Breeding for Eating Quality in Lamb

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MEAT & LIVESTOCK AUSTRALIA

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ALMTECH ADVANCED LIVESTOCK MEASUREMENT TECHNOLOGIES

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Outline

1. Update on consumer sensory trait analysis
2. Across breed genomic breeding values for EQ
3. Future

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Transition from a commodity product

Source: Lambpro

Resource Flocks in Australia

- 2005 – 2024
  - Sheep CRC - MLA
- Multiple sites across Australia
- 100 sires mated annually
  - Merino
  - Terminal
  - Maternal
- Comprehensive phenotyping of progeny
- SNP genotypes (15K, 50K, HD, Seq)
- Satellite projects with Breeders

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Australian sheep reference population

Traits

Composition

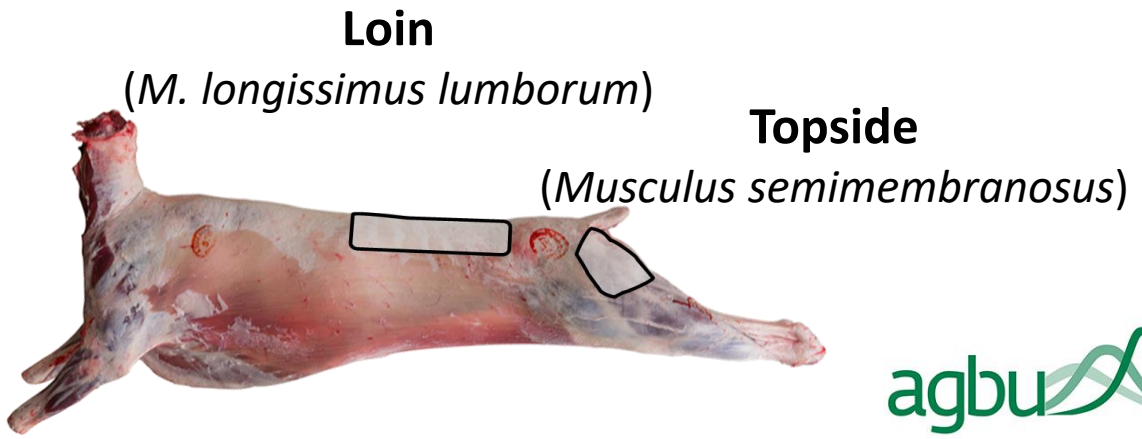
- **Carcase weight**
  n ~ 50,000
- **Lean meat yield (%) (CT and DEXA)**
  n ~ 11,000

Objective Eating Quality

- **Intramuscular fat (%)**
  n ~ 41,000
- **Shear force (N)**
  n ~ 37,200

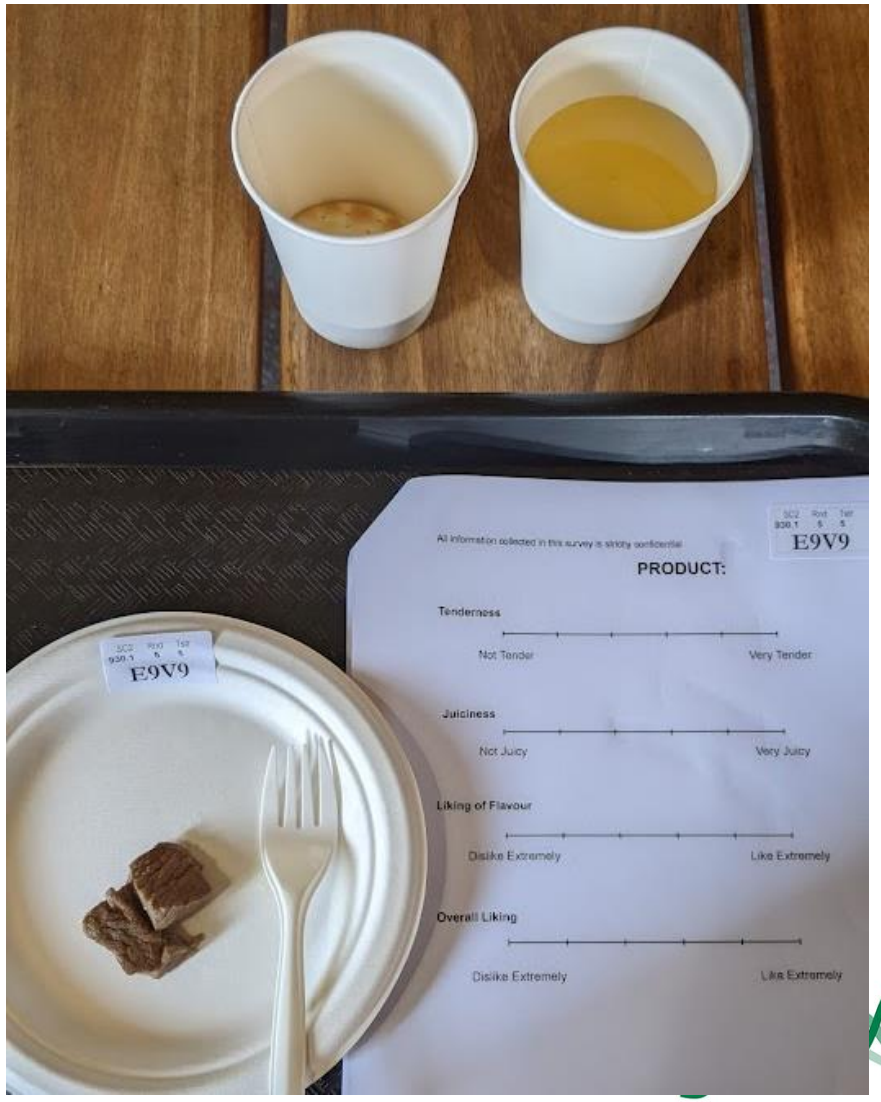
Consumer eating quality (0 to 100)

