



Implementation of genomic selection in UK dairy goats

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Goat milk



- Increasing popularity of goat milk
- 90,000 dairy goats
 - 1/3 on few large commercial farms
 - Produce majority of milk
 - Small scale industry - 'Niche' market

Breeding value



- Routine breeding value estimation
 - France, Canada, US, Norway, UK
- Genomic breeding values
 - France, UK
- Specific structure of reference population
 - Low number of animals
 - Mixture of males and females
 - Limited exchange of genotypes

Goat genomics



- 50K SNP caprine chip
 - Introduced in December 2011
 - 12000 chips sold world-wide
 - 7000 in UK



Breed composition



- Crossbred goat population
 - Saanen
 - Toggenburg
 - Alpine



<http://www.allgoats.com>

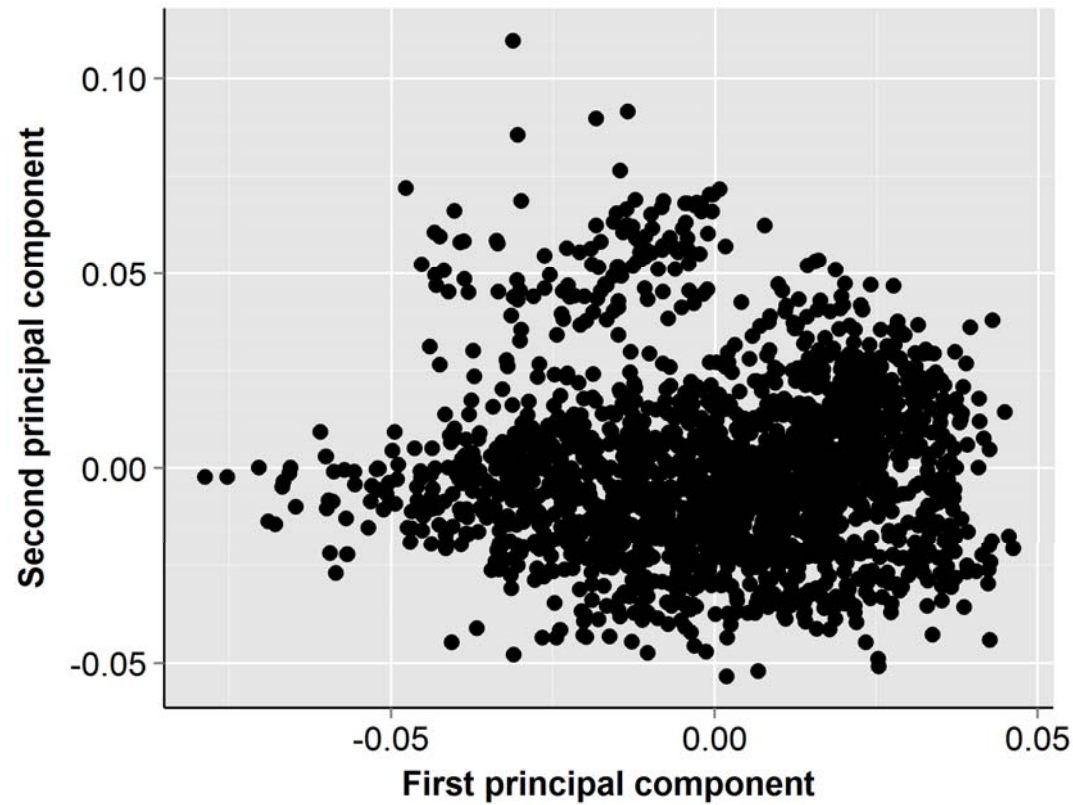


<http://www.allgoats.com>



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Population stratification



Animals



- 2 dairy goat farms
- 19,790 goats
- Lactation 1 – 6
- Years 1987 – 2016



Pedigree



- 38,273 individuals
- 16 generations
- 2,799 founders
- 386 sires & 16,112 dams



Phenotypes



- 1,337,653 milk yield records
- 123,611 milk composition records
 - 11,741 goats
- 6,723 conformation scores
- 11,844 mastitis records

Initial genotyped population



- Training: 1,474 1,410 ♀ & 64 ♂
- Validation: 305 302 ♀ & 3 ♂
- Young : 123 56 ♀ & 67 ♂
- TOTAL: 1,902

