HPA
CROATIAN AGRICULTURAL AGENCY

Genetic parameters estimation for reproductive traits of goat breeds in Croatia

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Conventional and traditional livestock production systems – new challenges

Introduction

- Goat breeding
  - Extensive breeding – autohtonous breeds
  - Semi-intensive breeding – conventional diary breeds

Breeding work in Croatia

- Around 7.000 (11%)
- Breeding work
  - Milk recording and control of reproductive traits
  - Performance testing
  - Genetic evaluation – milk traits

ALP

SAN

IGF

Reproductive traits

- Litter size (LS) and birth weight (BW)
- Low heritability – limited selection
- Important component in the breeding programs

- Aim: To estimate genetic parameters for **LS** and **BW** for ALP, SAN, and IGF breeds

Material

- Central database of Croatian Agricultural Agency
- Reproductive records from 2000 to 2017
- Data preparation
  - Parity (1- 6+)
  - Litter size (1, 2, 3+)
- Data editing
  - Animals without birth or kidding date
  - Flock (less then 10 animals per flock deleted)
  - Kidding season - year-month interaction
  - Age at kidding
- **123,322 phenotypic records**

Pedigree structure

	Breed			
	Breeds together	ALP	IGF	SAN
Animals with records	123,322	107,783	3,061	12,478
Non-base	138,870	120,955	3,926	14,624
Base	2,514	1,970	330	777
Pedigree	141,384	122,925	4,256	15,401

Method

- Data preparation
  - SQL (SAS/STAT)
- GLM procedure (SAS/STAT)
- Criteria for including effect into the model
  - Significance of effect (p-value)
  - Determination coefficient (R^2)
  - Degrees of freedom (df)
- Variance components estimation (VCE-6)

Model in matrix notation

$$y = X\beta + Z_s s + Z_p p + Z_a a + e$$

LS
BW

Residual

Random effects

- Additive genetic effect
- Flock-year of lambing
- Permanent environmental effect

Fixed effects

- Breed, parity, season (int. year-mounth of kidding), litter size for BW
- Age at kidding nested within parity (QR)

Results

Descriptive statistics

	N	%	LS	BW
Overall	123,322	100	1.61±0.60	3.24±0.60
Singles	55,213	44.78		3.26±0.61
Twins	60,217	48.82		3.23±0.59
Triplets	7,892	6.40		3.07±0.58

LS and BW by parity

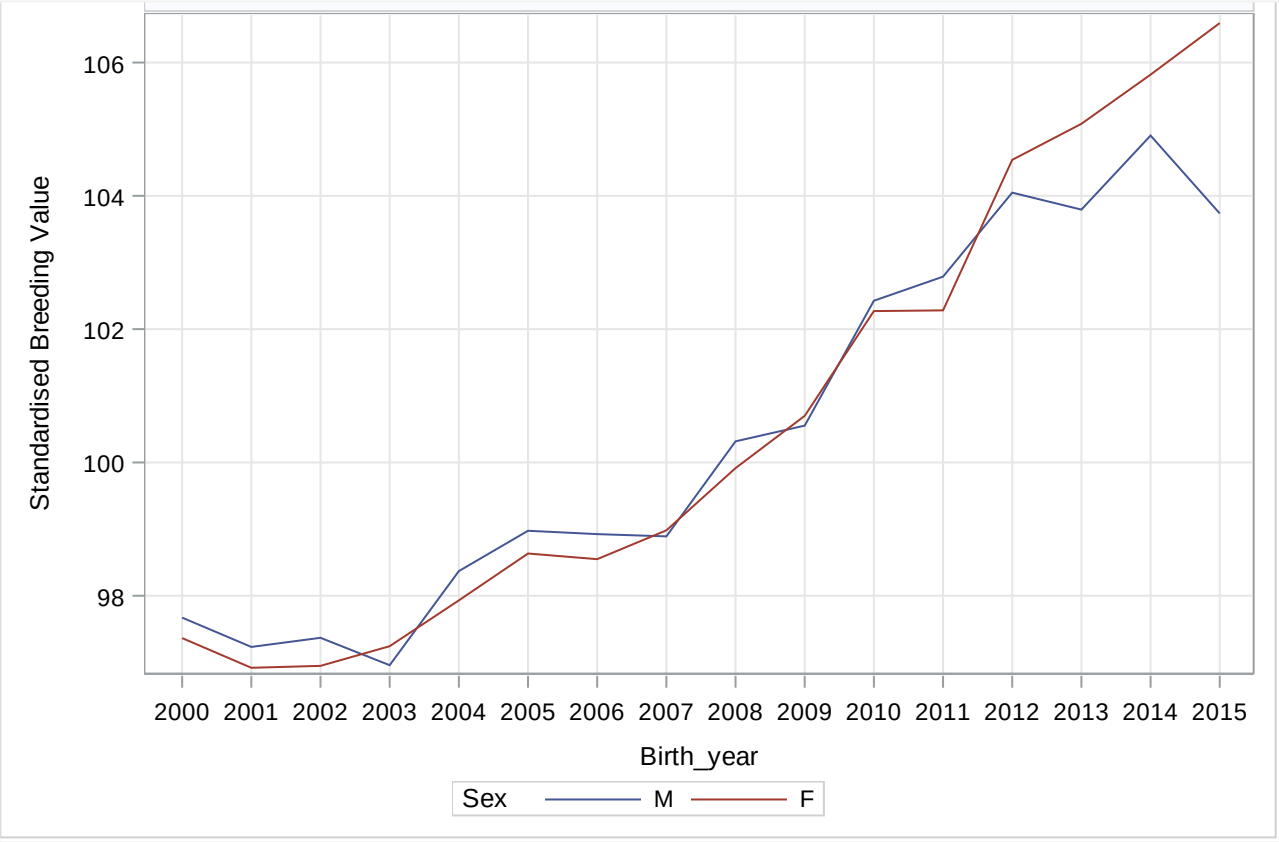
Parity	Number of lambed does		Litter size (%)			Mean	
	n	%	1	2	3+	LS	BW
1	26,844	21.7	46.2	49.3	4.5	1.29	3.15
2	24,962	20.1	72.8	25.6	1.6	1.59	3.25
3	22,950	18.6	36.2	57.0	6.8	1.71	3.26
4	17,851	14.5	33.1	58.1	8.8	1.75	3.26
5	12,747	10.3	32.1	57.3	10.6	1.78	3.26
6+	17,968	14.5	35.5	54.7	9.8	1.74	3.25