- **Tenderness**
- **Flavour**
- **Juiciness**
- **Smell**
- **Overall liking**
- **Star rating**
- *n* ~ 6,500



Consumer sensory trials

- Untrained consumers
- Randomised samples
- Multiple cooking methods

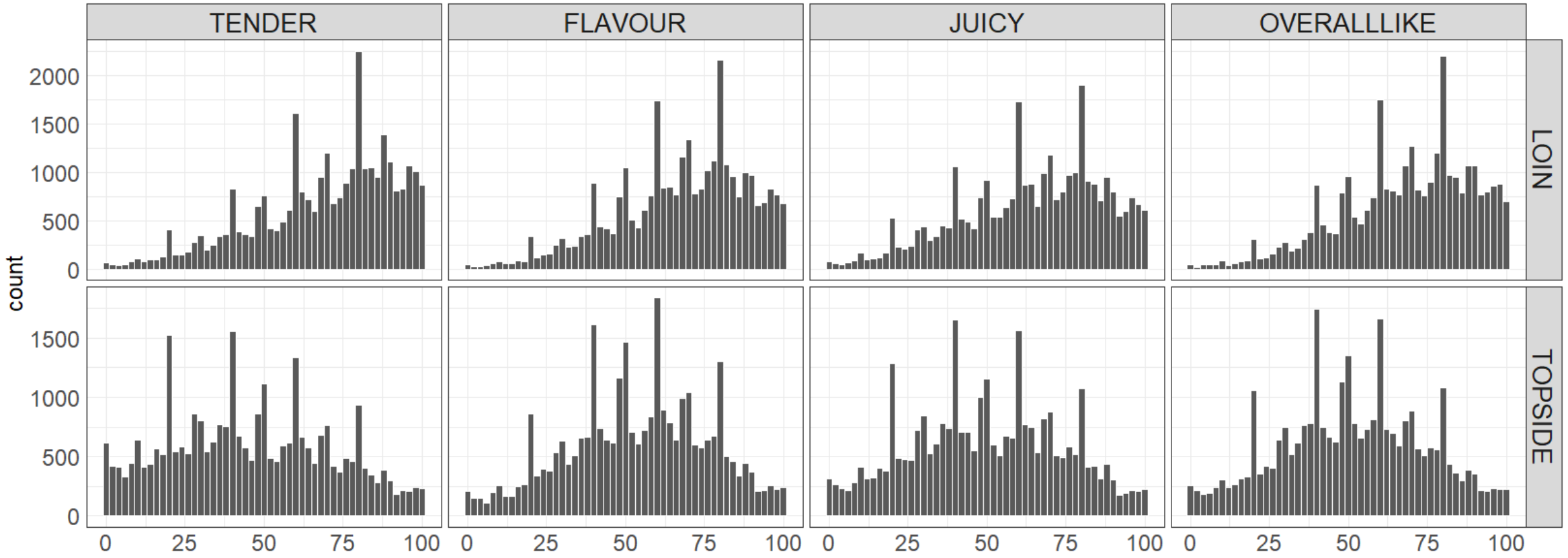


Sire breeds represented in consumer data

Breed Group	Breed	Sires
Terminal Sires	Composites	44
	Hampshire	125
	Southdown	41
	Suffolk	106
	Texel	83
	White Suffolk	519
	Poll Dorset	661
Maternal	Border	169
	Composites	247
	Coopworth	82
	Corriedale	72
Shedders	Dorper	152
	Composites	45
Merino	Merino	889
Total		**3235**