- Illumina Caprine 50K BeadChip
- 47,306 SNP after QA



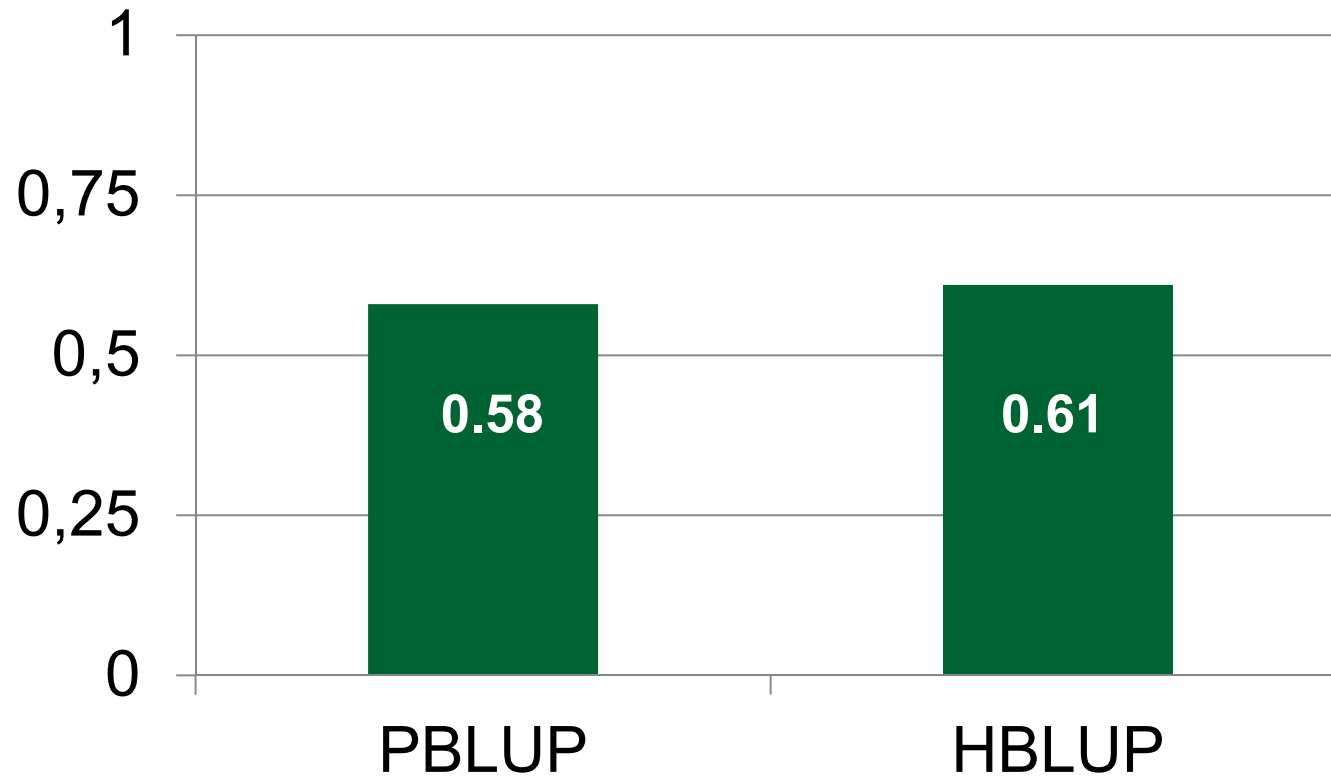
Current genotyped population



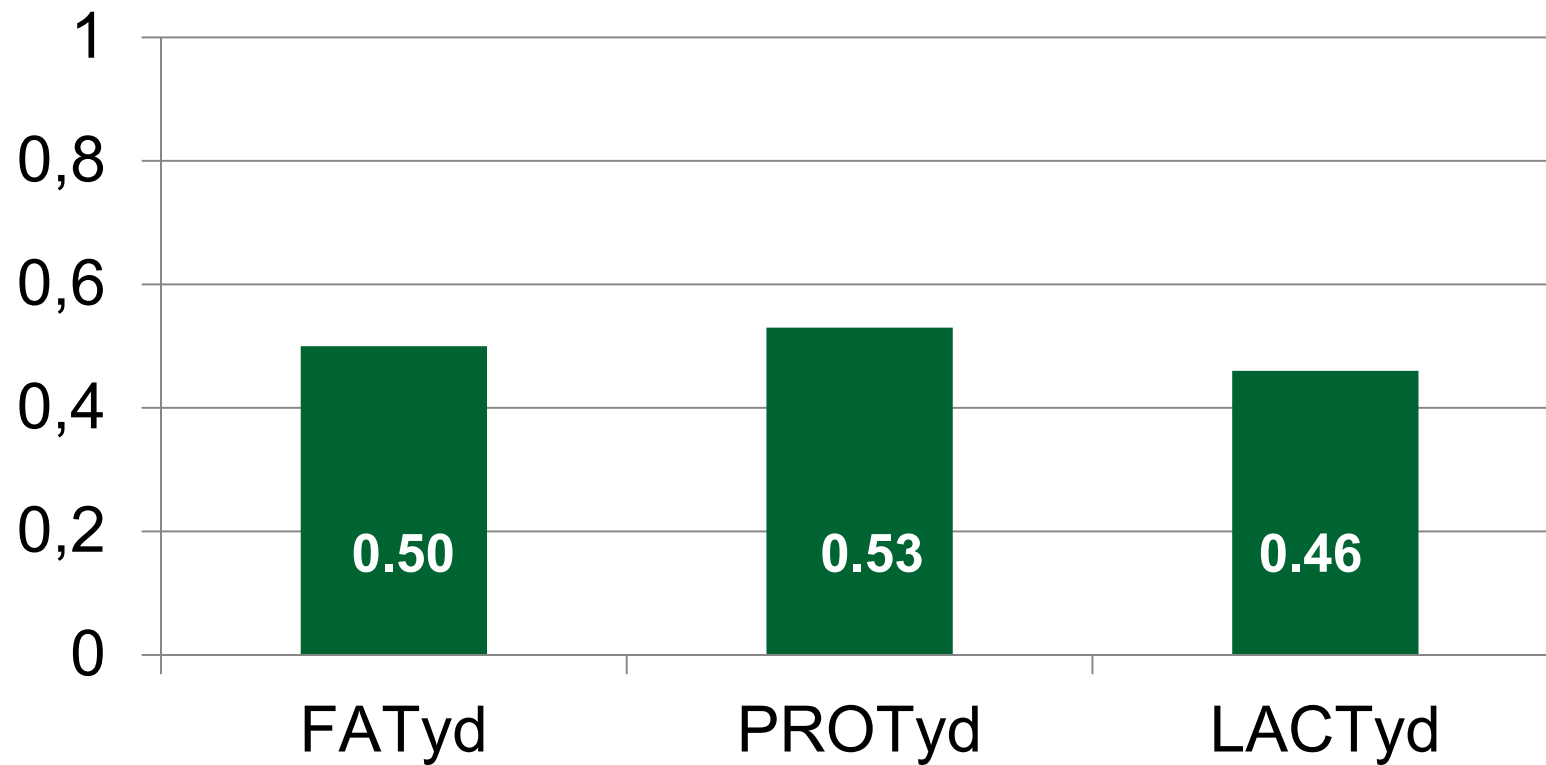
- Training: 3,793 3,675 ♀ 118 ♂
- Validation: 1,419 1,407 ♀ 12 ♂
- Young : 3,764 3,521 ♀ 243 ♂
- TOTAL: 8,976
- Illumina Caprine 50K BeadChip
- 44,670 SNP after QA



