

# First Steps towards Genomic Selection in French Dairy Goat

Céline Carillier,  
Christèle Robert-Granié,  
Hélène Larroque  
*INRA-SAGA Toulouse*



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# Few males progeny tested each year in French dairy goats

Progeny tested bucks each year

40 Alpine



30 Saanen



100 daughters /year



with performances

25 Alpine

AI bucks

15 Saanen

$CD_{asc} : 38\%$



> 5.5 years

sire-son  
pathway



Alpine or Saanen

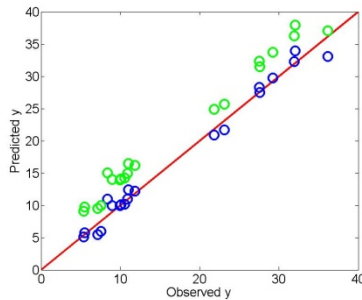


2011: Illumina goat SNP50 Bead Chip

# Not ideal population structure: prediction reliability similar to dairy sheep



linkage disequilibrium



genomic evaluation



interest of adding females in reference population

# Small multi-breed population genotyped with females

46 959 SNP after quality control



384 Alpines

677 males



293 Saanens

QTL  
detection



1,243 Alpines

1,985 females



742 Saanens

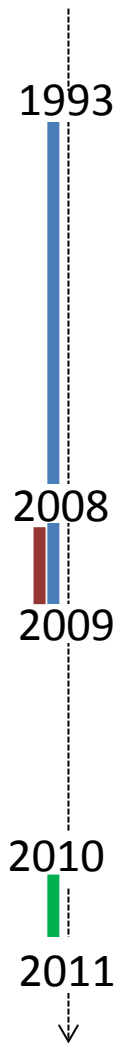


87 Alpines

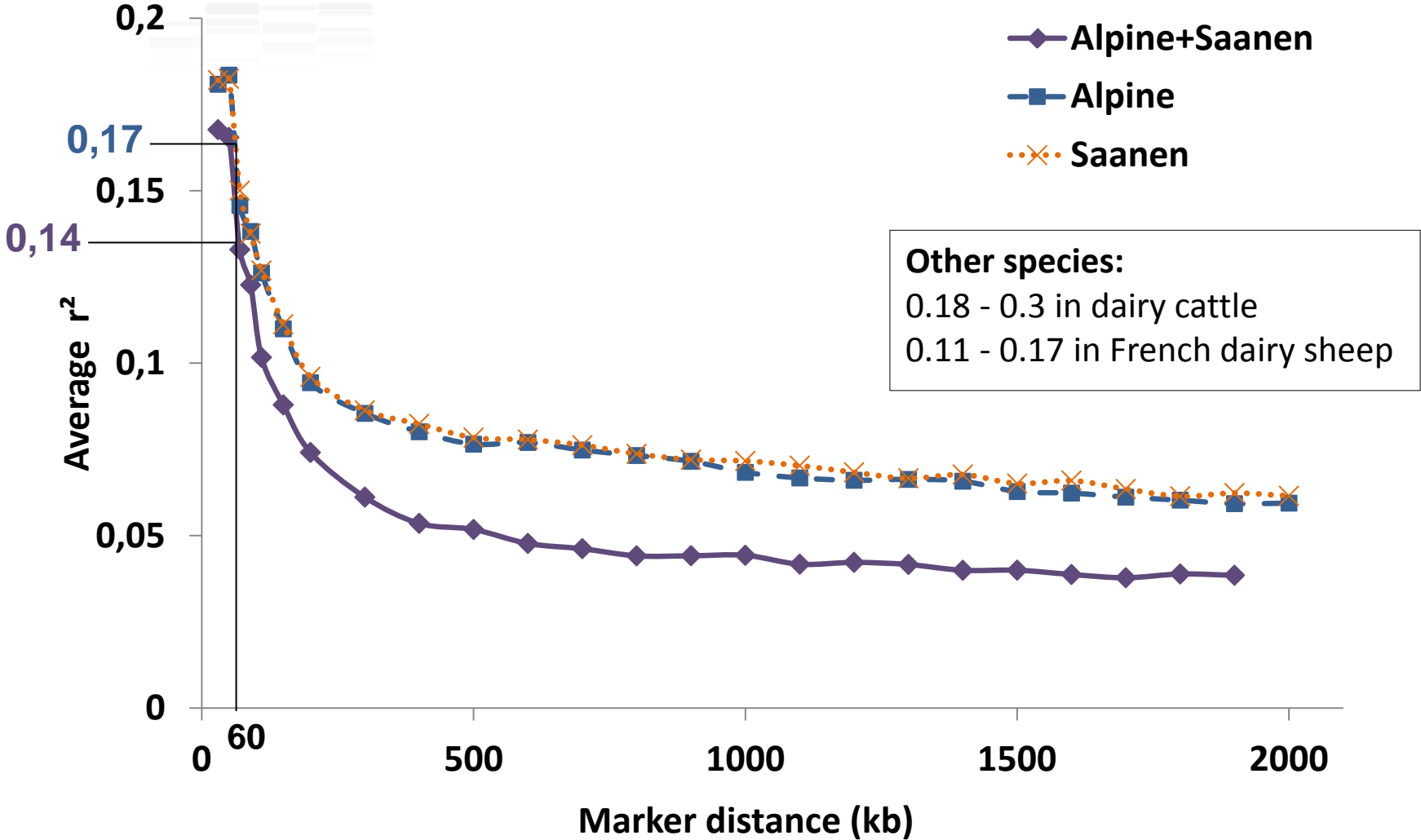
148 males  
not progeny tested yet



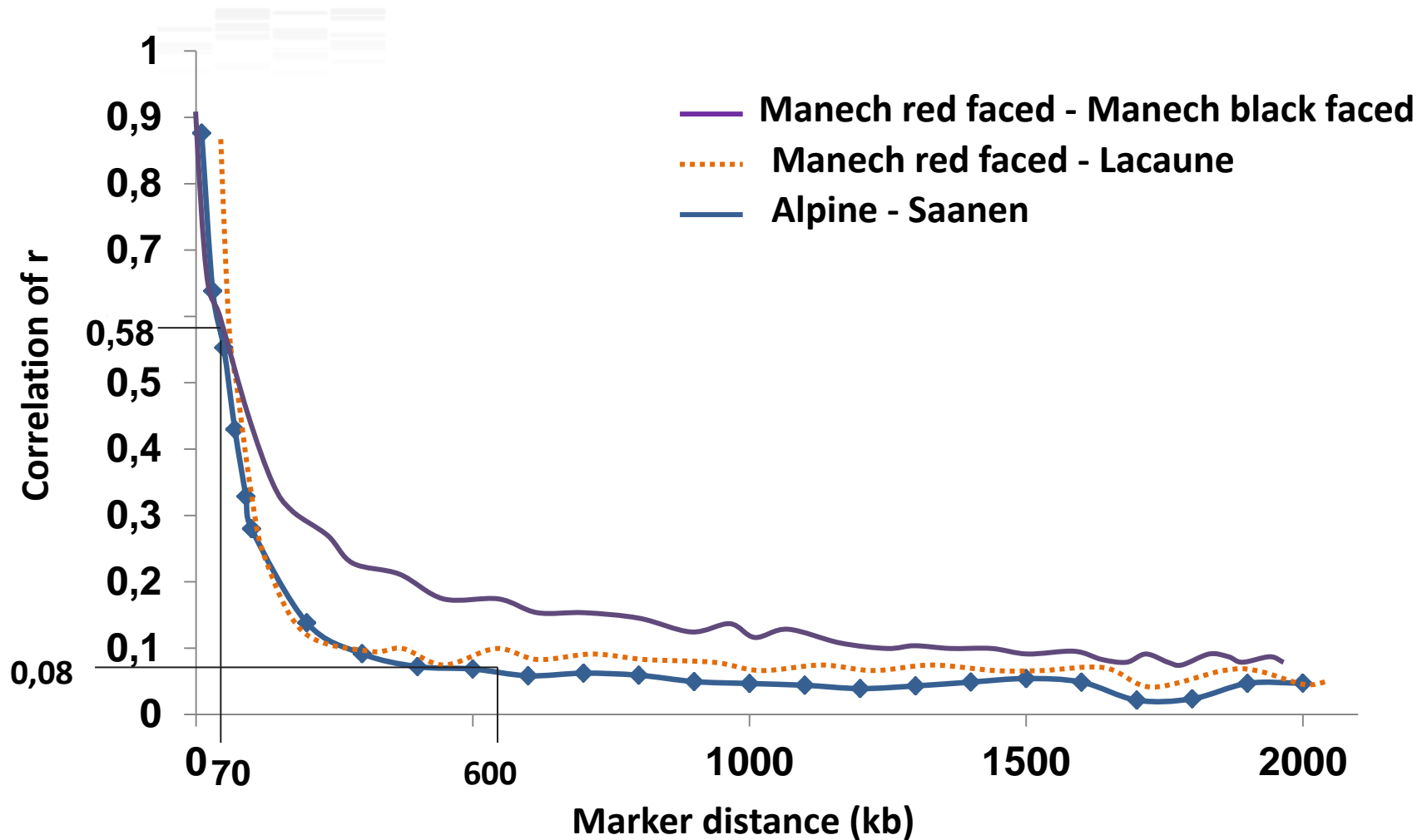
61 Saanens



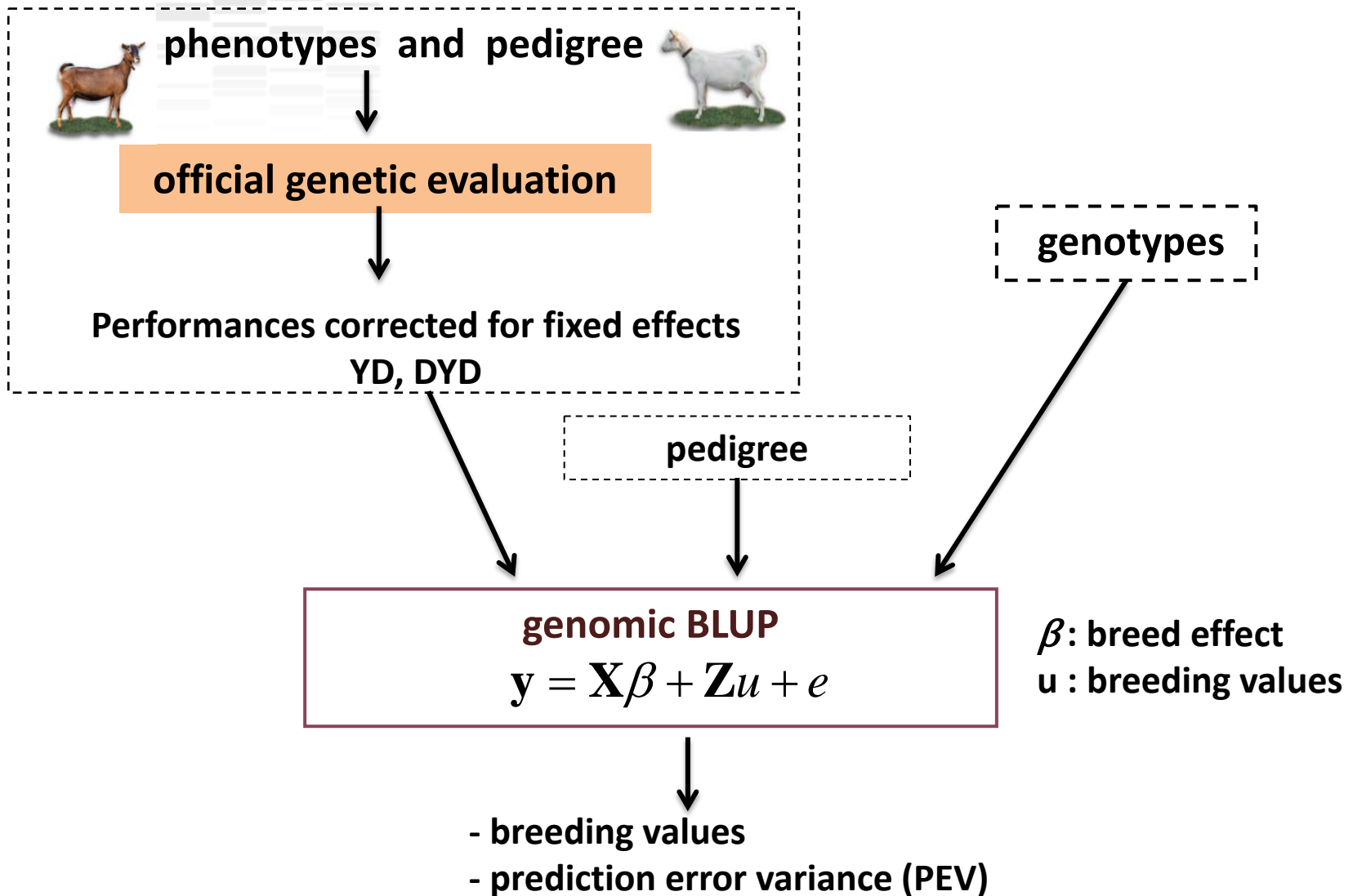
# Medium linkage disequilibrium in dairy goats, lower in multi-breed population than in each breed



