

The impact of inbreeding on the litter size in Romanov ewes

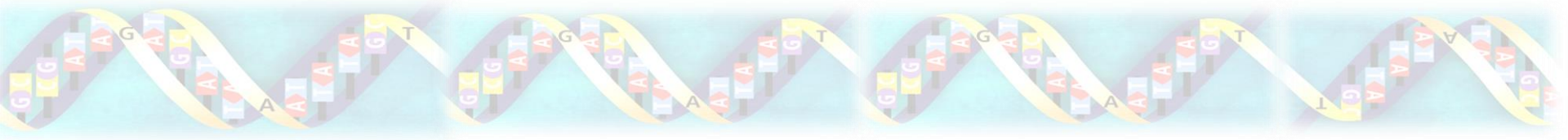
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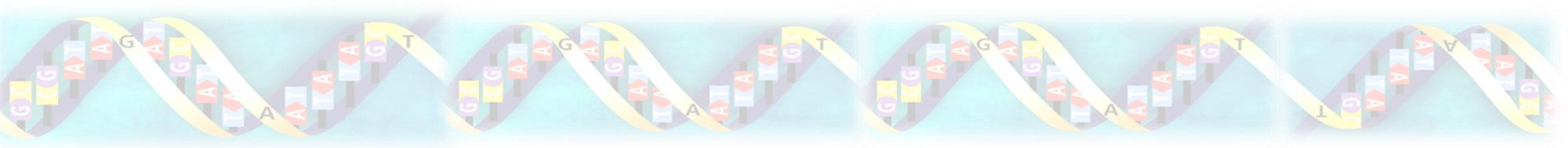
Breeding work in Croatia

- Romanov sheep – the most fertile sheep breed in the world
- Breeding work
 - 2059 animals
 - 40 breeders
 - Average litter size – 1.89



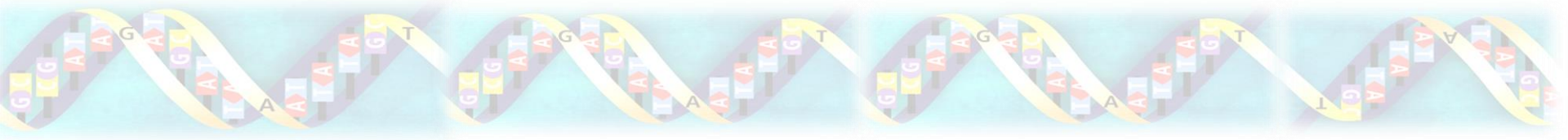
Inbreeding

- Mating of related individuals
- Why is inbreeding important?
 - The higher the inbreeding, the more likely deleterious recessives will be expressed
 - Inbreeding depression= reduction in performance due to inbreeding
- Aim: The effect of inbreeding on litter size using animal repeatability model



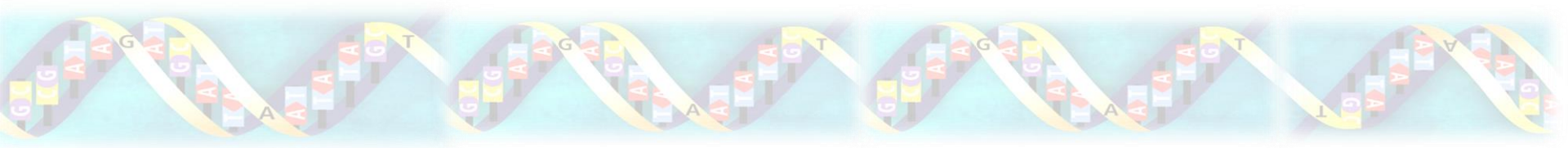
Material

- Central database of (ex) Croatian Agricultural Agency
- Records from 1995 to 2012
- Data editing
- 10,723 phenotypic records for litter size of 4,097 ewes



Method

- Data preparation
 - SAS/STAT
- Inbreeding coefficient (F)
 - The likelihood that an animal inherits the same gene from both parents
 - CFC (Coancestry, Inbreeding(F), Contribution)
- Variance components estimation (VCE-6)
 - BLUE and BLUP



Model in matrix notation

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

Litter size

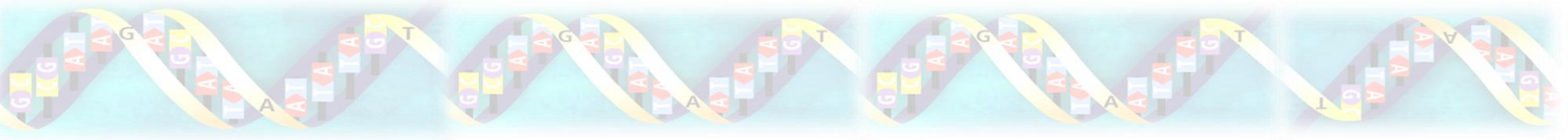
Residual

Random effects

- Additive genetic effect
- Herd
- Permanent environmental effect

Fixed effects

- Season (int. year-mouth of lambing)
- Parity
- Inbreeding coefficient (LR)
- Age at lambing nested within parity (QR)





