

Whole genome sequence GWAS reveals muscularity in beef cattle differs across five cattle breeds

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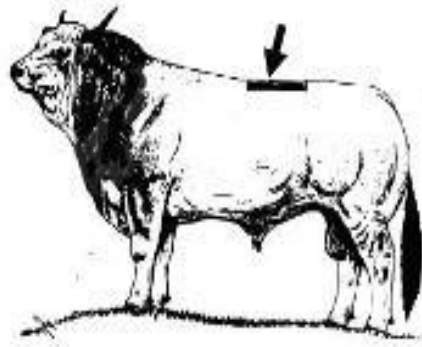
³Wageningen University and Research Centre, Wageningen, the Netherlands



Motivation



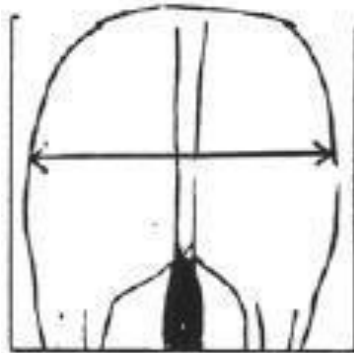
Muscular Linear Type Traits



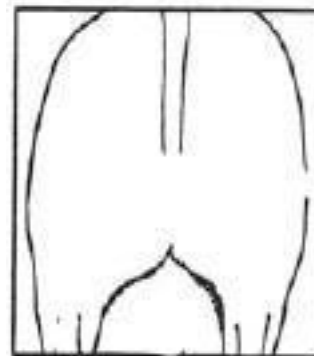
Development of Loin



Development of Hind Quarter



Thigh Width



Development of Inner Thigh



Width of Withers



Objective

- To identify genomic regions associated with the 5 muscular linear type traits
- To determine if these regions are common across 5 different breeds



Number of animals



Angus **Charolais** **Hereford** **Limousin** **Simmental** **Total**

Phenotypes	3,356	31,049	3,004	35,159	8,632	81,200
Genotypes	1,444	6,433	1,129	8,745	1,698	19,449



Number of SNPs



Angus



Charolais



Hereford



Limousin



Simmental

Total number of SNPs

41,389,526 41,389,526 41,389,526 41,389,526 41,389,526

Removed during MAF edit

24,359,204 22,969,027 24,064,152 22,899,039 22,939,493

Removed due to poor imputation accuracy

687,352 687,352 687,352 687,352 687,352

Number of SNPs analysed

16,342,970 17,733,147 16,638,022 17,803,135 17,762,681



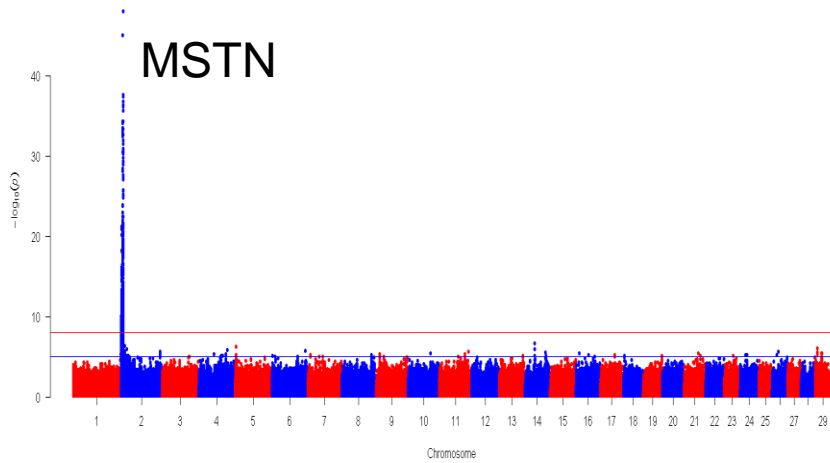
Methods

- Phenotypes adjusted within breed prior to GWAS
 - $y = \text{contemporary group} + \text{sex} + \text{age} + \text{dam parity} + \text{animal} + e$
- GWAS performed within each breed separately in GCTA (Yang et al., 2011)

