Genetic parameters of conformation traits of young Polish Holstein-Friesian bulls

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The objective of this study was to estimate the genetic parameters of conformation traits of Polish Holstein-Friesian bulls, evaluated as required for registration in the herd book and for entering progeny testing.

Material and Methods

Data: 8 linearly scored (1-9 scale) and 6 descriptive (scored from 50 to 100) conformation traits of 2738 young bulls born between 2001 and 2011.

The linear model: included fixed linear regressions on age at evaluation (from 10 to 23 months), fixed effects of year of birth, fixed effects of herd-classifier, and random animal effect.

Estimation: (co)variance components were estimated by a multiple-trait REML method.

Results

Estimates of heritabilities for all analyzed traits were within the range of 0.04–0.37. Among the 6 descriptive type traits the heritabilities were greatest for size and for overall conformation score. The lowest heritability was for feet and legs. The range of estimated heritabilities was similar for linearly scored traits. Heritabilities were lowest for rear legs side view and foot angle, and highest for rump angle and muscularity of front end.

Highest were genetic correlations among the descriptive traits, with muscularity playing the dominant role. Genetic correlations among linear traits were low and moderate. Linear chest width was moderately and positively correlated with other linear traits, except near zero correlation with rear legs side view.

Conclusions

More research is needed to establish possible relationship between bull conformation traits and conformation of their progeny.

Table 1. Heritabilities (on diagonal) and genetic correlations (above diagonal) for 14 conformation traits of Polish Holstein-Friesian bulls

Trait	Descriptive traits						Linearly scored traits							
	General appereance	Size	Overall conformation score	Feet and legs	Muscularity	Final score	Body depth	Chest width	Rump angle	Rump width	Rear legs – side view	Foot angle	Rear legs – rear view	Muscularity of front end
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	0.277	0.700	0.963	0.410	0.782	0.971	-0.207	-0.144	0.179	-0.171	-0.359	0.359	-0.293	0.853
2		0.366	0.751	-0.093	0.470	0.831	-0.375	-0.288	0.182	0.002	-0.152	0.175	-0.525	0.610
3			0.308	0.280	0.691	0.959	-0.287	-0.220	0.211	-0.141	-0.251	0.323	-0.334	0.892
4				0.102	0.174	0.314	0.263	0.167	-0.286	-0.474	-0.365	0.531	0.302	0.383
5					0.162	0.761	-0.189	0.162	0.501	0.207	-0.240	0.227	-0.174	0.482
6						0.279	-0.272	-0.153	0.243	-0.114	-0.302	0.347	-0.344	0.831
7							0.186	0.422	0.104	0.070	-0.127	0.209	0.161	-0.095
8								0.118	0.302	0.471	0.015	0.259	0.322	-0.285
9									0.308	0.528	0.072	-0.168	-0.068	0.108
10										0.127	0.398	-0.077	-0.016	-0.201
11											0.044	-0.031	0.367	-0.167
12												0.107	-0.111	0.265
13													0.152	-0.163
14														0.236