A New Model for the Genetic Evaluation of Carcass Traits in Swiss Beef Cattle

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Background

- **Since 2004: genetic evaluations for**
  > carcass conformation and net gain until slaughtering
  > calves and adults
  > Angus, Aubrac, Braunvieh, Charolais, Limousin, Simmental

- **Observation of Swiss Beef Cattle Association :**
  reduced levels of carcass fat on a phenotypic scale

- **Objective:**
  new model including carcass fat as a new trait

Trait definitions and data collection

Carcass Conformation

C H T A X

E U R O P

Carcass Fat

1 : no fat coverage

2 : partially covered

3 : regularly covered

4 : high fat coverage

5 : extremely fat

Slaughtercategories

Calves: age <= 180 days

Adults: 180 > age in days < 700

(Adults = young bulls, steers, heifers)

Carcass Weight
Kilogram

Collection by graders of *Proviande* in abattoir

(Proviande - the trade association of the Swiss meat industry)

Population average carcass fat score

LIMOUSIN

2.71

SIMMENTAL

2.82

ANGUS

3.08
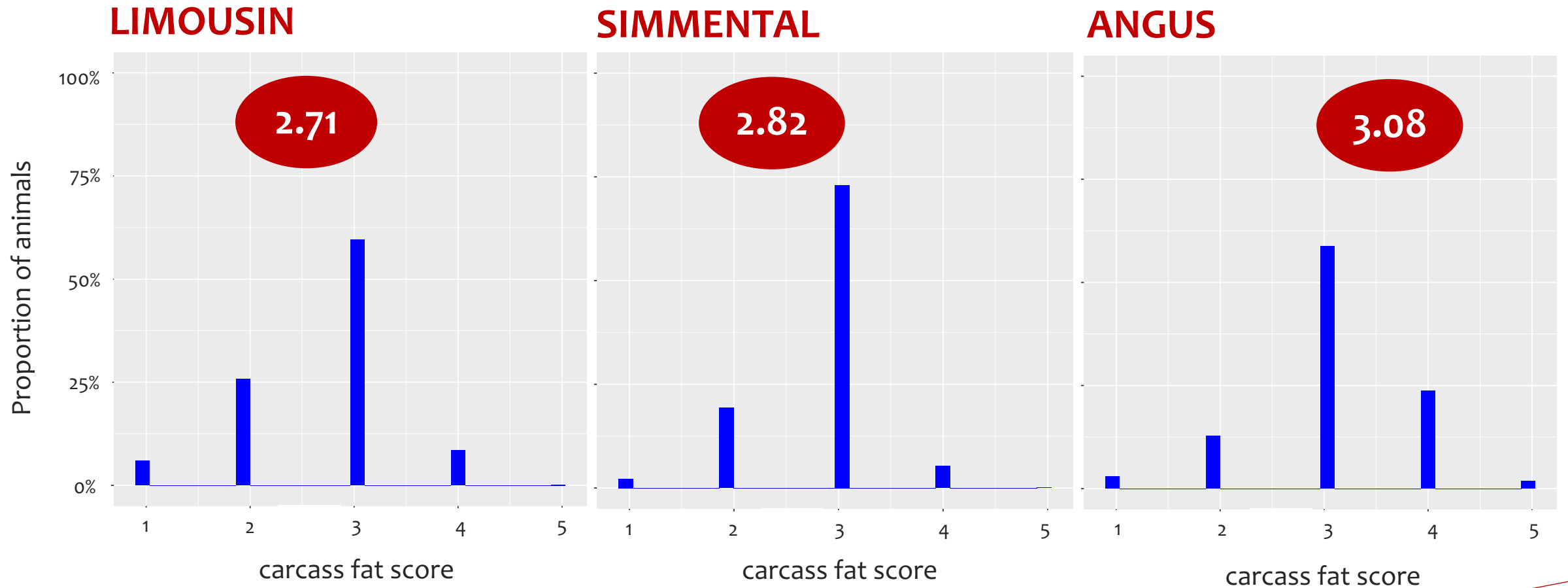
GOAL: mean 3.0

Evaluation model for carcass traits

	NEW	OLD
TRAITS	Carcass weight calves and adults Carcass conformation calves and adults Carcass fat calves and adults	Net gain until slaughtering calves and adults Carcass conformation calves and adults
MODEL	6-trait multivariate BLUP animal model, Multi-breed evaluation	4-trait multivariate BLUP animal model, Multi-breed evaluation
FIXED EFFECTS	sex abattoir grader for carcass conformation and fat	sex abattoir carcass fat
RANDOM EFFECTS	herd * year animal	herd * year animal grader for carcass conformation
COVARIATE	Age at slaughter (days) Age at slaughter (days) ^{2}	Age at slaughter (days) Age at slaughter (days) ^{2}
GENETIC GROUPS	breed, birth year and selection path	breed, birth year

Heritabilities and Genetic correlations

h² diagonal r_g offdiagonal	CCc	CCa	CFc	CFa	CWc	CWa
Carcass conformation calves **CCc**	**0.50**	0.83	-0.05	-0.17	0.52	0.29
Carcass conformation adults **CCa**		**0.56**	-0.03	0.15	0.36	0.38
Carcass fat calves **CFc**			**0.31**	0.73	-0.03	0.09
Carcass fat adults **CFa**				**0.36**	-0.20	0.26
Carcass weight calves **CWc**					**0.22**	0.63
Carcass weight adults **CWa**						**0.30**