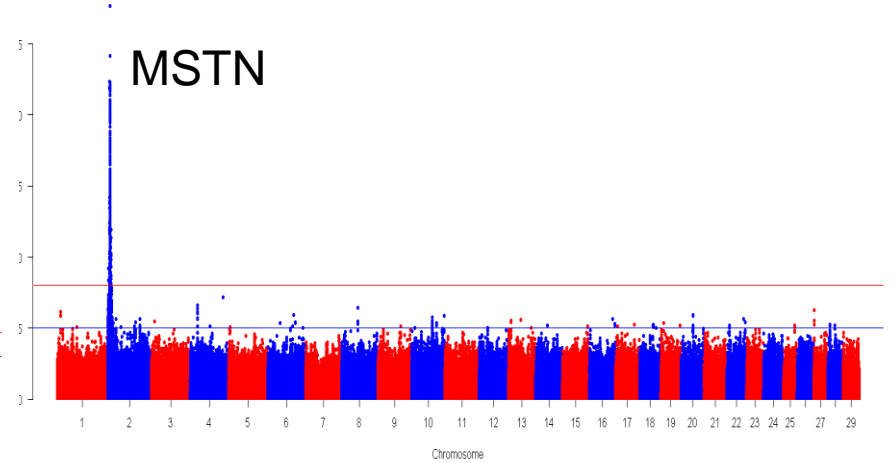


Development of inner thigh

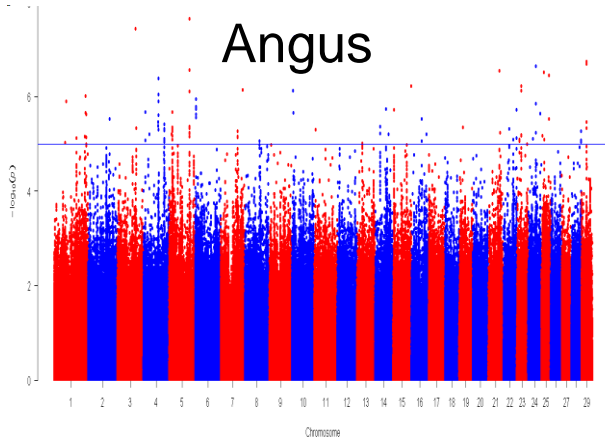
Charolais



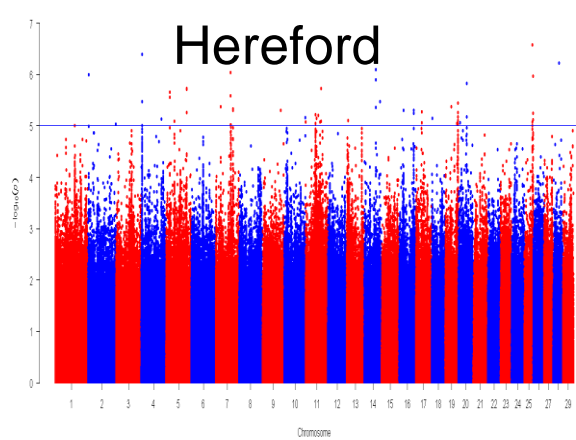
Limousin



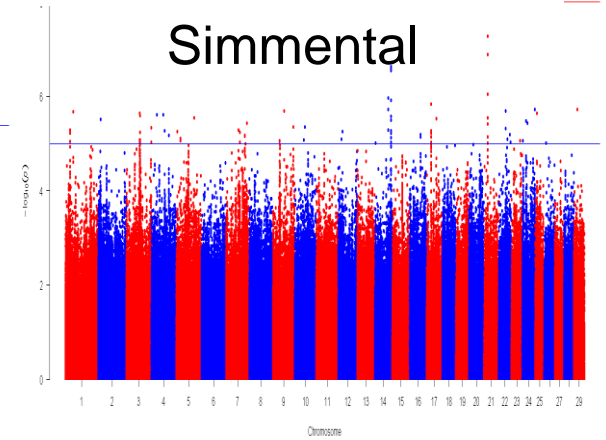