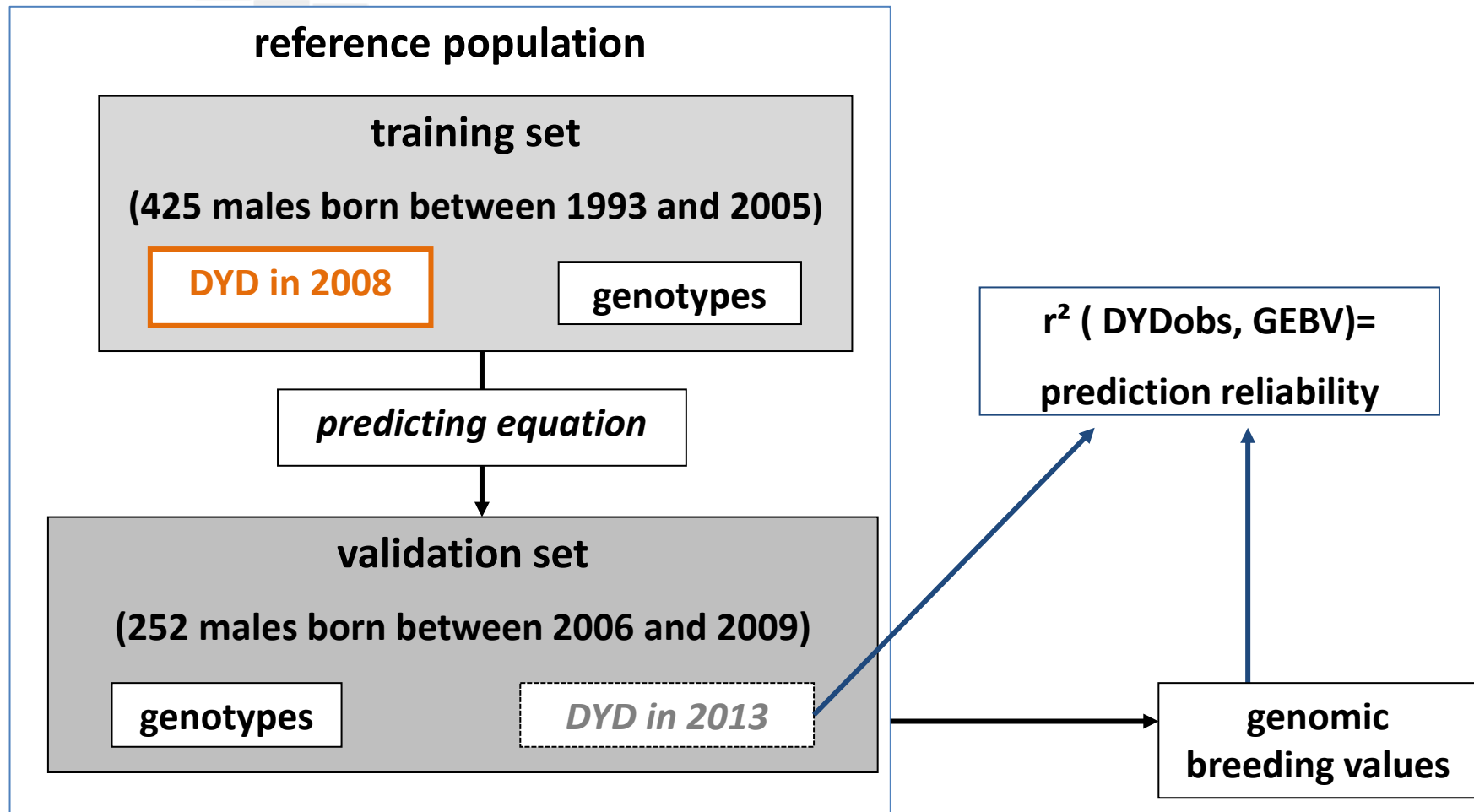
# Alpine and Saanen : two different breeds according to LD persistence between both



