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Introduction

The popularity of milking robots among farmers is proliferating all over the world. Therefore, the knowledge of udder conformation traits' impact on cows' usability in automatic milking systems (AMS) seems crucial. Our study aimed to recognize the genetic background of those relationships based on genetic correlations (rG) between the selected udder conformation traits (UCT) and milk yield (MY), milking characteristics (milking efficiency (ME), teat cup attachment time (AT), and number of attempts (AN).



Methods

The study covered 796 Polish Holstein-Friesian first-born cows in 7 herds whose barns were equipped with the Lely Astronaut A4 automatic system. The primiparous cows participating in the study were assessed for: fore udder attachment, front teat placement, teat length, udder depth, rear udder height, central ligament, rear teat placement, and rear udder width. In order to estimate the genetic correlations between the udder dimension traits and milking traits, the GIBBS1F90 program (Misztal et al., 2002) and a linear two-trait animal model were used. There were 100000 samples of variance and covariance components generated for each analysis, and the first 50000 of them were discarded as a so-called burn-in period. The number of samples in the burn-in period was determined using the POSTGIBBS1F90 program (Misztal et al., 2002).

Results

Tab. 1. The genetic correlations between udder conformation traits and milking traits.

TRAITS	MILK YIELD (MY)		MILKING EFFICIENCY (ME)		ATTACHMENT NO. (AN)		ATTACHMENT TIME (AT)		FAILURE (F)	
	rG	SE (rG)	rG	SE (rG)	rG	SE (rG)	rG	SE (rG)	rG	SE (rG)
UDDER DEPTH (UD)	-0,281	0,261	0,174	0,233	-0,185	0,320	-0,456	0,303	0,387	0,322
TEAT LENGTH (TL)	0,099	0,253	-0,251	0,224	0,254	0,337	0,798	0,331	-0,157	0,417
REAR UDDER WIDTH (RUW)	0,162	0,294	-0,105	0,273	0,844	0,230	0,977	0,059	0,858	0,152
REAR UDDER HEIGHT (RUH)	-0,003	0,339	-0,121	0,307	0,494	0,367	0,939	0,129	0,543	0,271
REAR TEAT PLACEMENT (RTP)	-0,052	0,375	-0,159	0,366	0,593	0,371	0,884	0,229	0,708	0,271
FRONT TEAT PLACEMENT (FTP)	0,143	0,354	0,142	0,305	-0,038	0,414	-0,381	0,396	0,889	0,121
FORE ATTACHMENT (FA)	0,102	0,290	0,198	0,276	-0,607	0,225	-0,567	0,269	0,085	0,394
CENTRAL LIGAMENT (CL)	-0,356	0,298	-0,146	0,291	0,293	0,381	0,397	0,410	0,437	0,345

Conclusions

The results of our study revealed that the rGs between individual UCT and MY are weak to moderate (-0.003 to -0.356). The rGs between the UCT and milking characteristics were weak to strong (in the range of -0.251 to 0.198 for ME, -0.607 to 0.844 for AN, and -0.567 to 0.977 for AT). In both cases, there are positive and negative rGs. The positive rGs for AN and AT were negative for ME simultaneously (teat length, rear udder height, rear udder width, and central ligament). When the rGs were negative for AN and AT, they were positive for ME (udder depth, front teat placement, and fore attachment).

