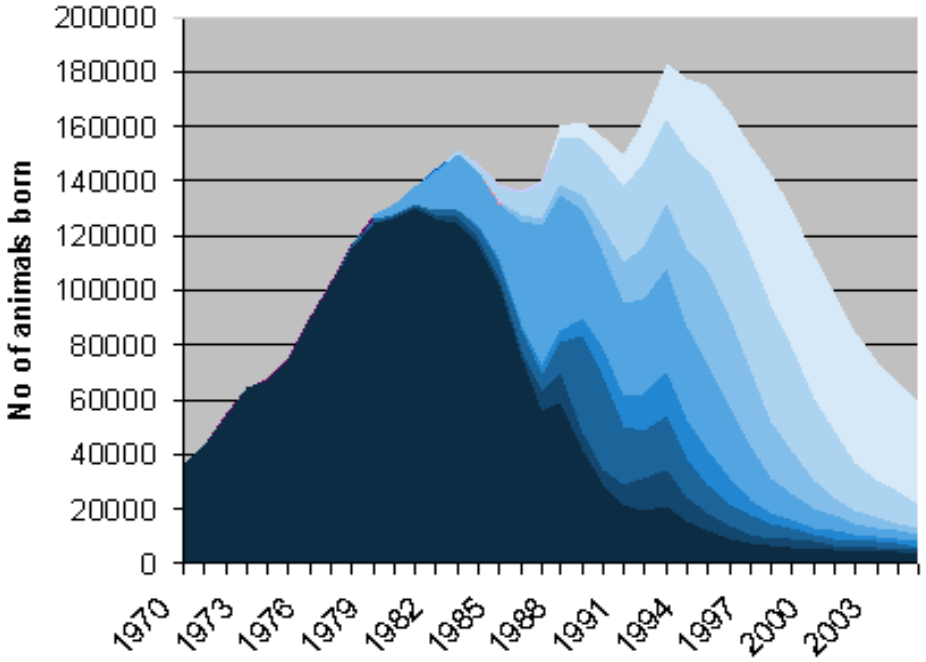
- Estimations
  - Average inbreeding
  - Average coancestry
  - Optimal contributions

NB: unknown parents → bias in estimations

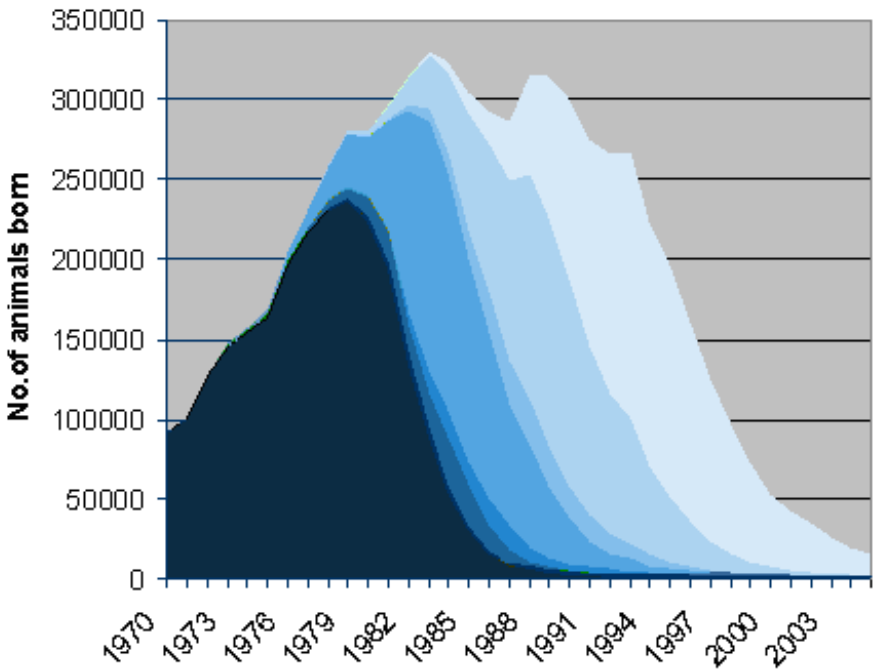
Results: Demographics (1)