1579

Results



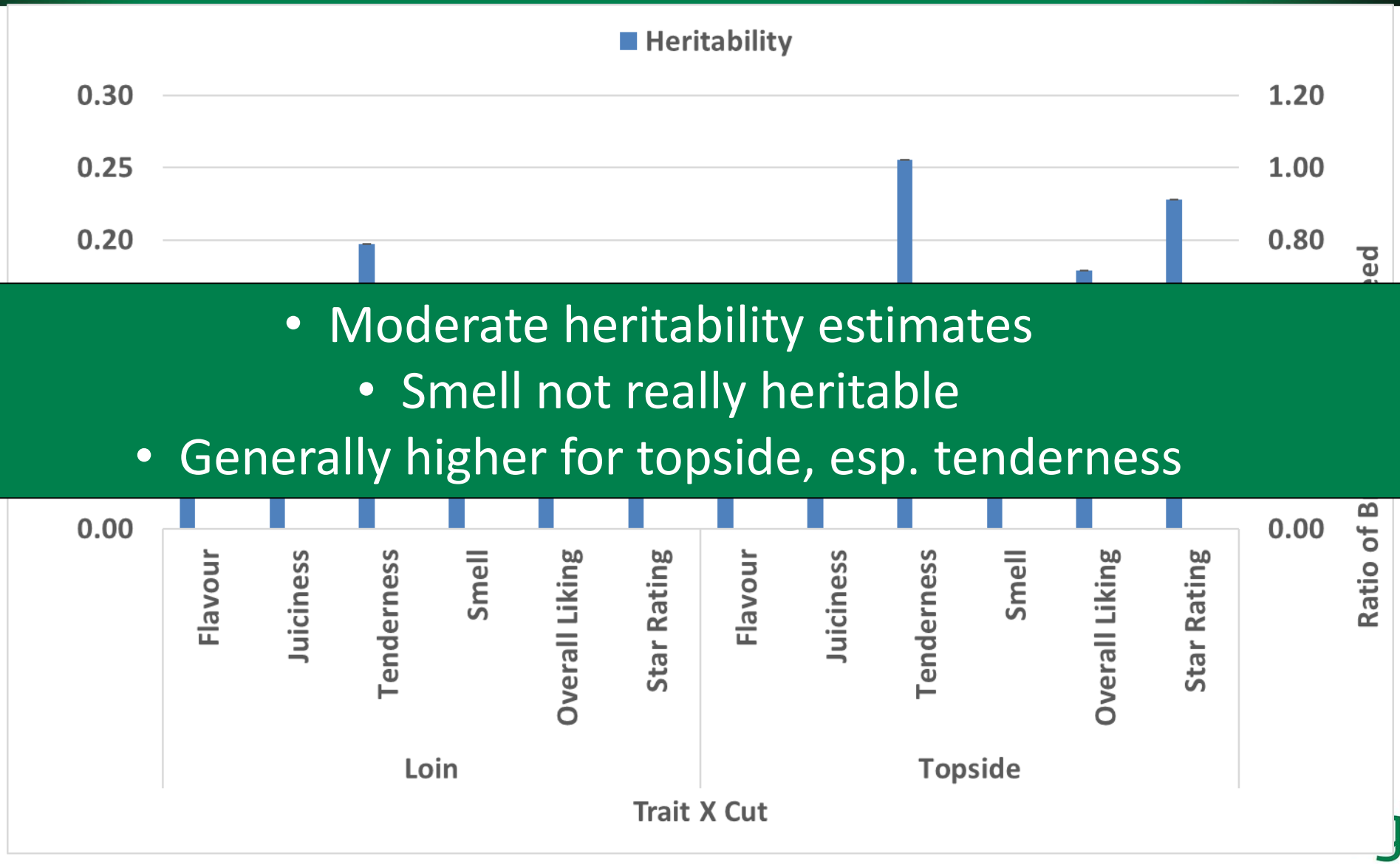
- Wide variation
- Loin scored higher across all sensory traits (on average)

Genetic parameter estimates – Objective lab measures

Trait	$\widehat{h}^2$	Breed : Within Breed
Carcase Weight	0.49 ± 0.02	2.3
Lean meat yield	0.39 ± 0.03	1.3
Intramuscular fat	0.61 ± 0.02	0.2
Shear force	0.26 ± 0.01	0.2

