Genetic parameters and breeding values for the four major sheep breeds in Switzerland

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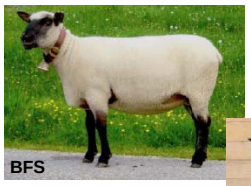
Introduction

Four major sheep breeds - White Alpine (WAS), Brown Headed Meat (BFS), Black Brown Mountain (SBS) and Valais Black Nose (SN) -, with population sizes above 10'000 animals, are kept in Switzerland. During 2009 population parameters, direct and maternal breeding values for average daily gayn up to 45 days of age were estimated using REML and BLUP methodology.

Material

Table 1: Trait and pedigree records

breed	litters	ancestors in the pedigree
BFS	116'991	171'994
SBS	103'298	157'712
SN	123'087	152'896
WAS	405'233	526'257



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Trait records were taken from 1995 upwards, pedigree records from 1985 upwards (table 1).

Methods

Statistical model

y_{ijklmn} = **μ + herd * year**$_i$ *(random)* **+ sex of lambs**$_j$ *(fixed)* **+ litter size**$_k$ *(fixed)* **+ litter number * age of the dam**$_l$ *(fixed)* **+ age at weighing**$_m$ *(fixed)* **+ lambing season**$_n$ *(fixed)* **+ permanent environment**$_m$ *(random)* **+ direct component of the animal**$_m$ *(random)* **+ maternal component of the animal**$_m$ *(random)* **+ residual effect**$_{ijklmn}$ *(random)*

Litter size was taken as a combination of total lambs born and number of lambs alive at 45 days of age. Litter size and age of dam were the two fixed effects with the largest influence on growth of lamb up to 45 days.

Results

Table 2: Heritabilities and genetic correlations

	BFS	SBS	SN	WAS
heritabilities for the direct component	0.20	0.22	0.27	0.21
heritabilities for the maternal component	0.19	0.16	0.15	0.17
genetic correlations between direct and maternal components	-0.38	-0.45	-0.66	-0.47

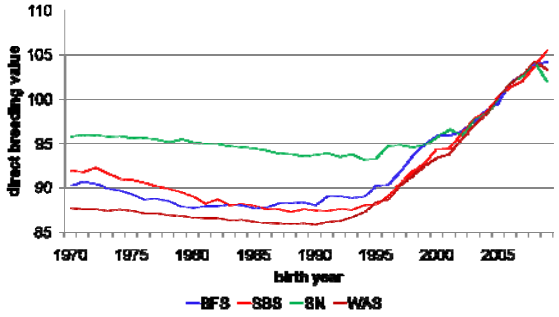

Figure 1: Genetic trends daily gain direct component

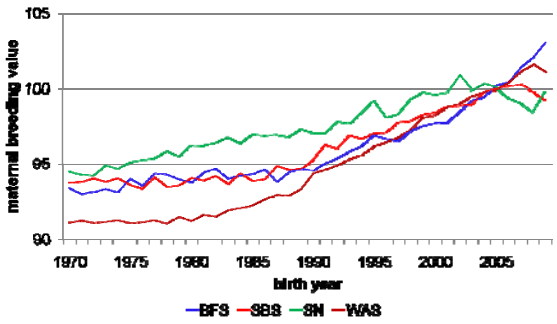

Figure 2: Genetic trends daily gain maternal component

The average breeding values per year of birth gave indications on the genetic trends, which differed between breeds (figures 1 & 2). Genetic trends provide information on the selection practised. As direct daily gain increases in average in all breeds (figure 1), care should be given to also maintain a positive future trend for the maternal component (figure 2), considering the negative genetic correlation between the two components (table 2).