Accuracy of milk yd GEBVs



Accuracy



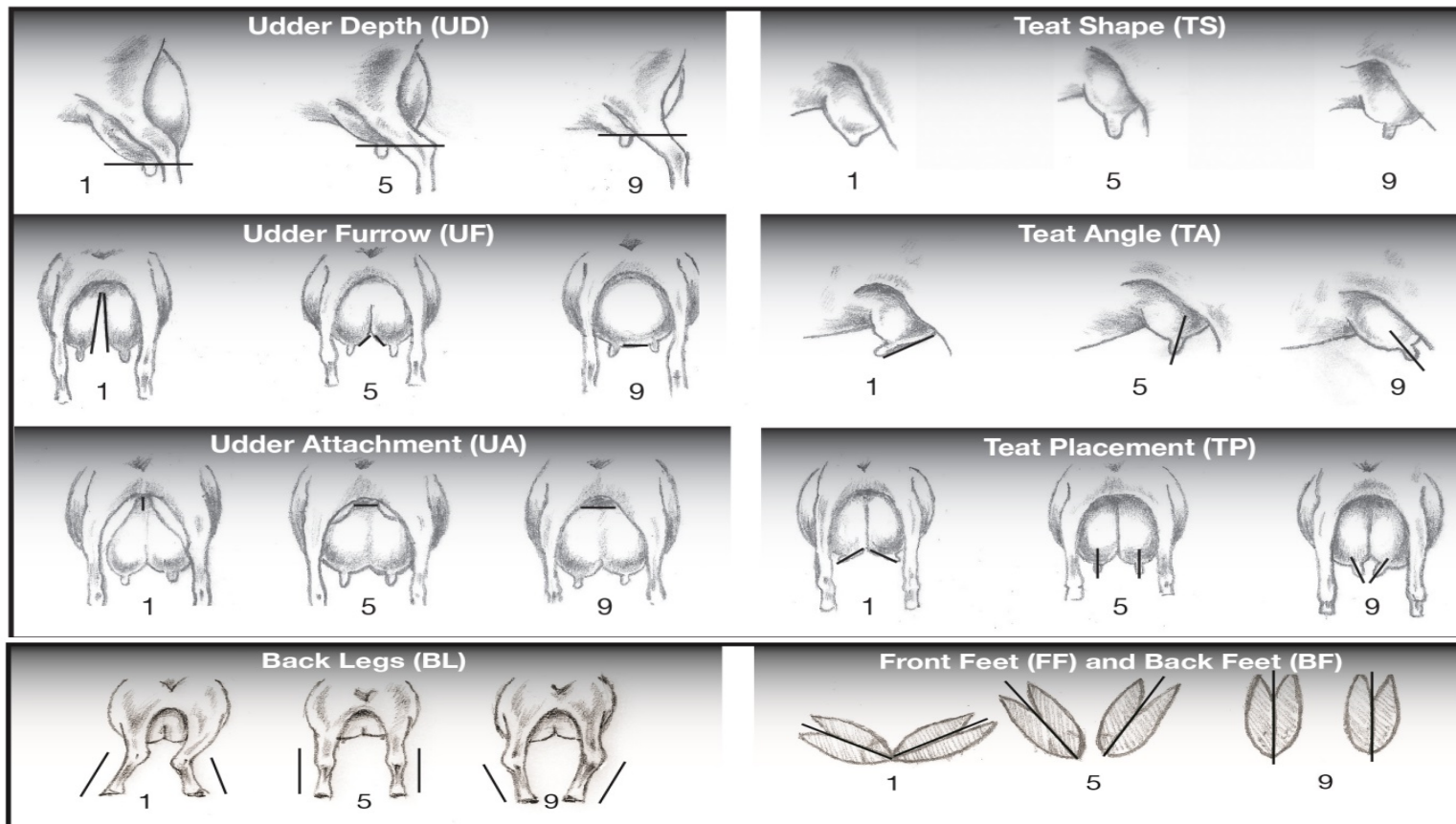
Conformation scoring



