# Estimation of genetic parameters and breeding values for the major Swiss dairy goat breeds

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## Summary

- **Estimated genetic parameters are plausible and the results are comparable to those in other countries**
- **Genetic evaluation is now performed and is carried out annually**
- **Breeders and organizations are requested to take advantage of this new information**

## Background

- The number of registered herdbook goats has been steadily increasing over the last years
- The herdbook currently contains 32,094 goats in 3,134 herds
- 70% of the registered animals belong to the major Swiss dairy goat breeds: Brown Alpine, Saanen and Toggenburg
- Until three years ago Swiss dairy goat breeders made their selection decisions based solely on phenotypic information
- Due to governmental regulations and supported by scientific evidence, a genetic evaluation for milk production traits was developed and put into practice

## Material and methods

- BLUP animal model, lactations as repeated measurements
- Using REMLF90 (Misztal, 2002) and BLUPF90 (Misztal, 1997)
- Multivariate runs for genetic parameter estimation and for breeding value estimation
- Data (observation period: 2000-2009):

| Breed | Lactations | Herds |
|---|---|---|
| Alpine Brown | 40,799 | 1,086 |
| Saanen | 43,409 | 1,324 |
| Toggenburg | 15,594 | 646 |

- Effects in model:

| Effect | Type |
|---|---|
| Lactation number | fix |
| Kidding year * season | fix |
| Herd * time period[1] | random |
| Additiv genetic effect of animal | random |
| Permanent environment | random |
| Residual | random |

[1] 2 3-year periods, 1 4-year period

## Milk production traits and publication criteria

- Milk yield (mkg), fat percentage (fp) and protein percentage (pp)
- 100-day performance as auxiliary traits, 220-day performance as main traits
- Publication of the breeding value (ebv): Mean of the base population (4 to 6 year old goats with at least one observation for auxiliary traits) is 100, standard deviation is 10
- Only main traits are published
- Publication criteria for ebv:
  Bucks: 8 lactating offspring with milk performance results
  Goats: At least one 100-day performance result

## Results

- Heritability ($h^2$, diagonal) and genetic correlations (off-diagonal)
  (Alpine Brown, *Saanen*, Toggenburg)

| Trait | mkg 100 | fp 100 | pp 100 | mkg 220 | fp 220 | pp 220 |
|---|---|---|---|---|---|---|
| mkg 100 | **0.14**<br>***0.17***<br>**0.18** | | | | | |
| fp 100 | -0.319<br>*-0.221*<br>-0.434 | **0.27**<br>***0.30***<br>**0.30** | | | | |
| pp 100 | -0.426<br>*-0.353*<br>-0.347 | 0.660<br>*0.624*<br>0.709 | **0.25**<br>***0.26***<br>**0.43** | | | |
| mkg 220 | 0.963<br>*0.966*<br>0.927 | -0.330<br>*-0.184*<br>-0.287 | -0.396<br>*-0.310*<br>-0.282 | **0.13**<br>***0.18***<br>**0.14** | | |
| fp 220 | -0.295<br>*-0.283*<br>-0.422 | 0.970<br>*0.973*<br>0.970 | 0.653<br>*0.638*<br>0.717 | -0.313<br>*-0.260*<br>-0.282 | **0.48**<br>***0.42***<br>**0.38** | |
| pp 220 | -0.398<br>*-0.338*<br>-0.329 | 0.662<br>*0.600*<br>0.694 | 0.989<br>*0.983*<br>0.972 | -0.390<br>*-0.313*<br>-0.271 | 0.671<br>*0.634*<br>0.703 | **0.46**<br>***0.42***<br>**0.56** |

- Compared to dairy cows: $h^2$ for yield are lower, $h^2$ for milk content are higher
- Different genetic correlations between the traits are explainable
- Similar genetic parameters were found in literature