Genetic parameters for chosen udder morphology traits in ewes

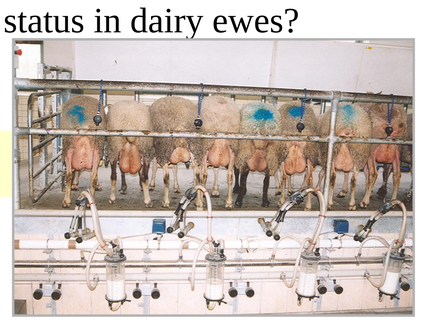
margetin@cvzv.sk

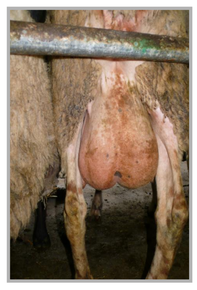
M. Margetín[1,2], A. Čapistrák[1], D. Apolen[1], M. Milerski[3], M. Oravcová[1]

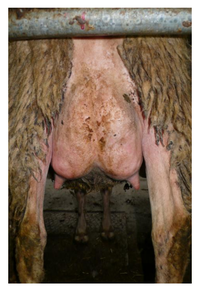
[1] *Animal Production Research Centre Nitra, Hlohovecká 2, 954 41 Lužianky, Slovak Republic*
[2] *Slovak University of Agriculture Nitra, Tr. Andreja Hlinku 2, 949 76 Nitra, Slovak Republic*
[3] *Institute of Animal Science, Přátelství 815, 104 00 Praha-Uhříněves, Czech Republic*

Introduction

- Machine milking of sheep – prevailing method of milking in Slovakia in the last years.
- Selection in dairy sheep must be aimed also on better udder morphology and milkability.
- Udder morphology and teat position have significant effect on udder health status and machine milking productivity.
- Linear scoring of udder – possible selection trait for better milkability and udder health status in dairy ewes?







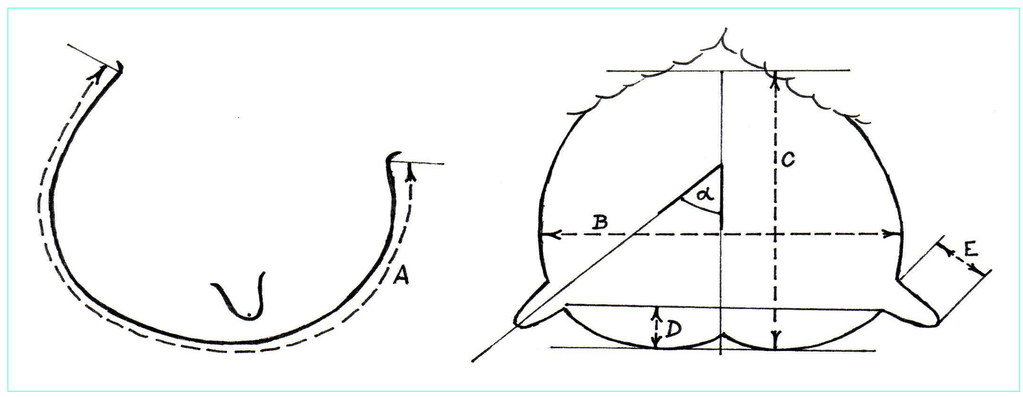
Objectives

To estimate genetic parameters for chosen udder morphology traits in ewes.

Material and methods

Evaluation of udder morphology

- **Linear udder assessment** (LS) according to De la Fuente et al. (1996) and Milerski et al. (2006) - **nine-point scale**; assessed following traits: udder depth (UD), cistern depth (CD), teat position (TP), teat size (TS), udder cleft (UC), udder attachment (UA), udder shape (US).
- Exact udder measurements (EAM) according to Milerski et al. (2006).



A – udder length, B – udder width, C – Rear udder depth, D – cistern depth, E – teat length, α – teat angle.

- During milking period (May – August) exact udder measurements (EAM) were taken in the same ewes and days as was done linear assessment.

Number of analyzed ewes

- Linear assessment - udders of **381 ewes were evaluated repeatedly** (within the lactation as well as between lactations) – totally were performed **1275 assessments**.
- Exact measurements - udders of **355 ewes were evaluated repeatedly** (totally were performed **1181 assessments)**.
- Genetic parameters were estimated using non-transformed data.

Model used

- **Multi trait animal models** were used to estimate the genetic parameters (REMLF90, VCE).
  - **Fixed effects:**
    - control year (7 or 5 levels)
    - breed group (9 levels)
    - parity (3 levels)
    - lactation stage (4 levels)
  - **Random additive genetic effect of animal**
  - **Permanent effect of ewe**

Results

Table 1 Heritability coefficients and genetic correlations between traits of linear assessment of ewe's udder

Trait	1	2	3	4	5	6	7
Udder depth (UD) - 1	**0.217**	0.580	0.550	0.005	-0.064	-0.095	0,445
Cistern depth (CD) - 2		**0.294**	**0.980**	-0.261	-0.380	0.071	0,061
Teat position (TP) -3			**0.242**	-0.381	-0.404	0.096	0,075
Teat size (TS) - 4				**0.275**	-0.391	-0.117	0,096
Udder cleft (UC) - 5					**0.205**	-0.323	-0,274
Udder attachment (UA) -6						**0.090**	0,756
Udder shape (US) - 7							**0.117**

Conclusion

- With LS, the highest h^2 were found for CD, TS and TP.
- From breeder's point of view, negative r_g between TP and TS (-0.381) is an important finding.
- With EUM, mostly higher heritability and genetic correlation coefficients were found.
- High genetic correlation coefficients between EUM and LS traits were found (>0.8) when simultaneous genetic evaluation was done.

Linear scoring of ewe's udder can be properly used in selection of dairy ewes with better morphology of udder and milkability, without need to know exact measurements of udder.

Table 2. Heritability coefficients and genetic correlations between exact udder measurements

Trait	1	2	3	5	6	7
Udder length (UL) - 1	**0.240**	0.525	0.923	0.301	0.231	0.233
Udder width (UV - 2		**0.102**	0.259	0.319	0.059	0.526
Rear udder depth (RUD) - 3			**0.239**	0.396	0.366	0.215
Cistern depth (CDE) - 4				**0.448**	-0.143	**0.943**
Teat length (TL) - 5					**0.338**	-0.286
Teat angle (TA) - 6						**0.295**

Table 3. Heritability coefficients and genetic correlations between chosen traits of linear assessment and exact udder measurements of the udder

Trait	Linear udder assessment score				Exact udder measurements			
	UD	CD	TP	TS	UL	CDE	TL	TA
Udder depth (UD)	**0.202**	0.357	0.314	-0.054	**0.855**	0.219	0.144	0.190
Cistern depth (CD)		**0.316**	**0.953**	-0.430	0.335	**0.932**	-0.384	0.953
Teat position (TP)			**0.263**	-0.538	0.417	**0.871**	-0.554	**0.903**
Teat size (TS)				**0.335**	0.021	-0.221	**0.937**	-0.486
Udder length (UL)					**0.236**	0.290	0.085	0.186
Cistern depth (CDE)						**0.386**	-0.186	0.953
Teat length (TL)							**0.352**	-0.415
Teat angle (TA)								**0.316**

This work was supported by the Slovak Research and Development Agency under contract No. APVV-0458-10 and Grant Agency VEGA No. 1/0575/10