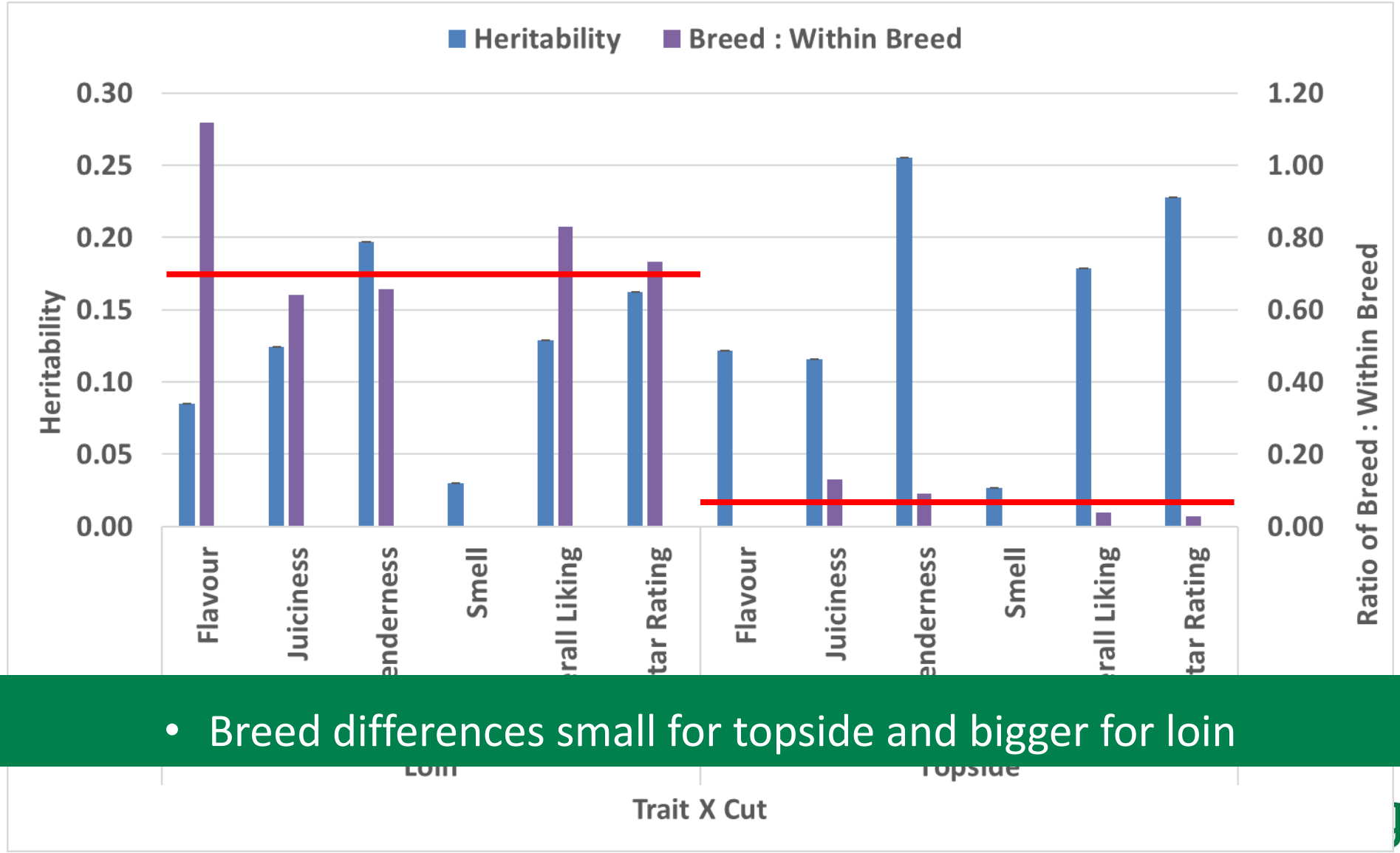
- High heritability estimates
- Breed difference more important for HCWT and LMY

Genetic parameter estimates – consumer eating quality



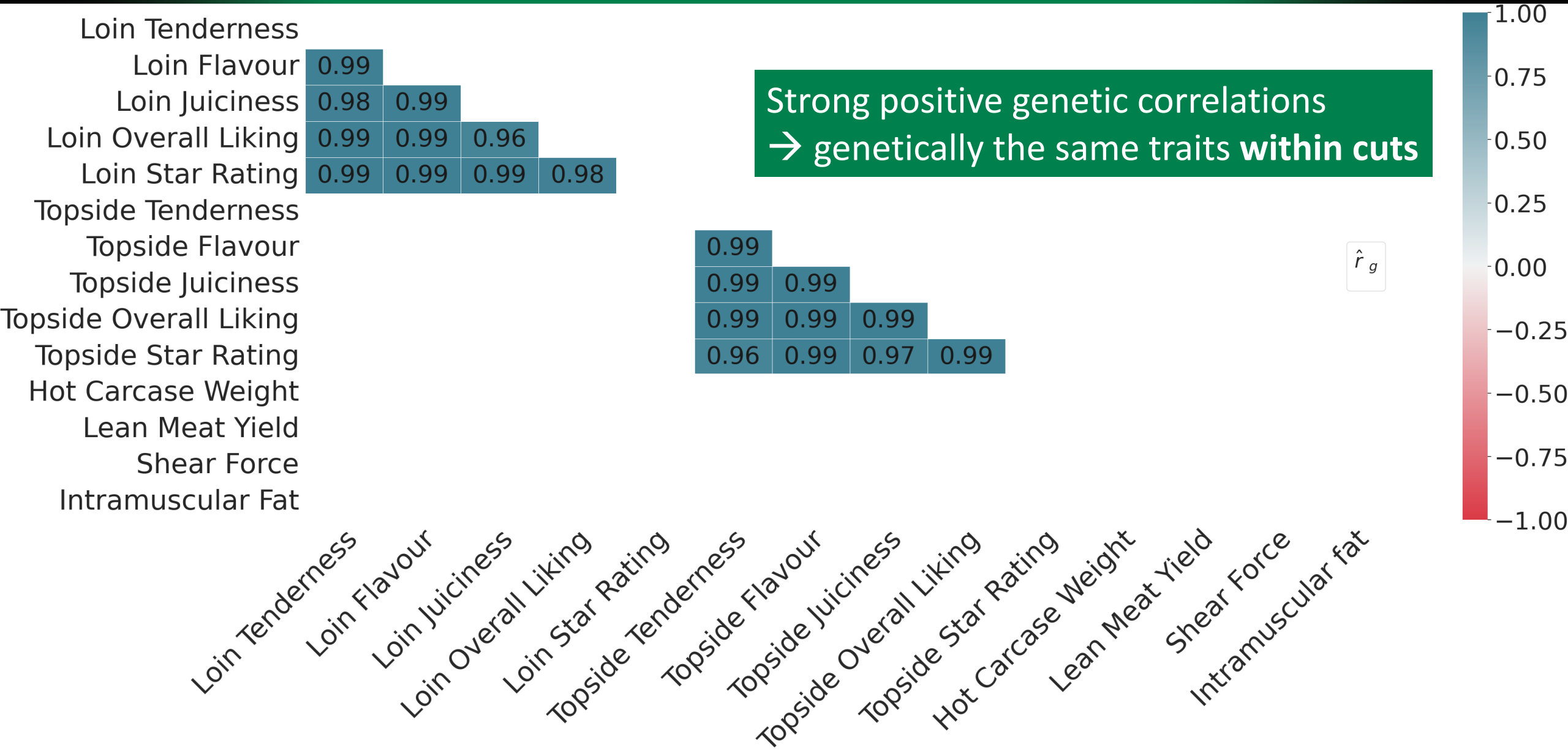
- Moderate heritability estimates
- Smell not really heritable
- Generally higher for topside, esp. tenderness

