Genetics of size traits, fur quality traits and litter size in blue fox (G4.43)

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INTRODUCTION

Main goals in Finnish blue fox breeding are increased litter size and pelt size and improved fur quality. Selection of pelt size and fur quality is largely indirect via live animal evaluations (grading traits).

In order to set proper breeding goals, heritabilities and genetic correlations for fertility, size traits and fur quality traits were estimated. One fertility trait four pelt character traits and six grading traits were analysed.

MATERIAL AND METHODS

The data was obtained from the Finnish Fur Breeders' Association. Data had 54680 animals from 7 farms between years 1987-2002.

Variance components were estimated in multitrait animal models using DMU program with REML.

Estimates were obtained from several analysis. In cases with several estimates, average estimates were used to estimate genetic correlations, heritabilities and proportion of litter variation.

RESULTS

Table 7. Genetic (upper triangle) and phenotypic (lower triangle) correlations between pelt character traits and grading traits. The genetic correlations that differ more than $1.96 \times SE$ from zero are presented in blue

	Pelt character traits				Grading traits						
	pSI	pDA	pCL	pQU	gSI	gDA	gCL	gDE	gGC	gQU	LS
pSI		0.02±0.04	0.08±0.05	**0.12±0.05**	**0.74±0.05**	**0.13±0.05**	0.04±0.08	0.33±0.07	**0.16±0.07**	**0.41±0.07**	**-0.28±0.11**
pDA	0.01		**0.10±0.04**	**0.11±0.04**	**-0.17±0.06**	**0.84±0.02**	**0.23±0.07**	**-0.16±0.06**	**0.51±0.05**	0.13±0.07	-0.12±0.09
pCL	0.02	-0.01		**0.12±0.05**	0.05±0.08	0.09±0.06	**0.22±0.09**	-0.06±0.08	0.07±0.07	0.08±0.09	0.05±0.12
pQU	0.11	0.02	-0.04		**0.38±0.07**	**0.10±0.05**	**0.19±0.09**	**0.75±0.06**	**0.33±0.07**	**0.59±0.07**	-0.08±0.11
gSI	0.57	0.00	0.07	0.13		-0.05±0.07	**-0.25±0.12**	**0.30±0.10**	-0.06±0.10	**0.23±0.11**	-0.23±0.15
gDA	0.02	0.08	-0.02	0.07	-0.05		-0.02±0.08	0.04±0.07	**0.50±0.06**	**0.22±0.08**	0.05±0.11
gCL	-0.15	0.03	0.23	0.12	0.05	0.02		0.17±0.12	**0.61±0.08**	**0.52±0.10**	-0.07±0.17
gDE	0.25	-0.04	0.05	0.26	0.40	-0.03	0.10		**0.21±0.10**	**0.77±0.06**	0.23±0.16
gGC	0.08	0.32	0.08	-0.06	0.07	0.18	0.29	0.09		**0.75±0.06**	0.05±0.15
gQU	0.17	0.26	0.06	0.04	0.24	0.03	0.35	0.57	0.45		-0.02±0.17
LS	-	-	-	-	-0.09	0.03	0.03	-0.04	0.01	-0.03	

pSI = pelt size, pDA = pelt darkness, pCL = pelt color clarity, pQU = pelt quality, gSI = animal size, gDA = grading darkness, gCL =grading color clarity, gDE = under fur density, gGC = guard hair coverage, gQU = grading quality and LS = 1st litter size

Table 2. Proportion of litter variation (c^2) and heritability (h^2) for the studied traits

	$c^2 \pm SE$	$h^2 \pm SE$
Pelt size	0.08±0.00	0.30±0.02
Pelt color darkness	0.05±0.00	0.55±0.02
Pelt color clarity	0.08±0.00	0.16±0.01
Pelt quality	0.06±0.00	0.22±0.01
Animal size	0.07±0.01	0.16±0.02
Grading color darkness	0.10±0.01	0.51±0.02
Grading color clarity	0.13±0.01	0.10±0.02
Grading density	0.11±0.01	0.15±0.02
Grading guard hair coverage	0.10±0.01	0.19±0.02
Grading quality	0.12±0.01	0.11±0.02
1st litter size	0.01±0.03	0.12±0.03

CONCLUSION

Heritabilities were higher in the pelt character group than in the grading group. Genetic correlations between most trait pairs (e.g. pelt color darkness and grading color darknes) were high. Thus indirect selection of pelt character traits via grading traits is relative effective. However, trait pairs in different trait groups should be considered as different traits, because genetic correlation was always less than 0.84.

Genetic correlation between 1st litter size and pelt size and also between 1st litter size and animal size was negative. Therefore breeding value evaluation of litter size and size traits should be estimated together.

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