Genetic structure of Romanov sheep in Croatia

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Importance of genetic diversity

- Genetic diversity = variety of alleles and genotypes present in population
- Basis of evolutionary potential of species for
  - Responding to environmental changes
  - Genetic (genomic) selection

Description of genetic variability

- **Demographic description**
  - Generation interval, family size, no. of males and females in population over time

- **Probability of identity by descent of genes**
  - Inbreeding coefficient
  - Effective population size

- **Probability of gene origin**
  - Effective number of founders, ancestors and founder genomes
  - Equivalent number of known generations

Objective

- To estimate genetic variability using pedigree information
- To present generation interval
- Genetic variability parameters
  - Inbreeding
  - Equivalent number of known generations
  - Effective number of founders, ancestors, and founder genomes

Material and method

- Pedigree information

	Male	Female	All
No. of animals	10,252	19,932	30,184
Year		**2005-2010**	
Reference population	4,550	6,195	10,745

- PEDIG program package

Generation interval for the four pathways parent-offspring

Pathway	Number of		Generation interval
	Parent	Offspring	
Sire-son	204	9,570	3.64
Sire-daughter	211	12,930	3.56
Dam-son	1,552	8,710	3.30
Dam-daughter	3,969	12,092	3.31

Inbreeding

Class	No.of animals	Inbreeding (%)
0	16,609	55.0
0 - <5	6,137	20.3
5 -<10	4,690	15.5
10 -<15	1,226	4.1
>15	1,522	5.0
		Average
Inbred animals	13,575	**7.1**
Total	30,184	3.3

Number of generations
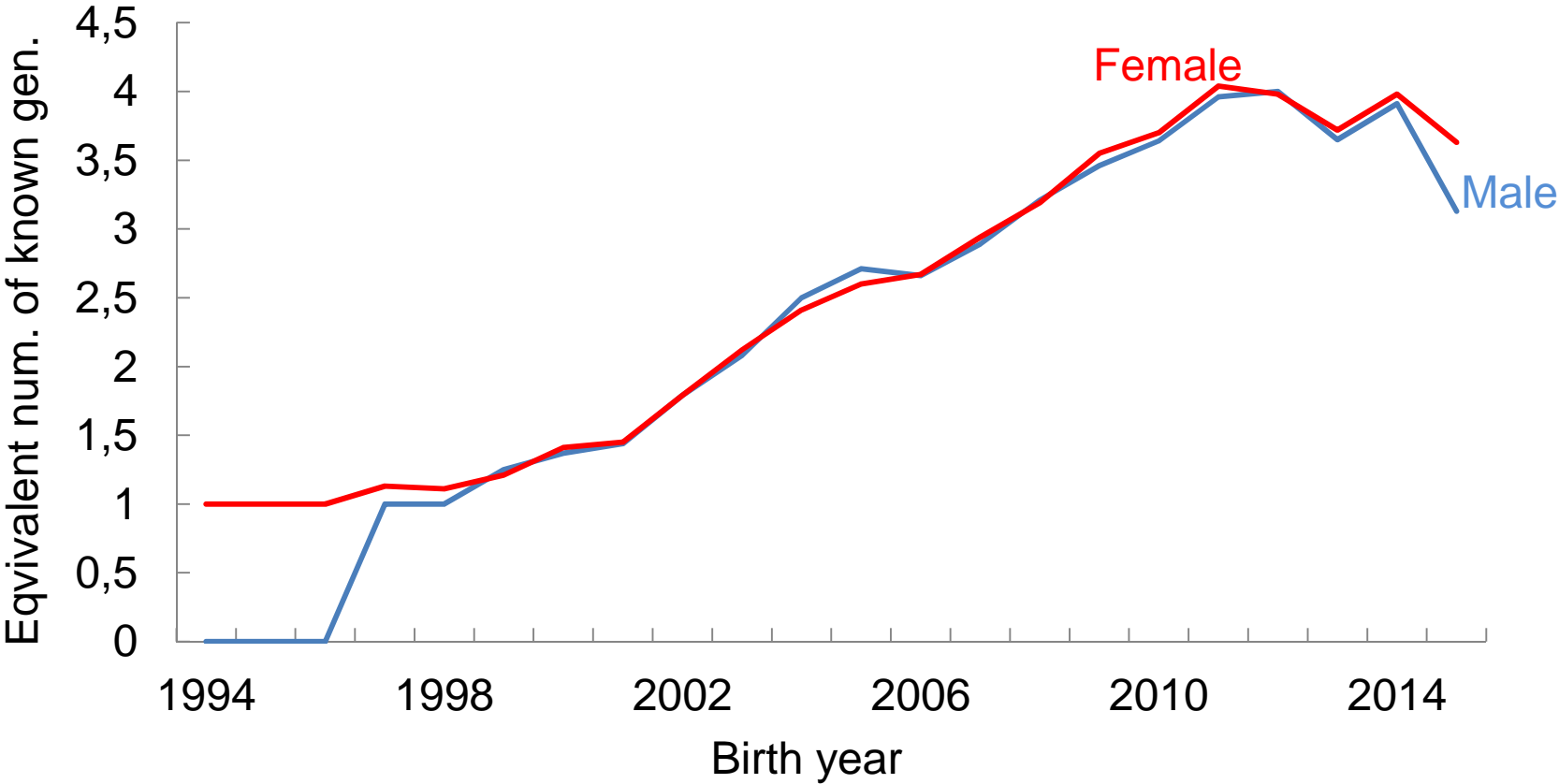
Effective number of founders and ancestors

Parameter	Sex	
	Male	Female
Number of founders	336	372
Effective number of founders	14.3	14.3
Effective number of ancestors	13.9	13.7
Effective number of founder genomes	10.2	10.2
N_{50}	5	5
C_{max} (%)	15.9	15.3

N_{50} – number of ancestors contributed 50% genes in gene pool

C_{max} – gene contribution of the most important ancestor

Conclusions

- Low average inbreeding coefficient in whole population

- Equivalent number of known generations was small

- Most important ancestor contribute to reference population (15.9% in males, 15.3% in females)

- 50% genes in gene pool of male and female reference population was contributed by 5 ancestors

- Quality of pedigree data