Results



Descriptive statistics for litter size

Parity	All			F=0			F>0		
	n	\bar{x}	sd	n	\bar{x}	sd	n	\bar{x}	sd
1	3446	1.35	0.55	3075	1.35	0.56	371	1.36	0.55
2	1962	1.55	0.64	1746	1.55	0.64	216	1.59	0.66
3	1405	1.65	0.69	1243	1.64	0.69	162	1.73	0.71
4	1007	1.69	0.68	852	1.68	0.68	155	1.72	0.67
5+	2457	1.68	0.69	2087	1.67	0.69	370	1.72	0.70
All	10277	1.54	0.65	9003	1.53	0.65	1274	1.59	0.67

F=Inbreeding coefficient

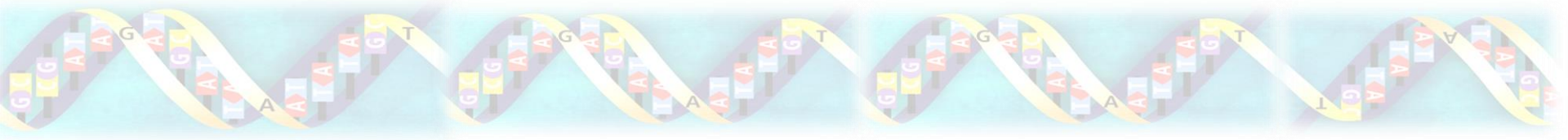


Pedigree structure

Total number of animals	4,272
Animals with phenotypic records	4,097
Base animals	423
Non-base animals	3,849
Number of Inbreds	415
Average F (%)	1.8
Average F in the inbreds (%)	19.2
Minimum of F (%)	1.5
Maximum of F (%)	43.8

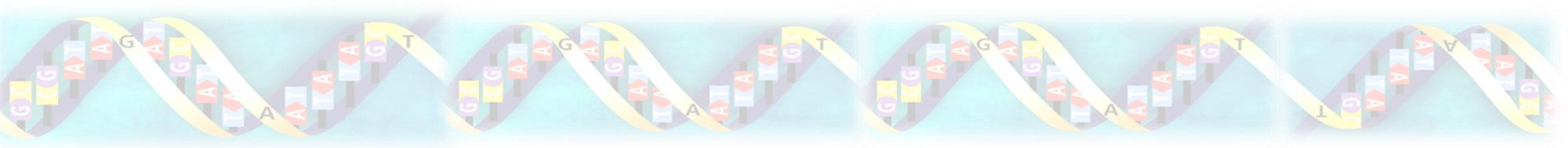
Average F by birth year

Birth Year	F (all animals)			F (inbreds)		
	n	\bar{x}	sd	n	\bar{x}	sd
2000	193	0.05	0.10	41	0.23	0.07
2001	133	0.02	0.07	12	0.21	0.11
2002	352	0.04	0.09	75	0.19	0.08
2003	382	0.04	0.09	81	0.18	0.09
2004	296	0.02	0.05	44	0.11	0.10
2005	183	0.01	0.04	12	0.14	0.07
2006	249	0.02	0.05	22	0.17	0.08
2007	560	0.01	0.06	37	0.20	0.09
2008	700	0.02	0.06	45	0.24	0.10
2009	534	0.01	0.05	27	0.24	0.04



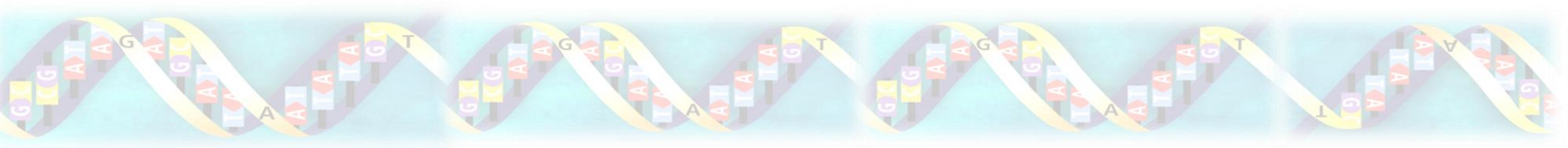
Inbreeding in the Romanov sheep population

- The existence of slight inbreeding depression
- The regression coefficient of the litter size on the coefficient of inbreeding was -0.051



Conclusion

- Inbreeding did not affected the litter size of Romanov sheep
- Despite the existence of negligible inbreeding depression on the litter size, we advise not to practice inbreeding
- Mating programme





Thank you for the attention !!!