Estimated ratios

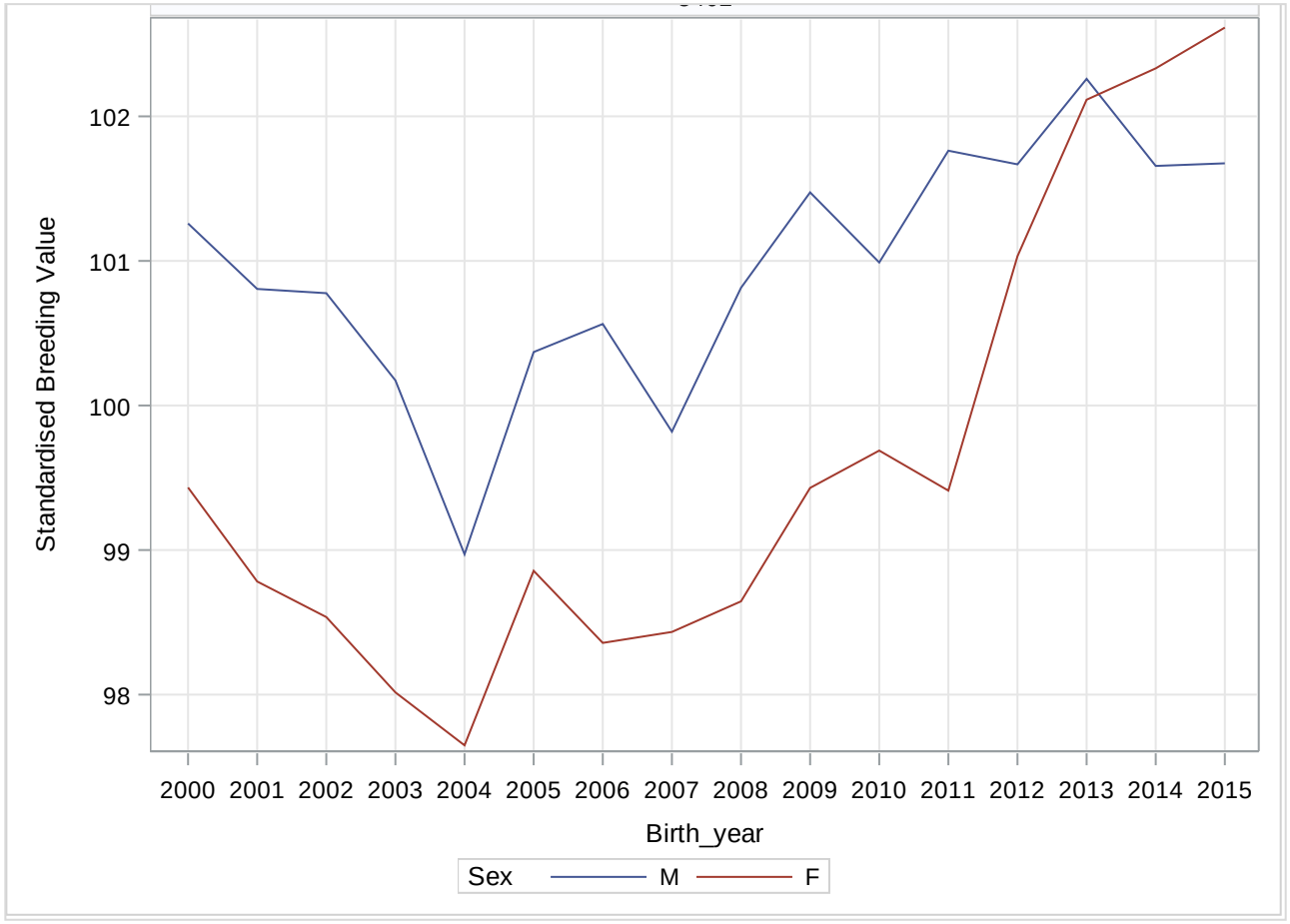
Trait	h^2	c^2	p^2
LS	0.075±0.003	0.111±0.004	0.677±0.003
BW	0.098±0.004	0.406±0.007	0.184±0.004

h^2 – heritability; c^2 – ratio for flock-year of lambing; p^2 – ratio for permanent environmental effect; r^2-repeatability

Genetic trend - LS



Genetic trend - BW



Conclusion

- Low heritability for LS and BW
- Estimated heritabilities are in line with previous reports for this breed
- Non-effective direct selection for reproductive traits
- Future work
  - Multi-trait analysis with diary traits
  - Education of breeders to use the BV results

Thank you for the attention !!!