Angus



Hereford

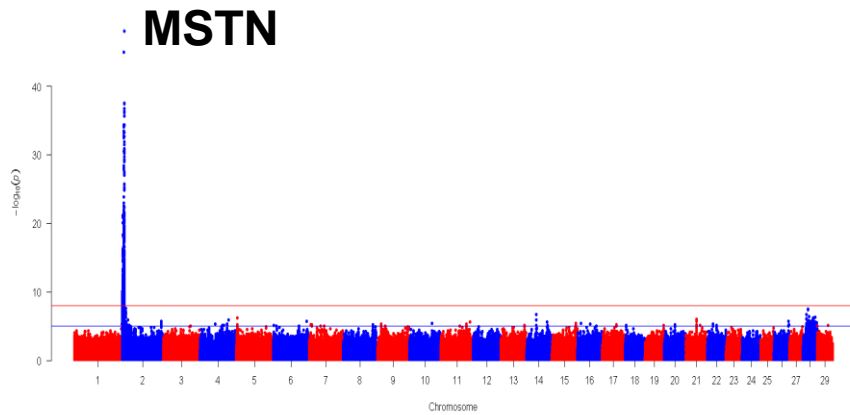


Simmental

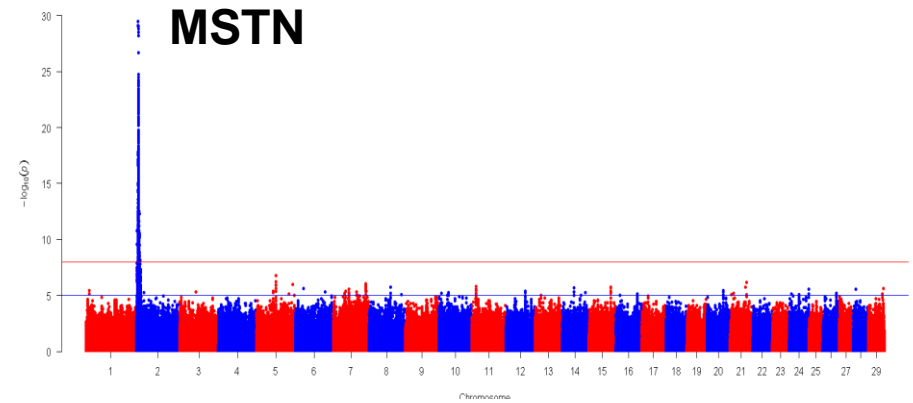


Development of hind quarter

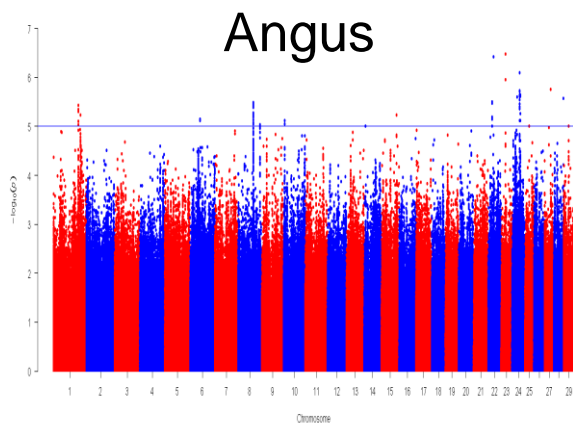