Consequences on development population sizes 1

MRY



FH



100% 87.5% 75% 62.5% 50% 37.5% 25% 12.5%

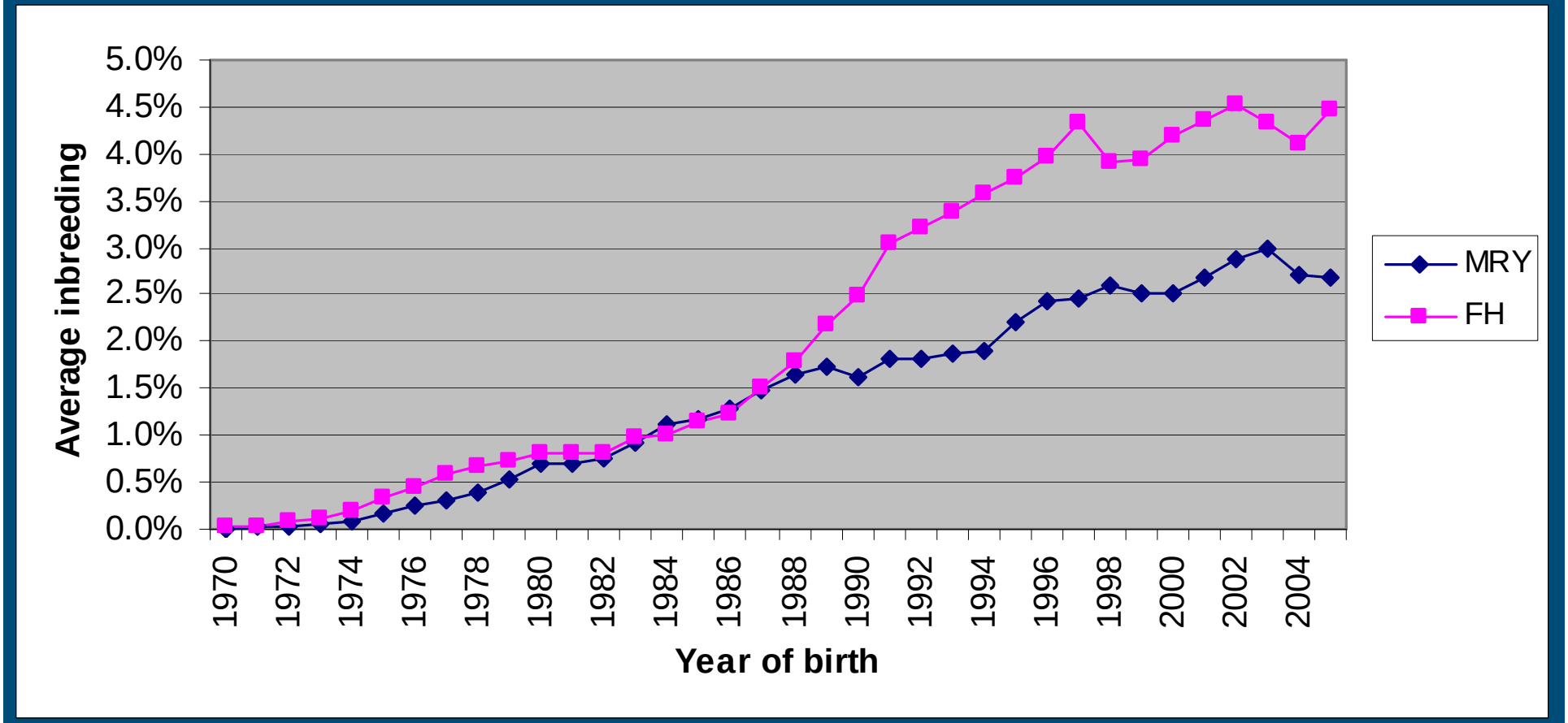
% own genes

Conclusion: Demographics 1

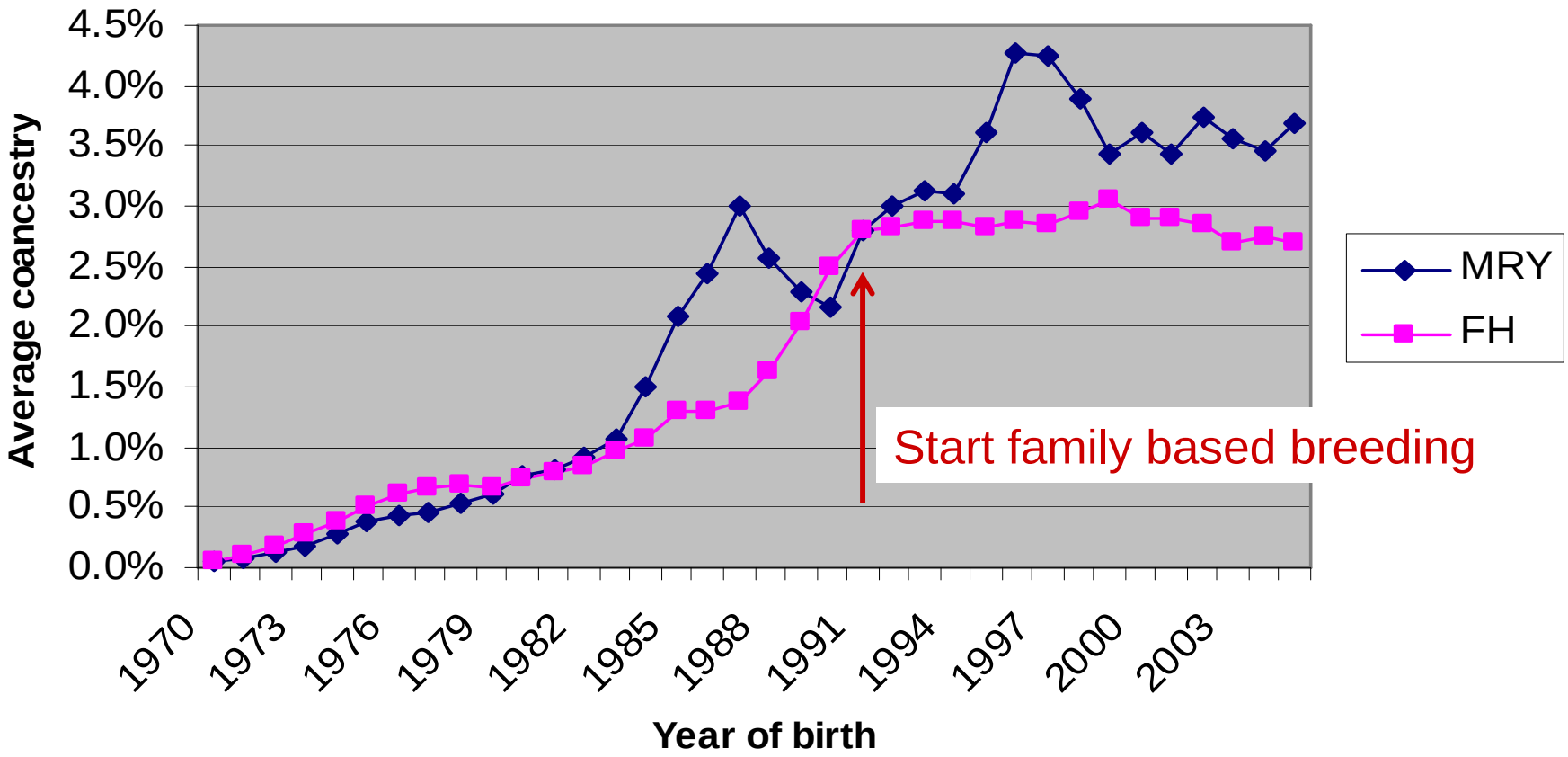
- The purebred population size strongly decreased for both breeds
  - > 99% in the last three decades
- Some arguments of farmers:
  - Milk production level
  - Breed characteristics: robustness; sober; recognizable; meat production and milk composition

Results: Genetic diversity (2)

Average inbreeding



Average coancestry



Conclusions: trend genetic diversity 2

- Genetic diversity decreased in both populations;
- The ‘family based’ breeding structure of FH had a positive effect on the conservation of genetic diversity;
- Utilization of a few bulls causes a strong decrease in genetic diversity.

Results: Gene bank collection (3)

Gene bank collection (FH)

- Using the optimal contribution method a maximum of genetic diversity can be reached by selecting 91 bulls.
- 62 of these 91 selected males were bulls for which semen is stored within the gene bank. These 62 gene bank bulls cover 75% of the total calculated sire contributions.

Conclusion: FH gene bank collection 3

- The CGN genebank collection is an important genetic resource of FH- material

Final messages

- Farmers and breeding organisations need to be aware of the effect of bull selection
- Preservation of breeds in a genebank alone cannot prevent breeds from extinction by itself
- Give attention to special breed characteristics

Thank you for your attention

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