Genetic parameter estimates – consumer eating quality



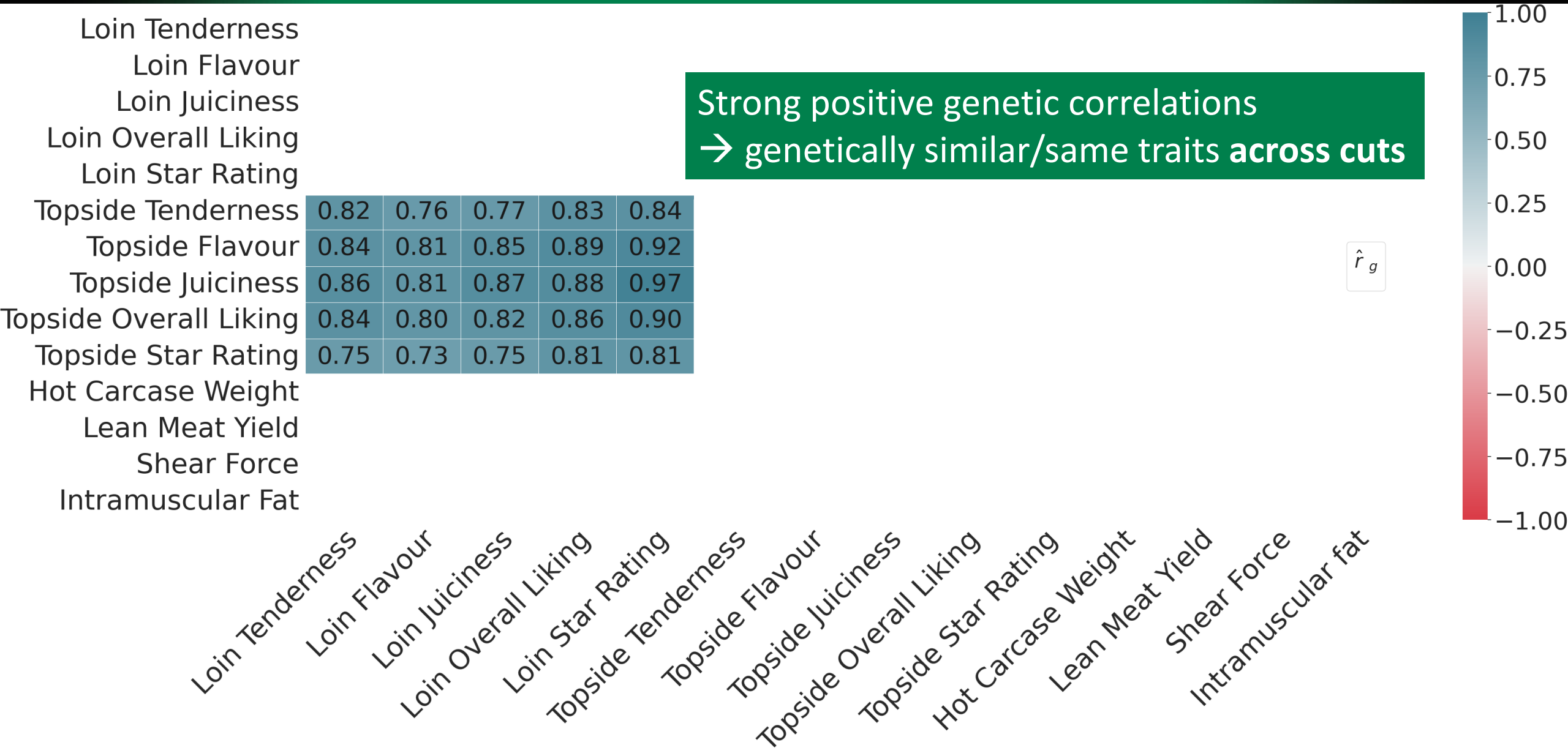
- Breed differences small for topside and bigger for loin