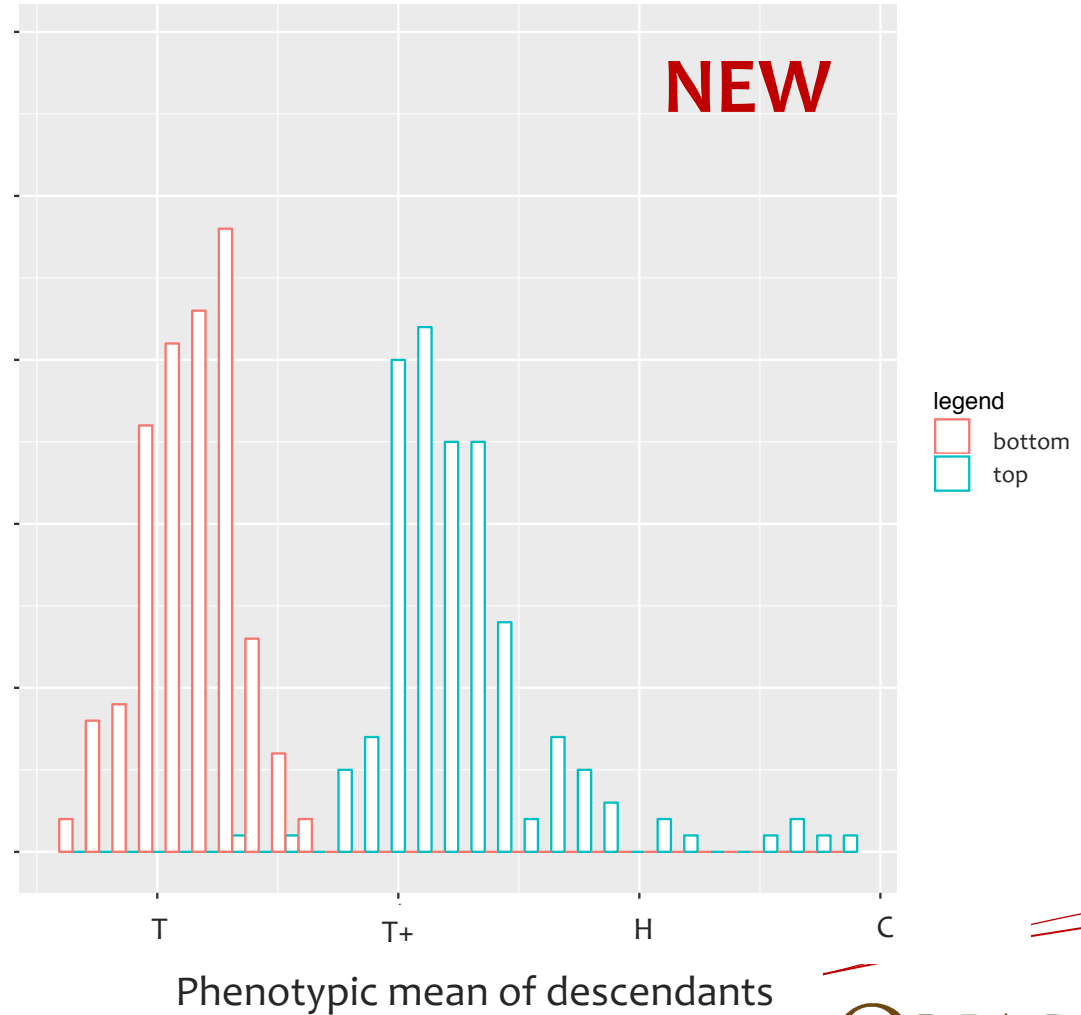