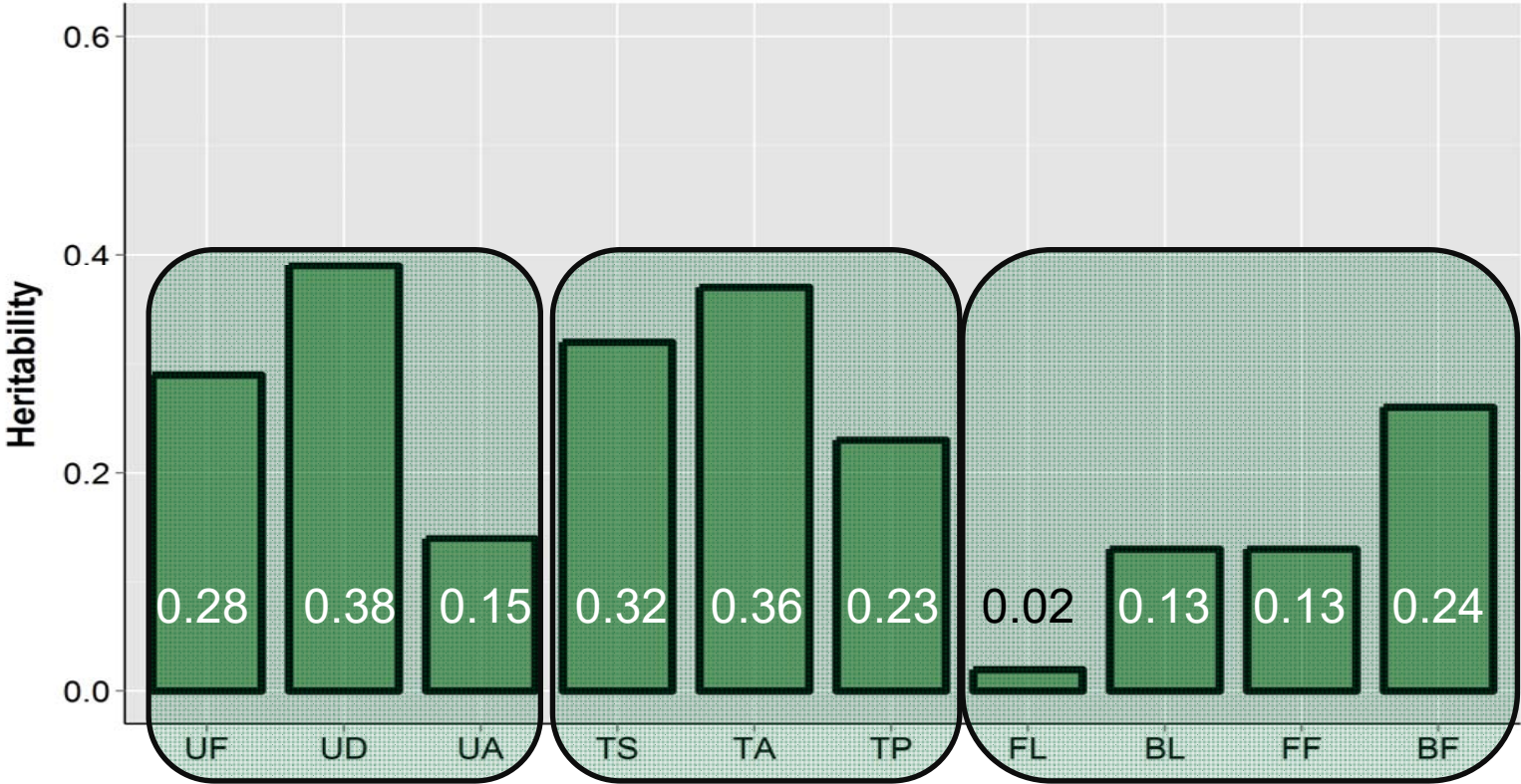
- 9 traits
- Linear scale (1 – 9)
- Similar to CAPGENES
- 2 scorers