# What are the model and the data used in this study?

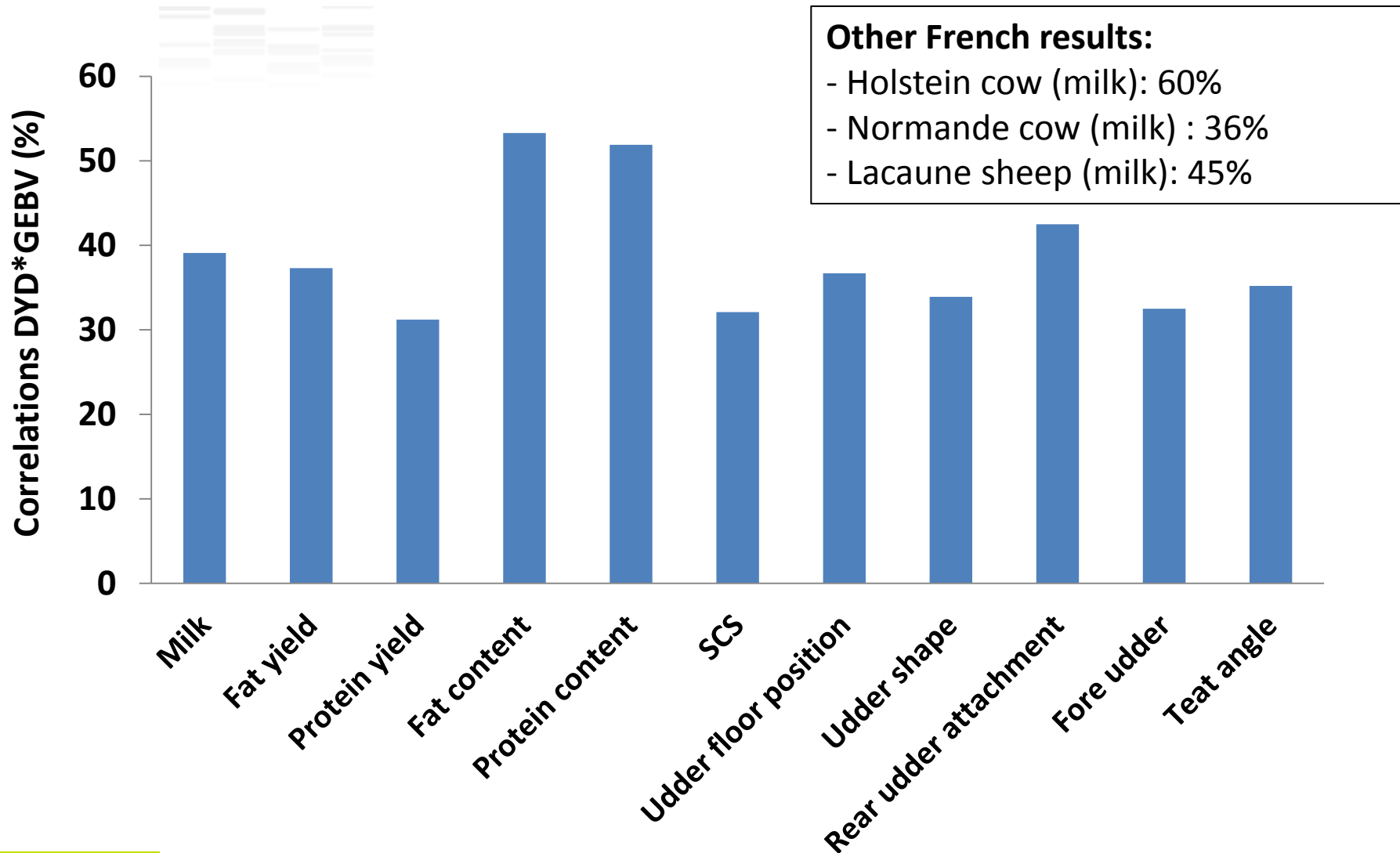


# How we calculate prediction reliability?





# Prediction reliability in validation population close to the one in Normande dairy cattle breed



# No males with daughters born after females genotyped

46 959 SNP after quality control



384 Alpines

677 males



293 Saanens

QTL  
detection



1,243 Alpines

1,985 females



742 Saanens



87 Alpines

148 males  
not progeny tested yet



61 Saanens

1993

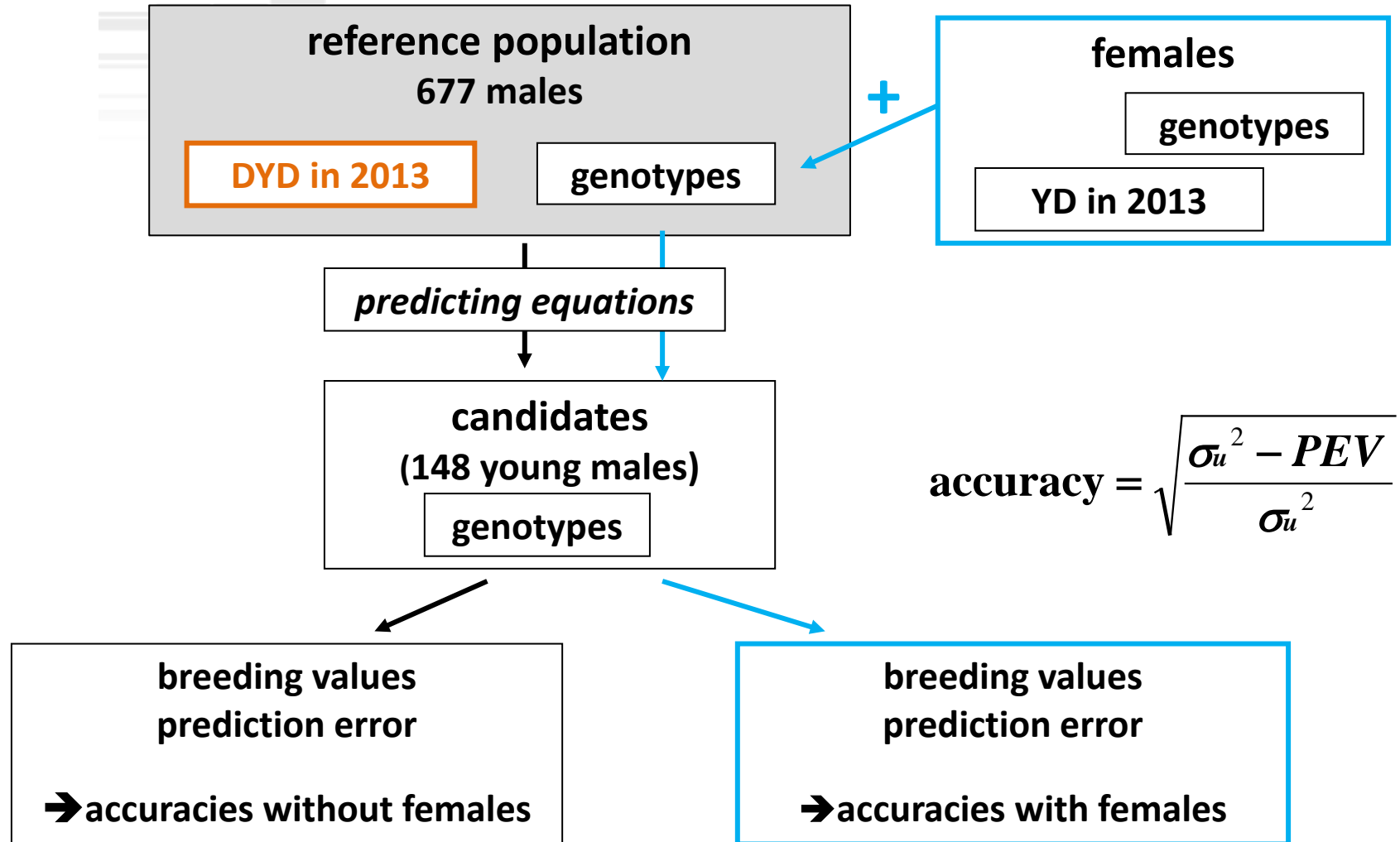
2008

2009

2010

