Genetic trends of milk production traits in Slovak sheep populations

M. Oravcová[1], M. Kovač[2], D. Peškovičová[1], M. Margetín[1], J. Huba[1], P. Polák[1]

[1]Research Institute for Animal Production, Hlohovská 2, Nitra, Slovakia,

[2]University of Ljubljana, Biotechnical Faculty, Groblje 3, Domžale, Slovenia

Objective of the study

- produce breeding values for milk production traits as a replacement for old-fashioned phenotype selection
- compare genetic changes over years between two Slovak sheep populations Improved Valachian and Tsigai

Milk production traits – Improved Valachian

Year	Daily milk yield (kg)	Fat content (%)	Protein content (%)
1995	0.58	8.46	5.93
1996	0.50	8.20	5.70
1997	0.51	7.75	5.68
1998	0.51	7.51	5.73
1999	0.63	7.70	5.92
2000	0.62	7.50	5.76
2001	0.62	7.53	5.79
2002	0.62	7.49	5.81

Milk production traits – Tsigai

Year	Daily milk yield (kg)	150 d. milk yield (kg)	Fat content (%)	Protein content (%)
1995	0.58	87	8.52	6.05
1996	0.50	75	8.40	5.65
1997	0.55	83	8.30	5.85
1998	0.60	90	8.21	5.95
1999	0.60	90	7.95	6.05
2000	0.62	90	8.06	5.92
2001	0.61	92	7.79	5.91
2002	0.61	92	7.50	5.92

Material and methods

- three-trait animal model based on test day records (Oravcová et al., Small Ruminant Research, accepted in April 2004)
- daily milk yield (adjusted for 150 days in milk), fat and protein content
- program PEST (Groeneveld et al., 1991)
- breeds of local importance

Statistical model

- **fixed effects**
  - parity
  - litter size
  - # milkings/day
  - age within parity
  - DIM* within parity,
  - Ali-Schaeffer's lactation curve (1987) adopted for sheep
- **random effects**
  - flock-TD
  - additive genetic effect
  - permanent environmental effect within parity

*DIM - Days in milk

Mathematical form of the model

$$y_{ijklmn} = N_i + B_j + P_k + b_{1k}A_{ijklmn} + b_{2k}(DIM_{ijklmn}/150) +$$

$$+ b_{2k}(DIM_{ijklmn}/150)^2 + b_{3k}\,(\,DIM_{ijklmn}/150)^2 +$$

$$+ b_{4k}\ln\,(150/DIM_{ijklmn}) + b_{5k}\ln(150/DIM_{ijklmn})^2 +$$

$$+ f_l + a_m + p_{mk} + e_{ijklmn}$$

Data available

- **Valachian**

174,468 TD records

63,698 animals in pedigree

12 daughters with data per sire

- **Tsigai**

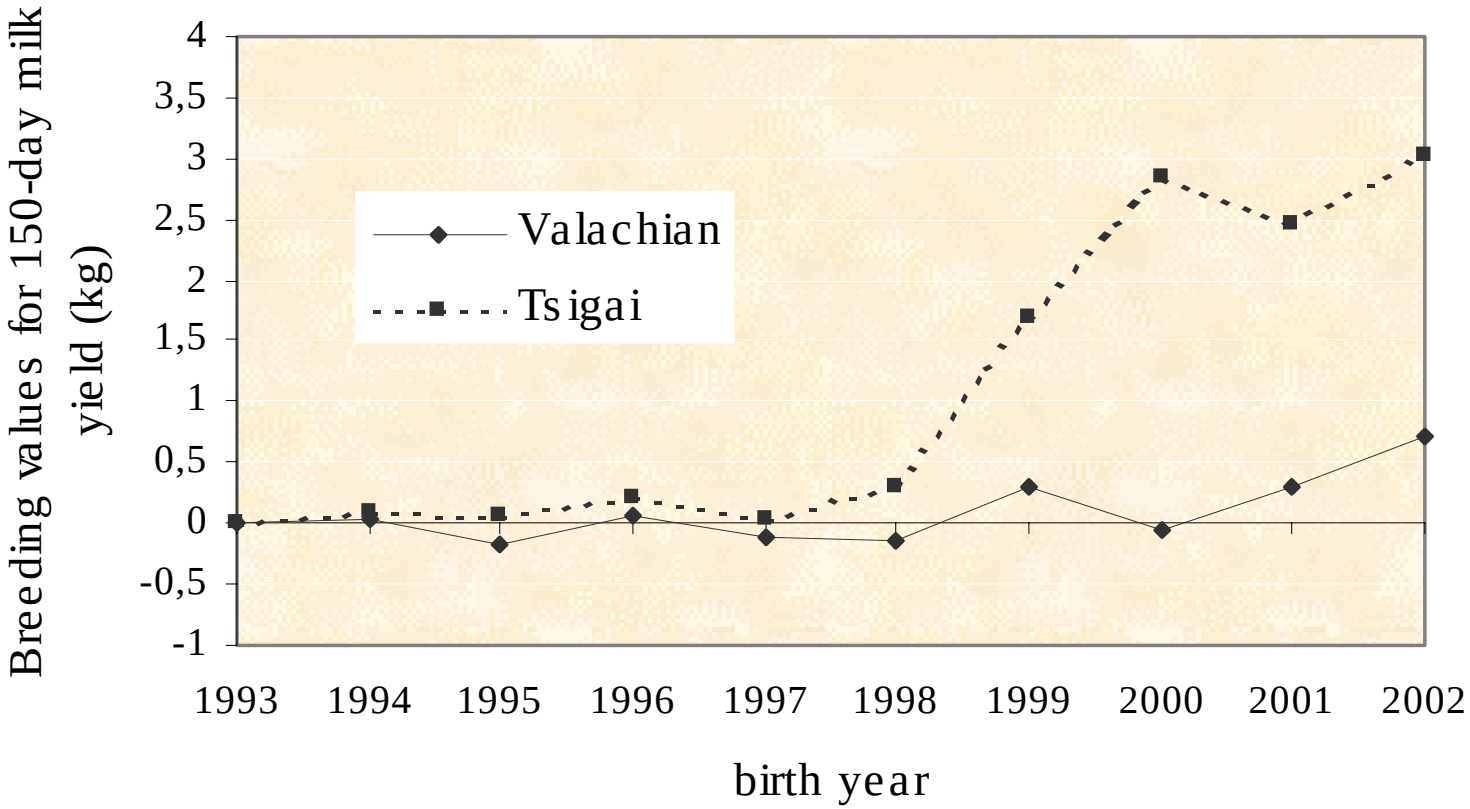
82,248 TD records

30,476 animals in pedigree

13 daughters with data per sire

only natural mating
more than 50 % individuals in pedigree with both parents known
less then 30 % individuals in pedigree with both parents unknown

Genetic changes over years



Cumulative changes for milk yield

Time period	Improved Valachian	Tsigai
1993-1998	+0.25 kg	+0.40 kg
1998-2002	+0.80 kg	+2.69 kg

milk yield adjusted for 150 days

Cumulative changes for fat and protein content

Time period	Fat content	Protein cont.
1993-1998	-0.02 %	-0.01 %
1998-2002	0 %	0 %

same changes for both breeds and both traits

Conclusion

- two different periods in genetic changes on milk yield observed, before 1998 negligible changes, after 1998 higher changes over years
- higher genetic changes on milk yield in Tsigai breed when compared to Improved Valachian
- negligible changes observed for milk components
- low improvement of phenotype values of milk production traits observed