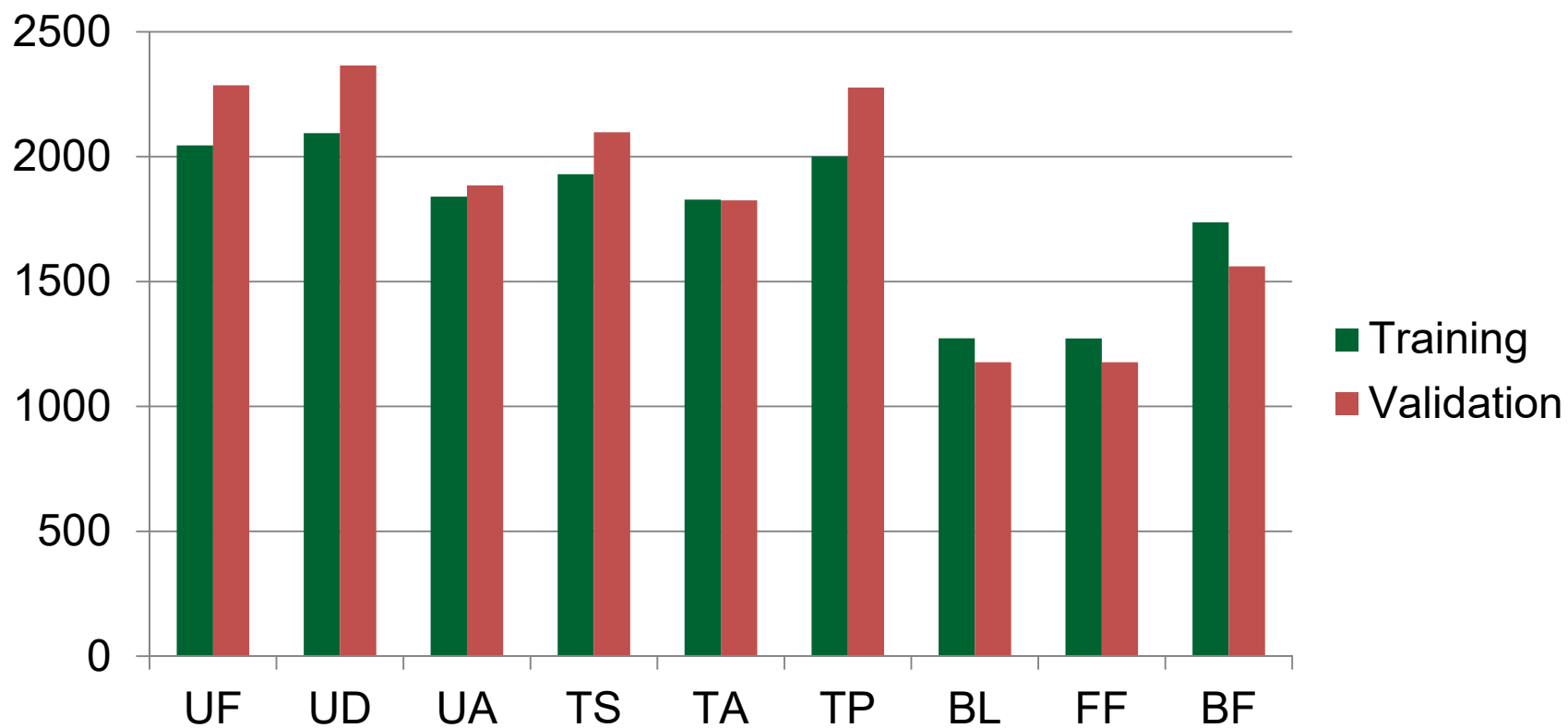
Conformation traits



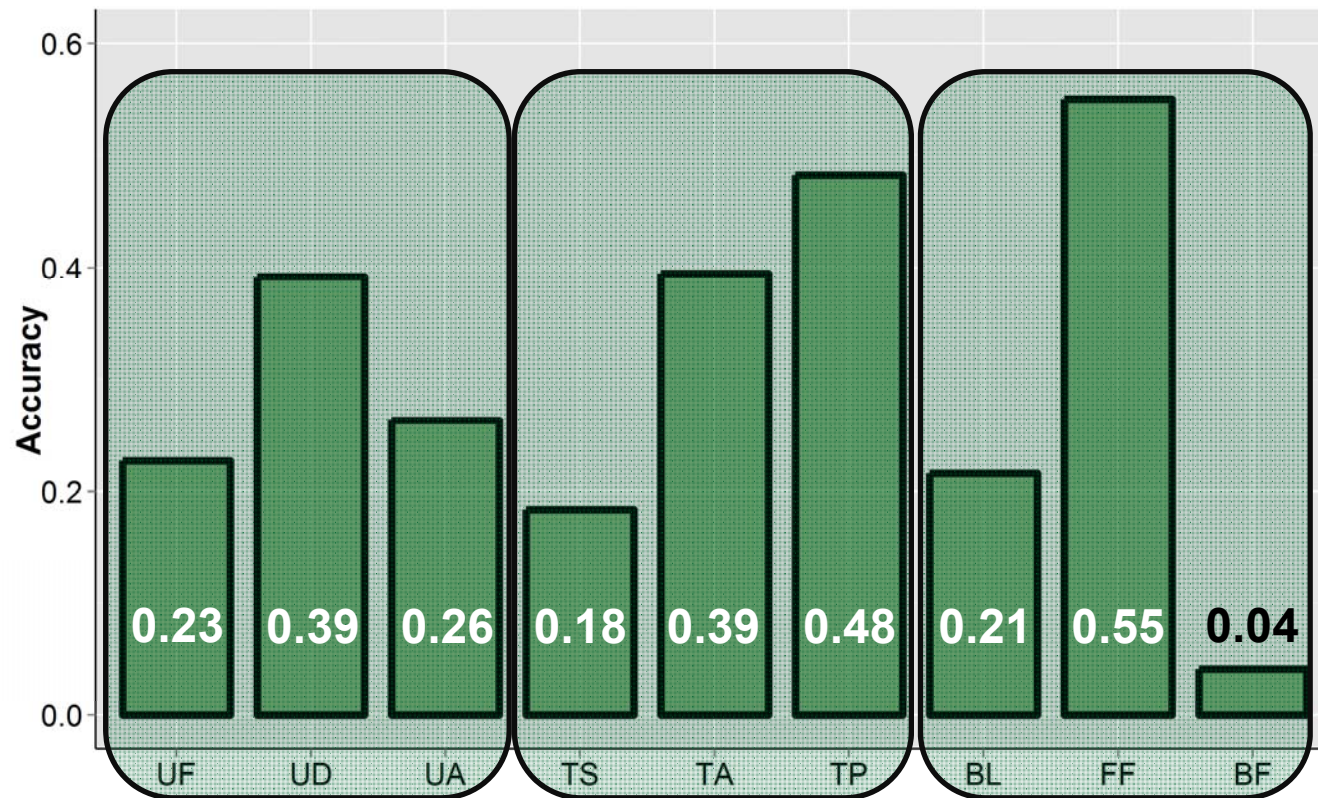
Heritability



Genotyped population



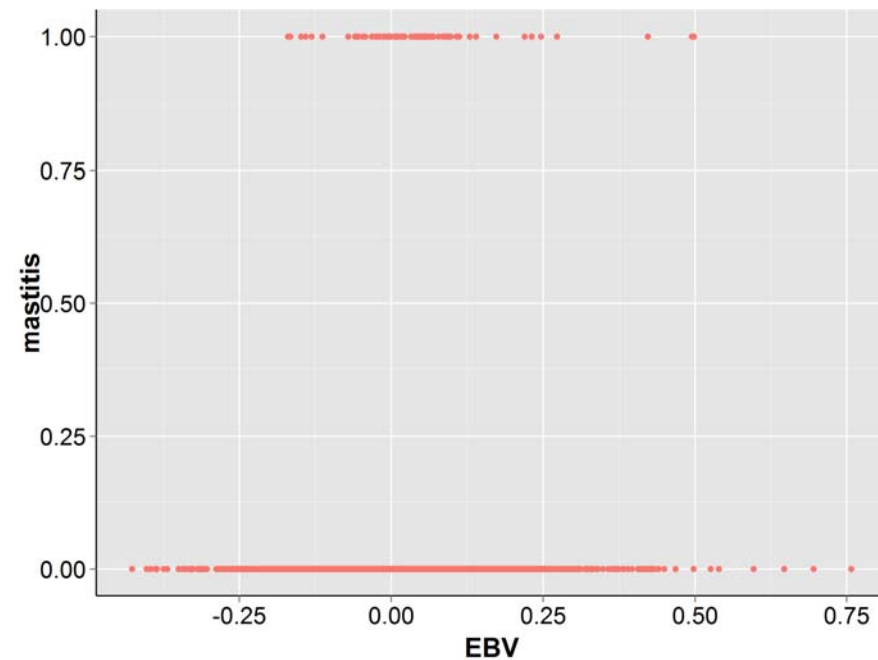
Accuracy



Sub-clinical & clinical mastitis



- Frequency: 4.96%
- Heritability: 0.05 ± 0.01
- Accuracy: 0.30



Future plans



- Genomics of new traits
 - Out of season breeding
 - Longevity
 - Feed efficiency
 - Parentage panel
 - Sequence analysis
 - ...



Acknowledgement



YORKSHIRE
DAIRY
GOATS

Innovate UK

Thank you for your attention





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