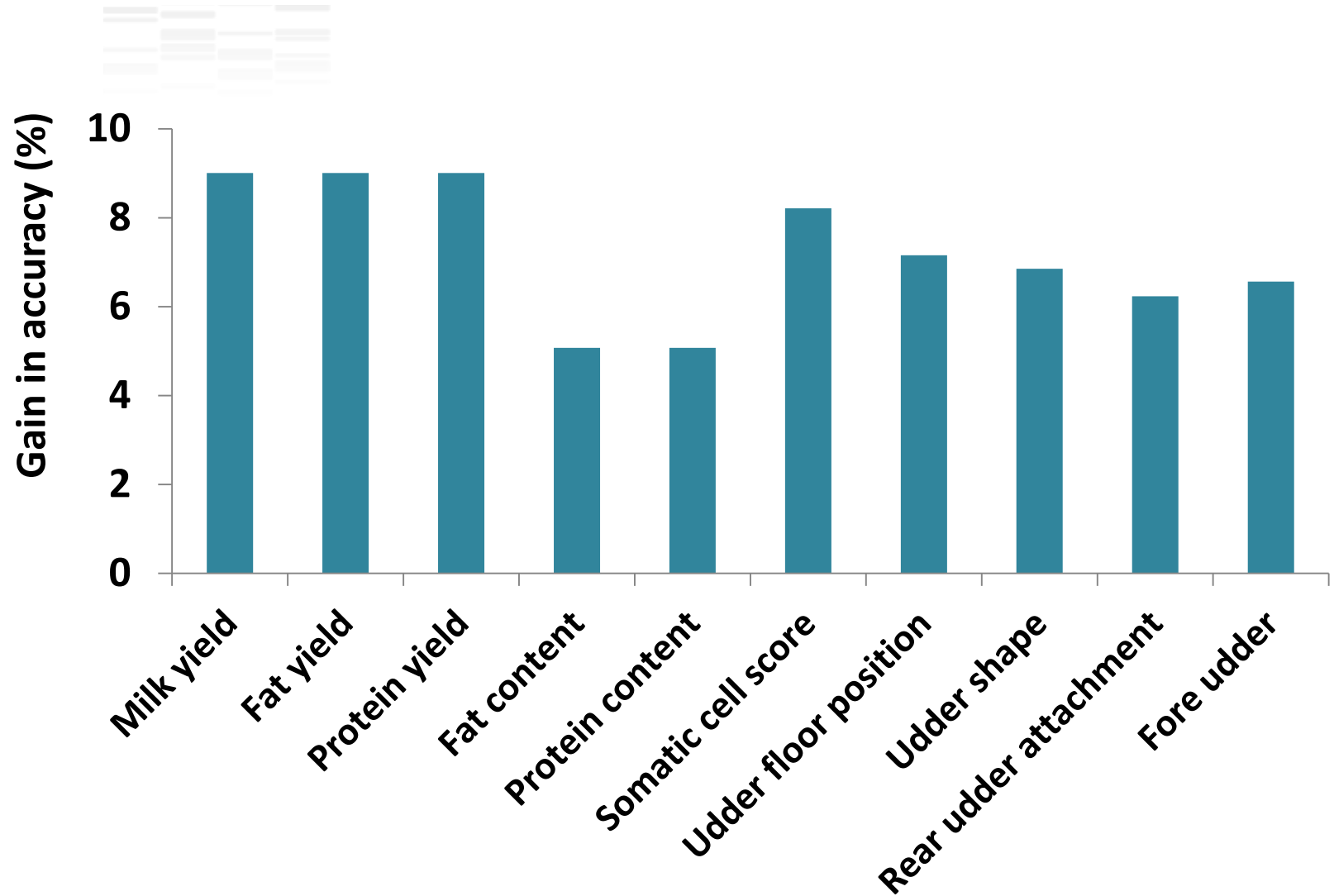
2011

# How we calculate accuracy of young buck breeding values?

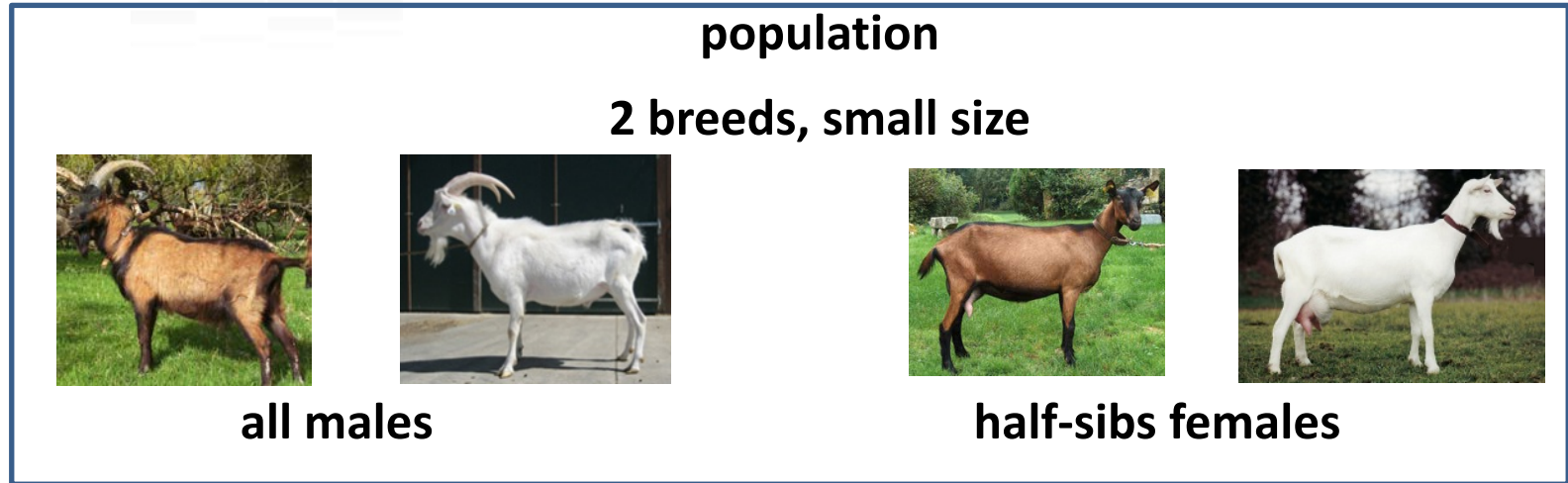


$$gain = \frac{accuracy_{with\ females} - accuracy_{without\ females}}{accuracy_{without\ females}}$$

# Improvement of accuracies when adding 1,985 females in reference population of 677 males



# Genomic selection is difficult to apply due to small population size, two breeds and population structure



good model fit

improvement of GEBV accuracy with females

What is the most accurate model adapted to multiple breeds?