Genetic correlation estimates – within cuts



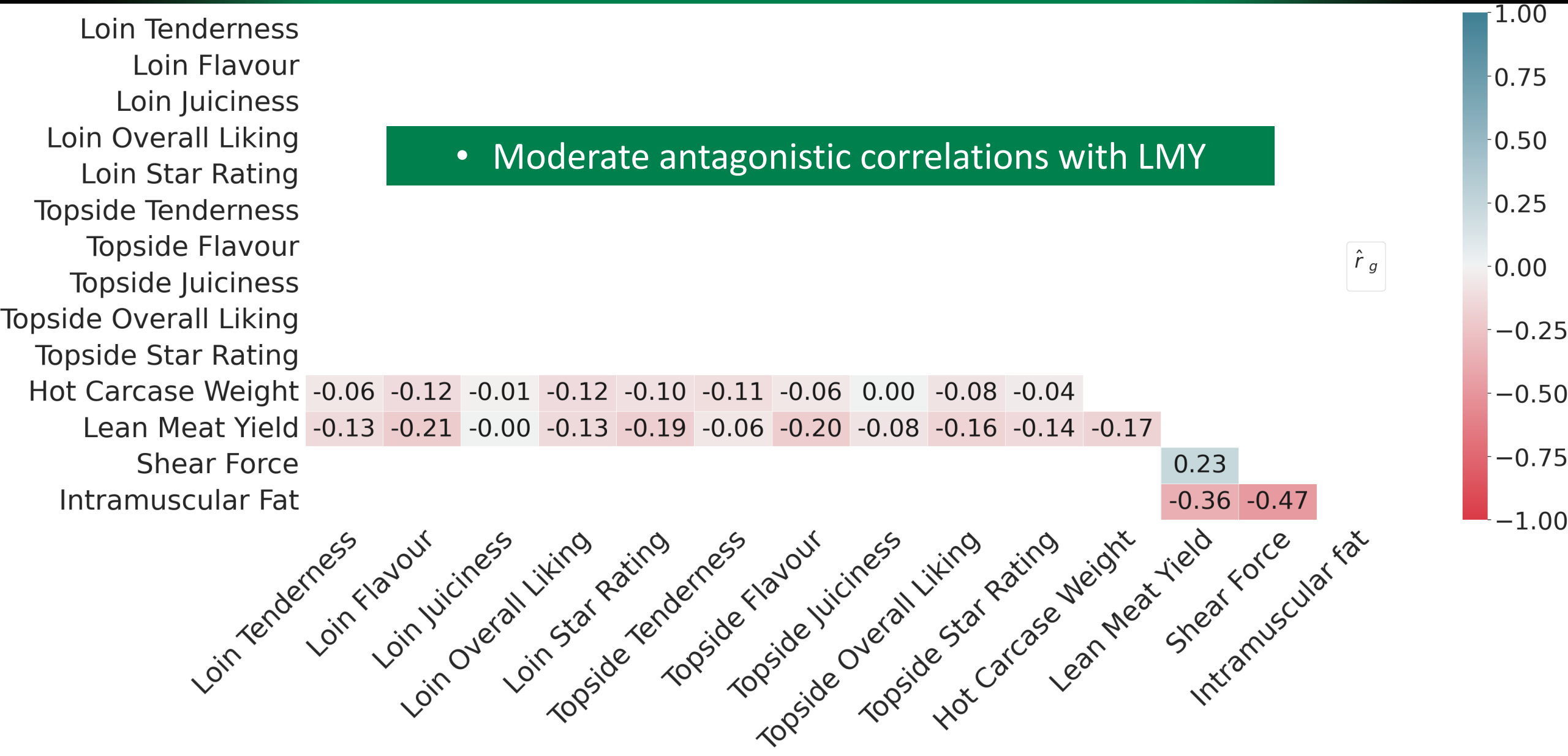
Strong positive genetic correlations
→ genetically the same traits **within cuts**