Charolais



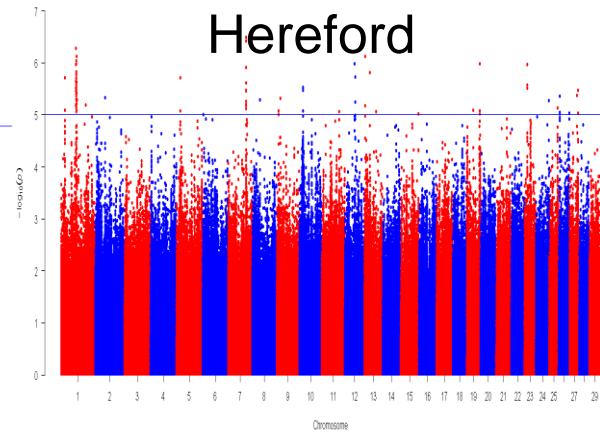
Limousin



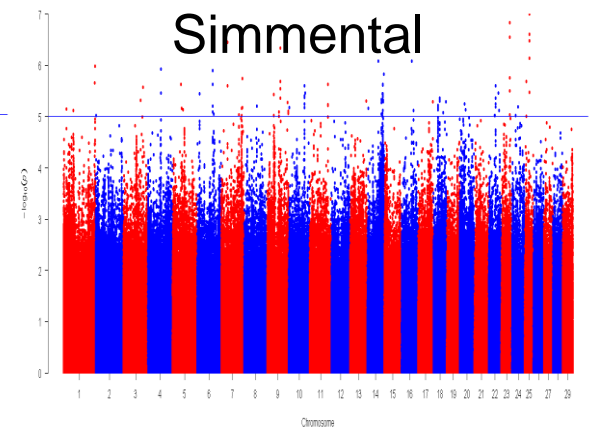
Angus



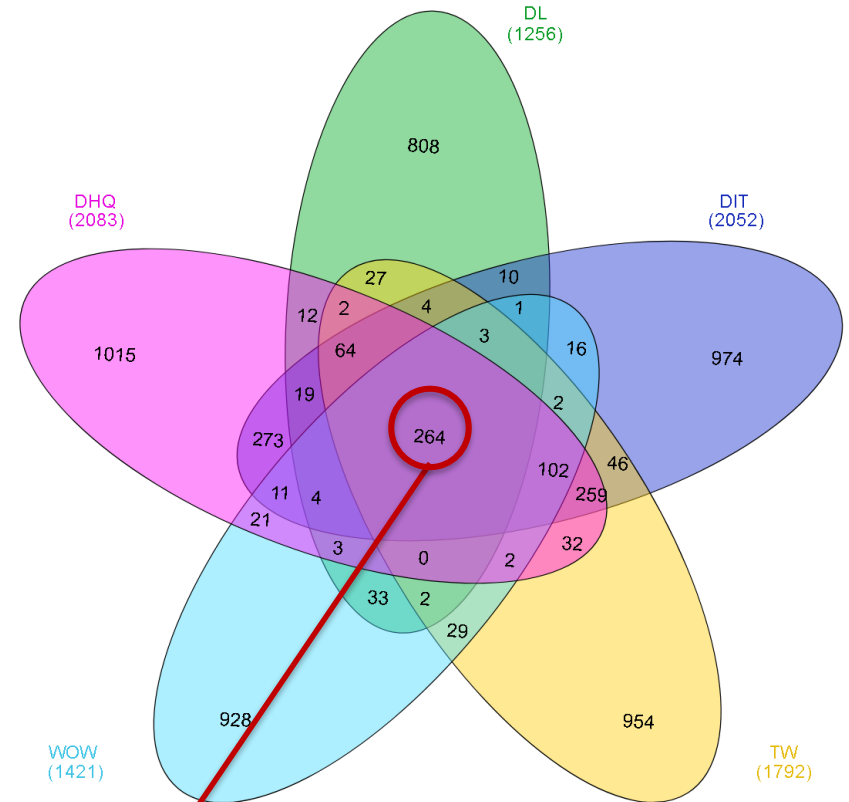
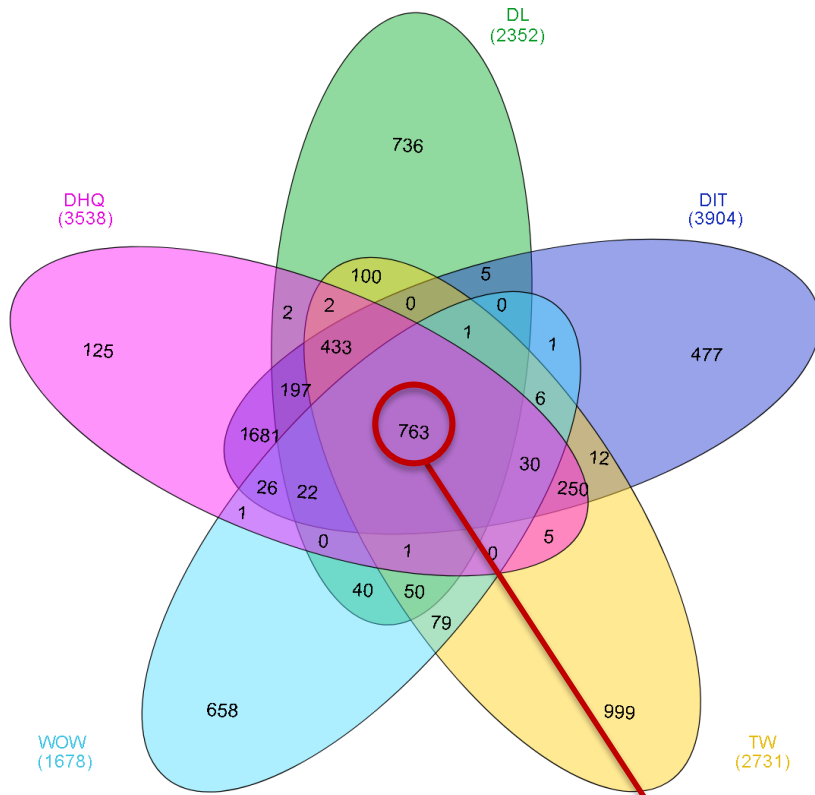
Hereford