What are the females to be genotyped?



# Appendix

# Difficulties to consider Alpine and Saanen as a single breed



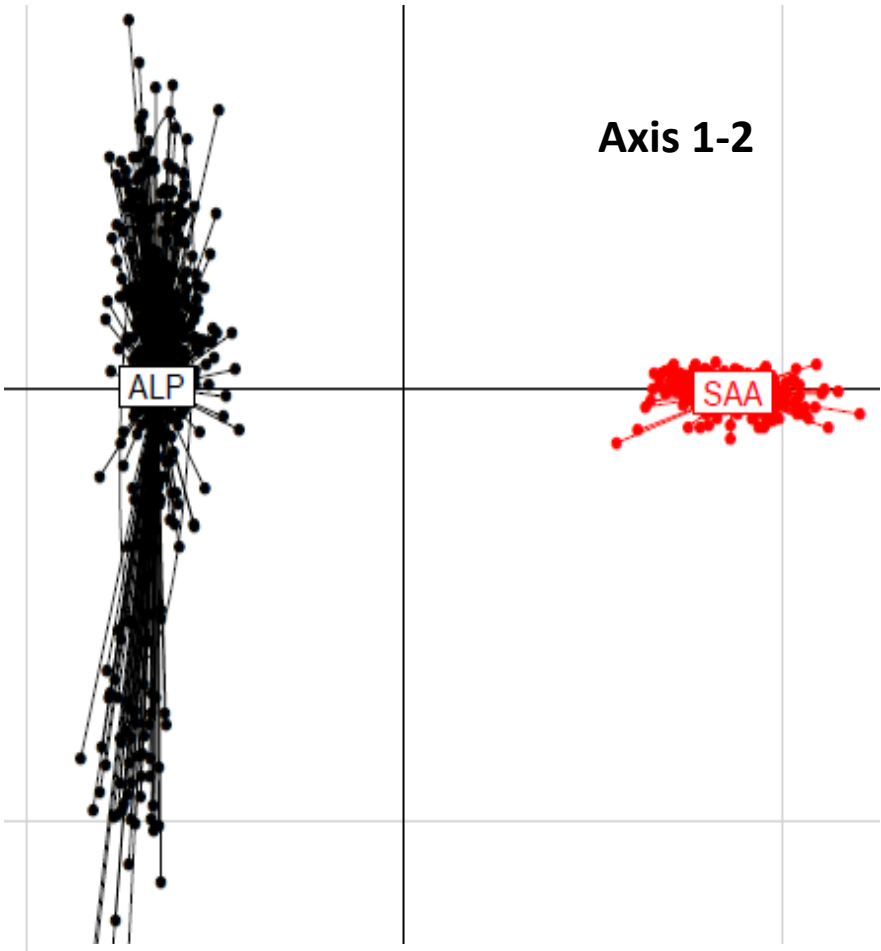
common ancestor



Saanen



Alpine



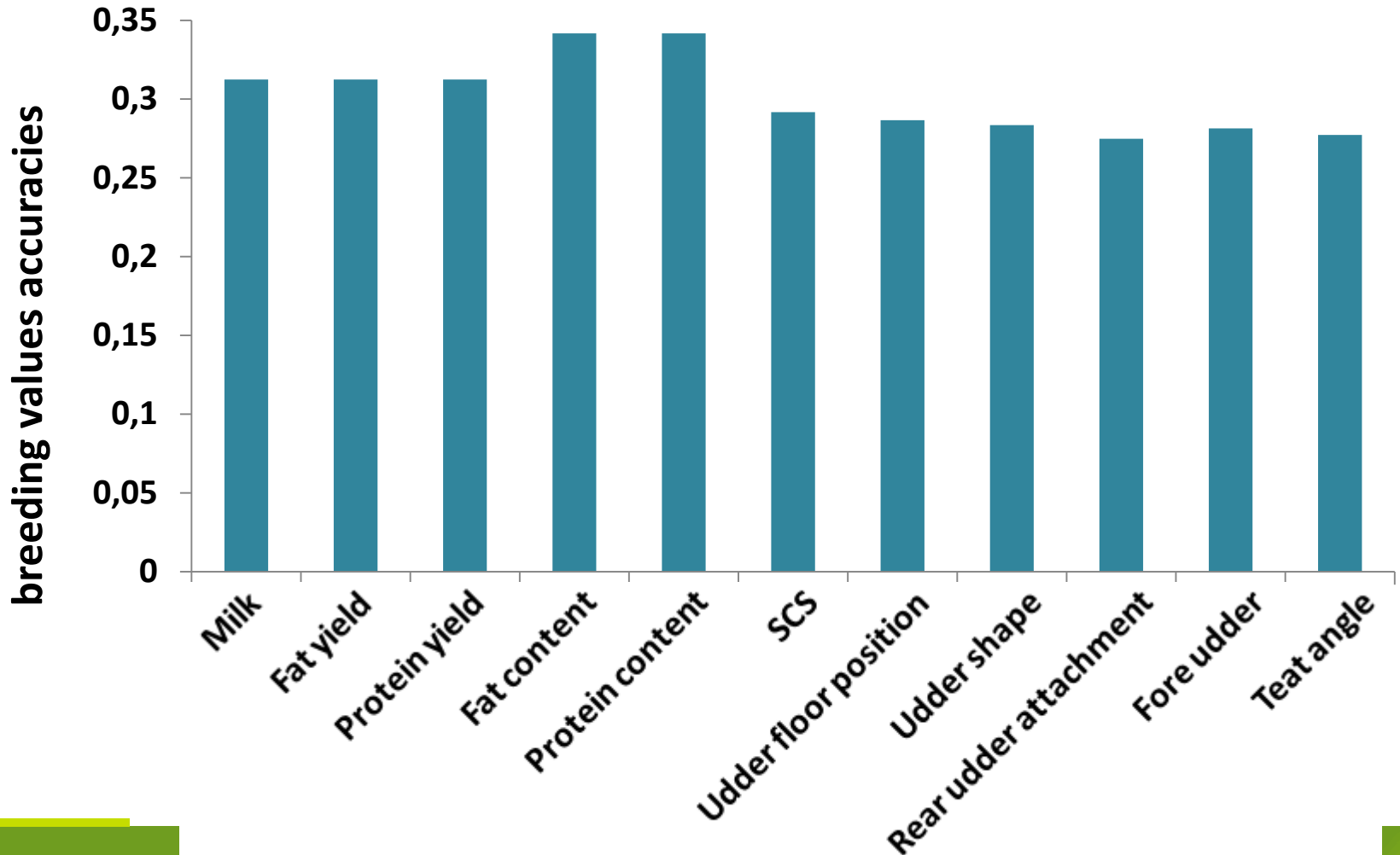