Genetic correlation estimates – across cuts

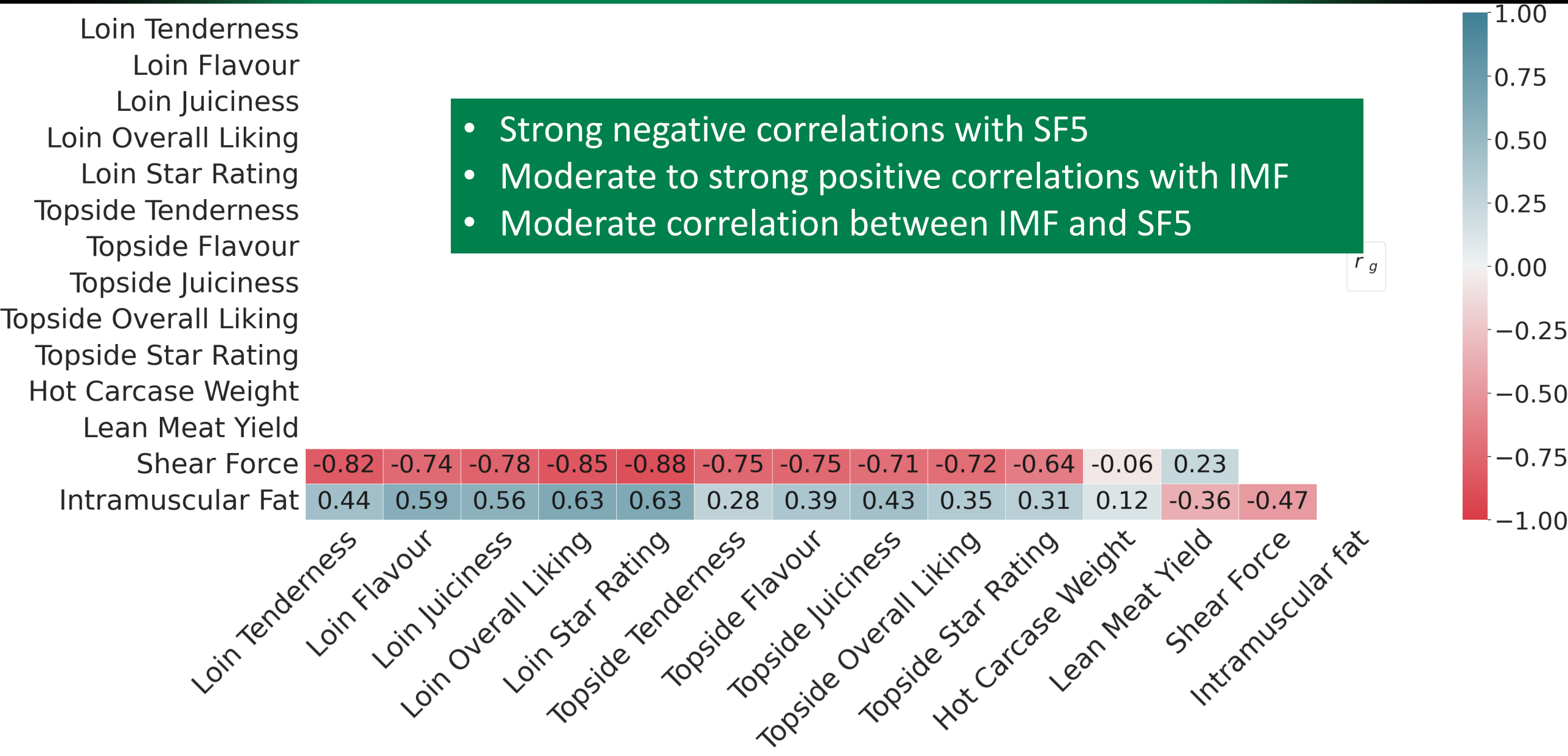


Consumer eating quality & carcase composition

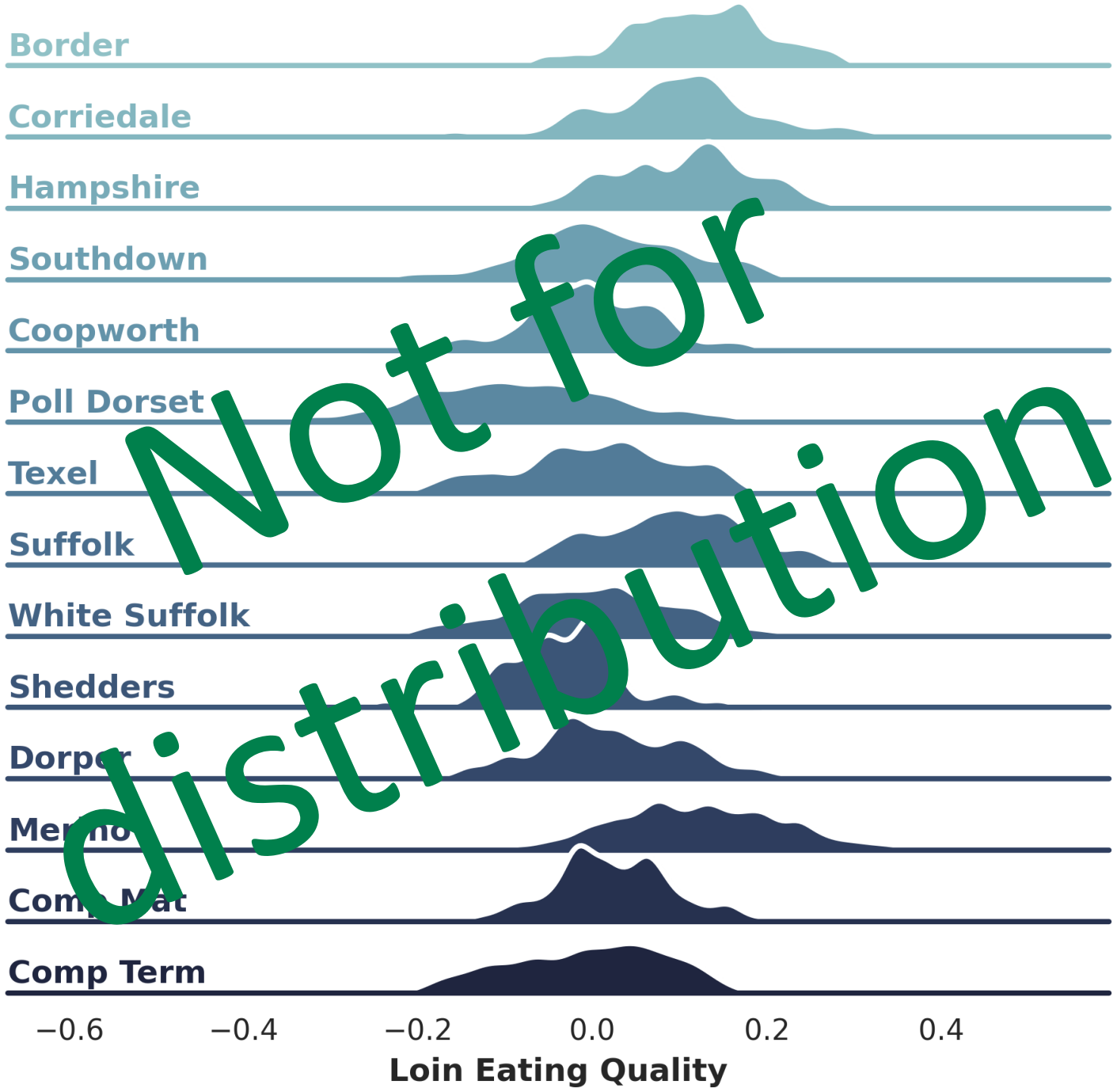
- Moderate antagonistic correlations with LMY