Simmental



Charolais & Limousin

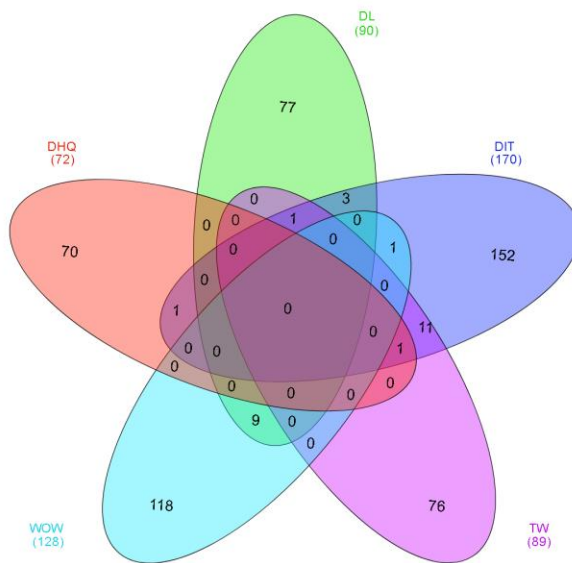


Predominantly
BTA2

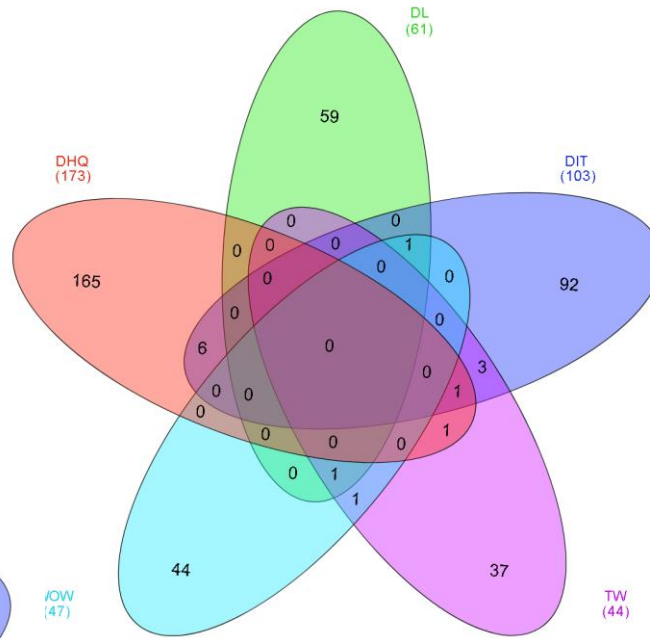


Angus, Hereford & Simmental

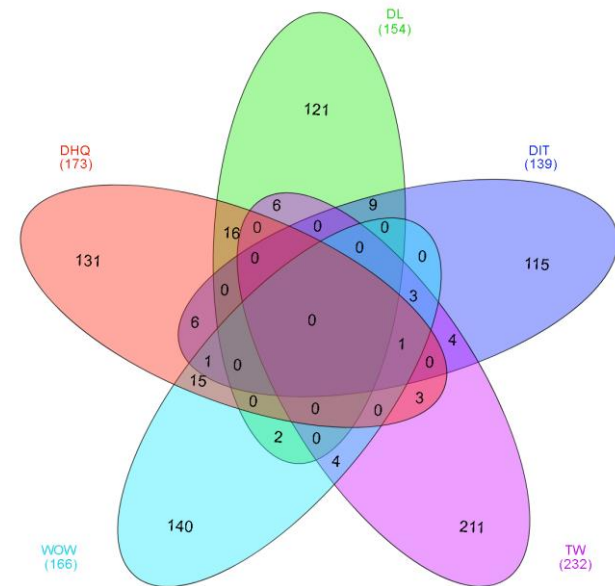
Angus



Hereford



Simmental



Conclusion

- QTL = breed and trait specific
- Overlap among Charolais & Limousin
 - Myostatin!
- Differences in genetic architecture among the other breeds



Acknowledgements



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INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE



Thank you!



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