ACP on genotypes, factor: breed

correlation between allele frequencies :

Males	0.6852
Females	0.8455
Both	0.8605

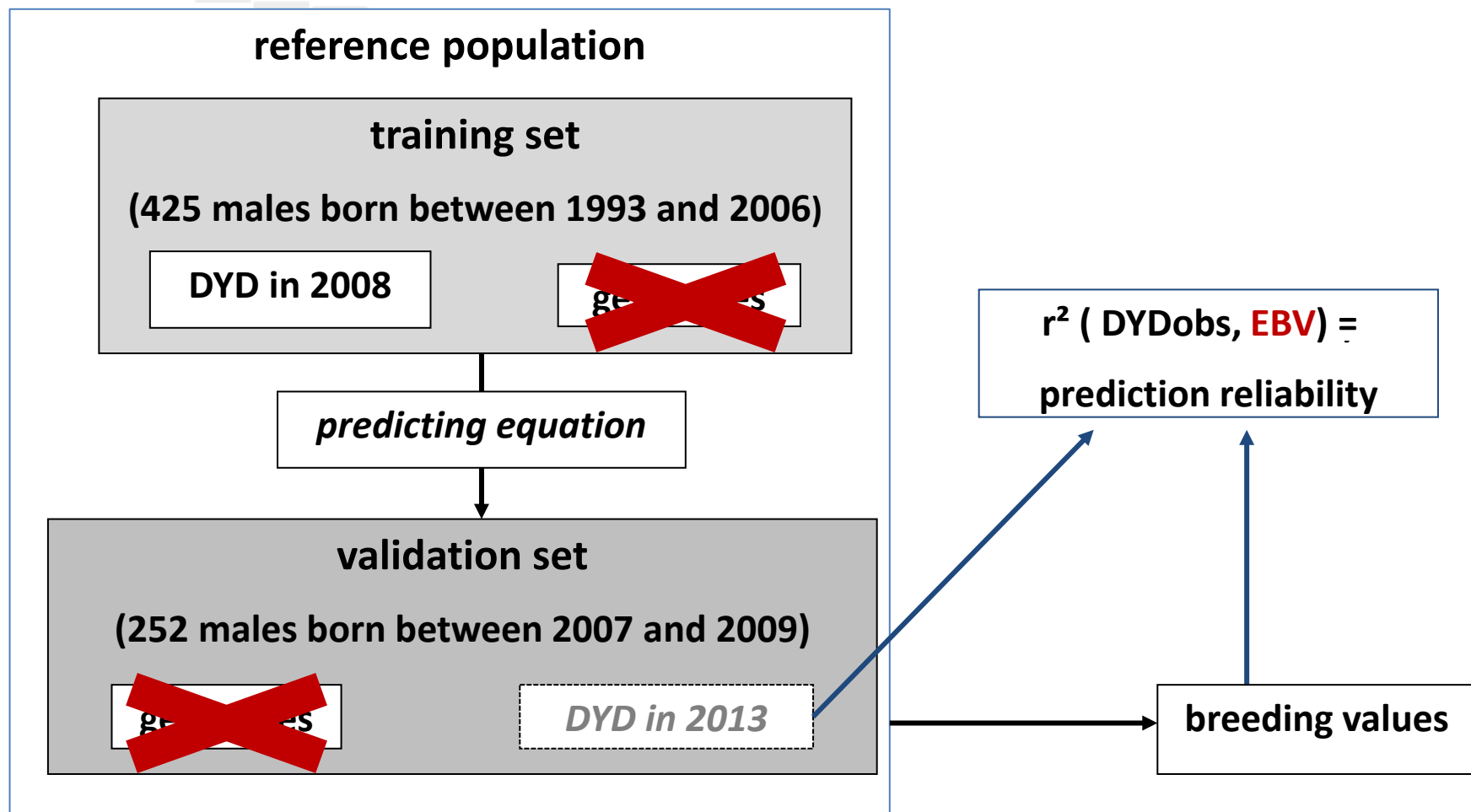
# Young buck breeding value accuracies not as high as expected

