

# Management of genetic diversity in the Dutch Landrace goat

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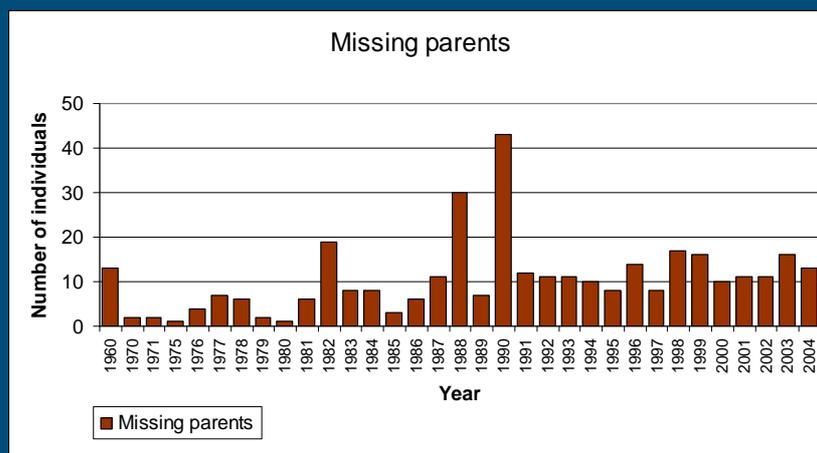
## Objectives of the research

- Analysis of the structure of the Dutch landrace goat population
- Estimation of inbreeding coefficient and inbreeding rate in the investigated population
- Recommendation for breeding in order to minimize inbreeding and maintain genetic diversity of the breed
- Estimation of the effect of importing animals
- Selection of donors for the gene bank and their influence on the diversity of the stored genetic material

## Structure of the population

- 6980 individuals in the pedigree
- Current population size is 2134
  - Females – 1818 (85.2%)
  - Males – 316 (14.8%)
- Average age 1420 days (4 years)
- Average number of offspring
  - per female: 3
  - per male: 8

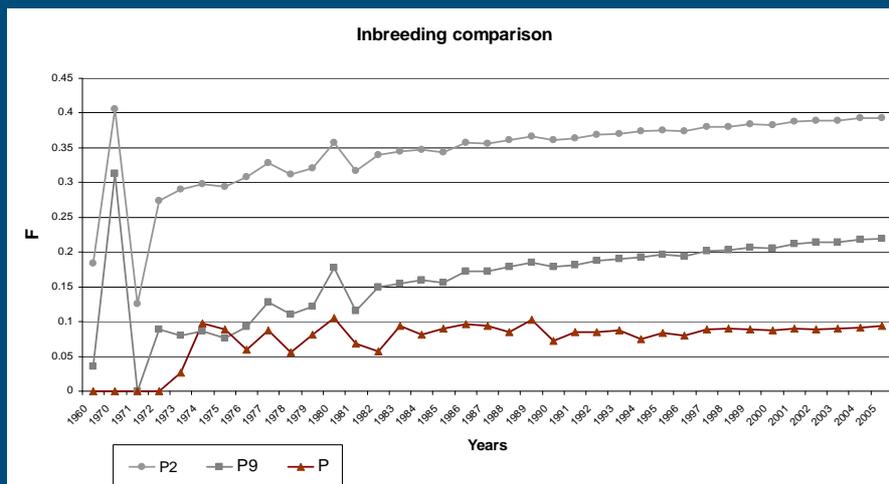
## Errors in the pedigree



## Coefficient of inbreeding

- Inbreeding was calculated for three pedigrees:
  - P – original pedigree with 350 founders
  - P9 – pedigree with randomly assigned parents (if missing) – 9 founders
  - P2 – pedigree with random parents (if missing) and 2 founders

## Coefficient of inbreeding



## Inbreeding rate

- Inbreeding rate over 5 years period

Inbreeding rate in year 2003

$\Delta F$	$\Delta F9$	$\Delta F2$
0.08%	0.19%	0.19%

- Low inbreeding rate
- Partially caused by missing parents

## Minimization of inbreeding

Changes of relationship in the population

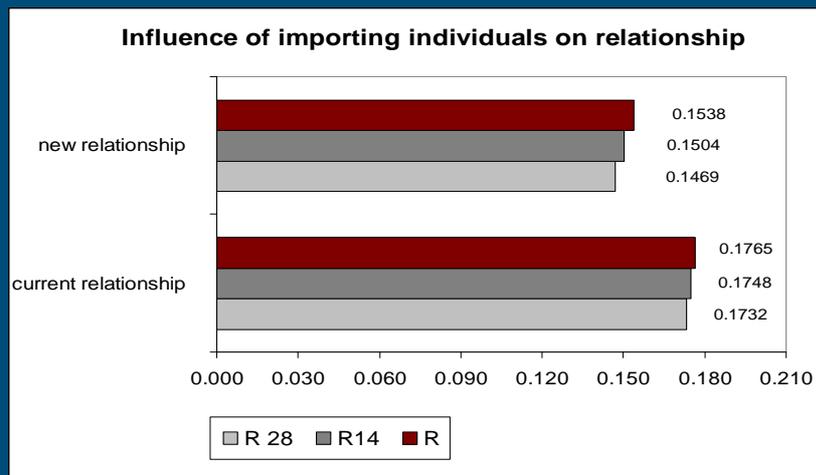
Pedigree	Current relationship	New relationship	$\Delta F(\%)$
P	0.1765	0.1256	-2.79
P9	0.4224	0.4144	-0.51
P2	0.7746	0.7684	-0.51

- Minimization may be overestimated because of missing parents

## Influence of unrelated animals

- Effect of importing 14 and 28 animals was estimated using Gen Cont
- 1 (2) female(s) and 1 (2) male(s) were added to the population during 7 years
- Effect on inbreeding and average relationship was estimated

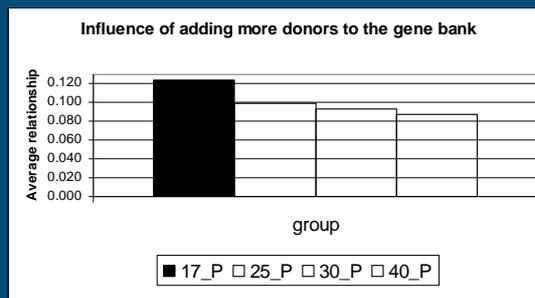
## Influence of unrelated animals



## Candidates for the genebank

- Material from 17 animals is currently present in the gene bank
- The analysis was performed by Gencont
- Additional candidates were selected to reach a number of 25, 30 and 40 donors
- Selection candidates were born between 1998 and 2005

## Candidates for the genebank



- Diversity in the gene bank increases for all three pedigrees
- 22% of the donors were the same for the different pedigrees

## Conclusions and recommendations

- Problems due to inconsistent or incomplete data.
- Currently the population is not endangered by excessive inbreeding.
- Small decrease of average relationship and increase of genetic diversity due to mating between candidates selected by Gen Cont.
- Unrelated animals decrease the average relationship in the population.
- Increasing the number of donors has a positive effect on the conserved genetic diversity

## Acknowledgements

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- CGN Centrum Dierlijke Genetische Bronnen
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