Consumer eating quality & objective eating quality



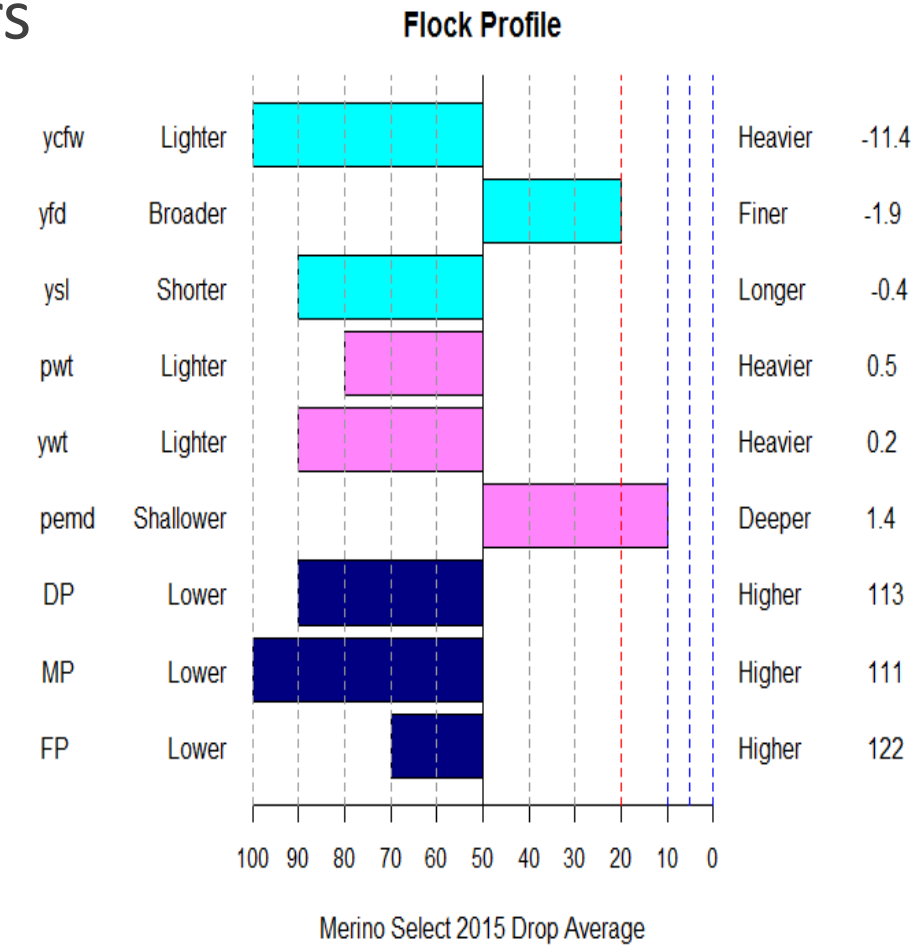
- Strong negative correlations with SF5
- Moderate to strong positive correlations with IMF
- Moderate correlation between IMF and SF5



Balanced selection

Genomic breeding values for eating quality

- Genomic breeding values for seedstock breeders
- Commercial flock benchmarking
- Genomic only breeding values for within



FlockProfileTest

Conclusions

- Eating quality is growing in importance
- Balanced selection for carcass yield and lamb eating quality now possible:
  - Genomically enhanced breeding values and indexes
- Variation within breeds is generally much bigger than across breeds
  - Utilise both sources of variation

Innovation in Valuing and Breeding for Eating Quality in Lamb

1. LMY and EQ in lamb	Moving away from a commodity product
2. Genetic improvement	Across breed genomic ASBVs for LMY and EQ
2. Industry application	Better tools for better decisions

Technology provides an opportunity – if we have systems to use the data!

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Acknowledgements

+ the many staff involved in the funding, projects and collecting data

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