Reference population: 677 males and 1,985 females



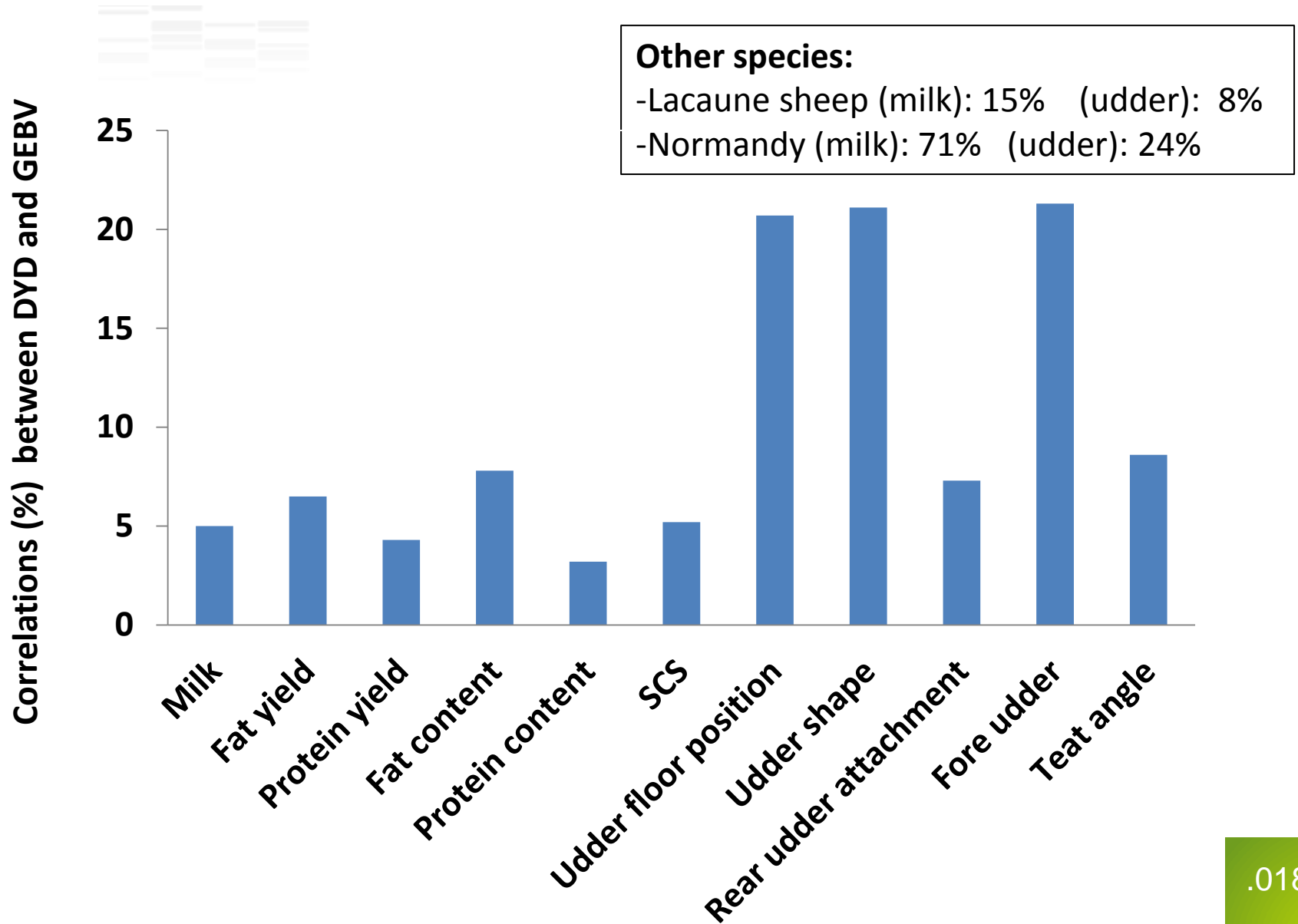


# How we calculate prediction reliability?

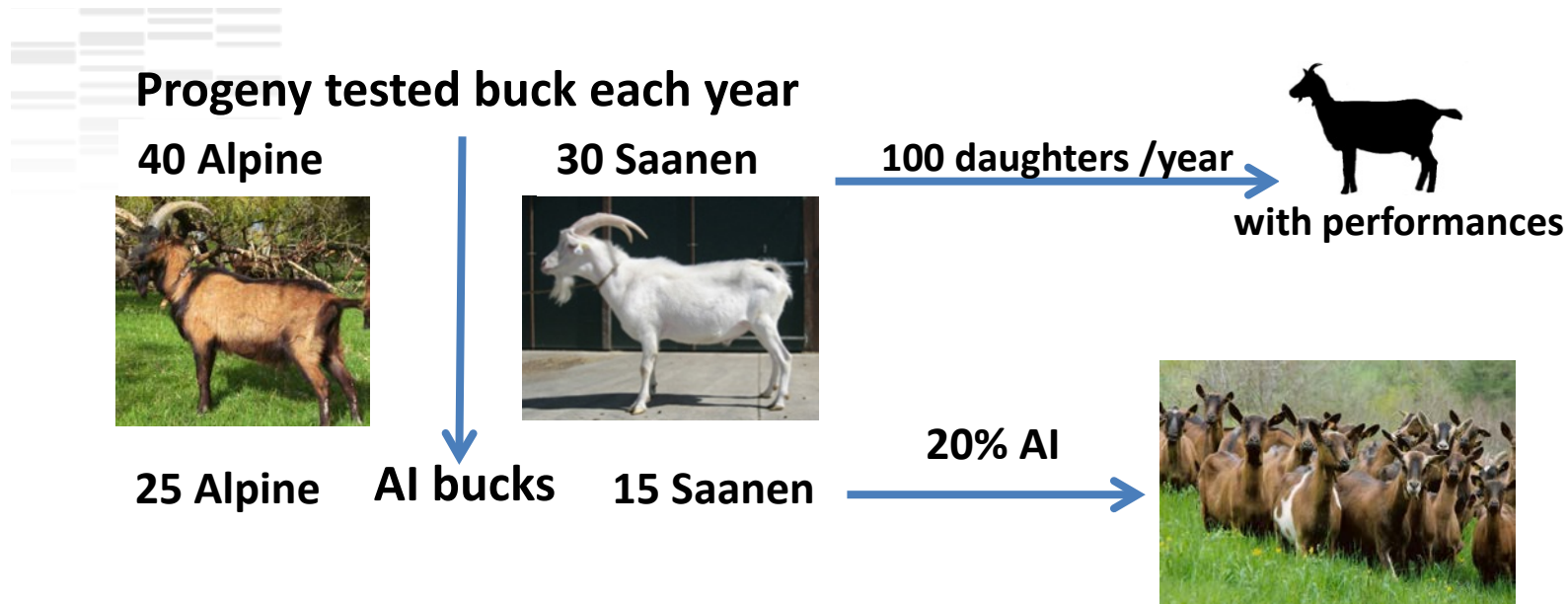


$$\text{Gain in reliability} = \frac{r^2(\text{DYD}_{\text{obs}}, \text{GEBV}) - r^2(\text{DYD}_{\text{obs}}, \text{EBV})}{r^2(\text{DYD}_{\text{obs}}, \text{EBV})}$$

# Gain in reliability with genomic information lower than in other species for milk production traits



# Few male progeny tested each year in French dairy goats



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