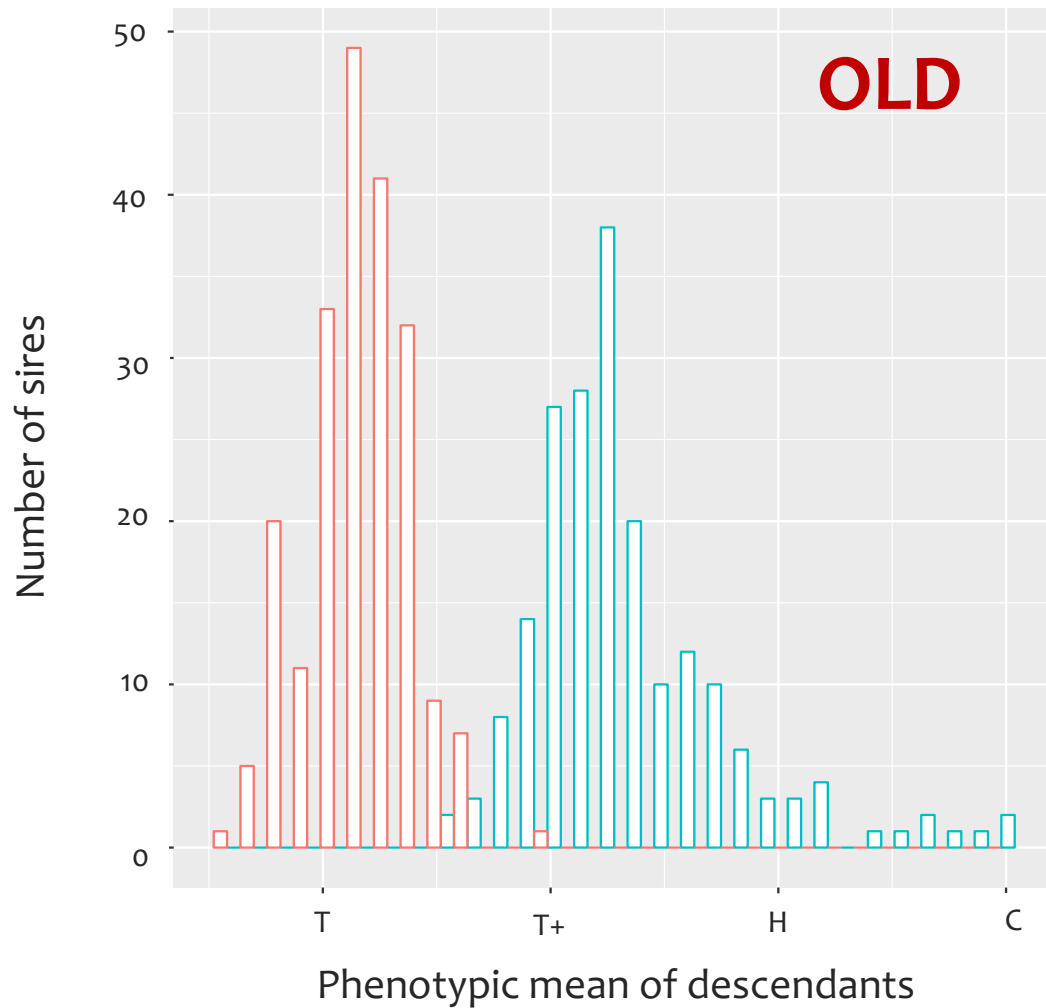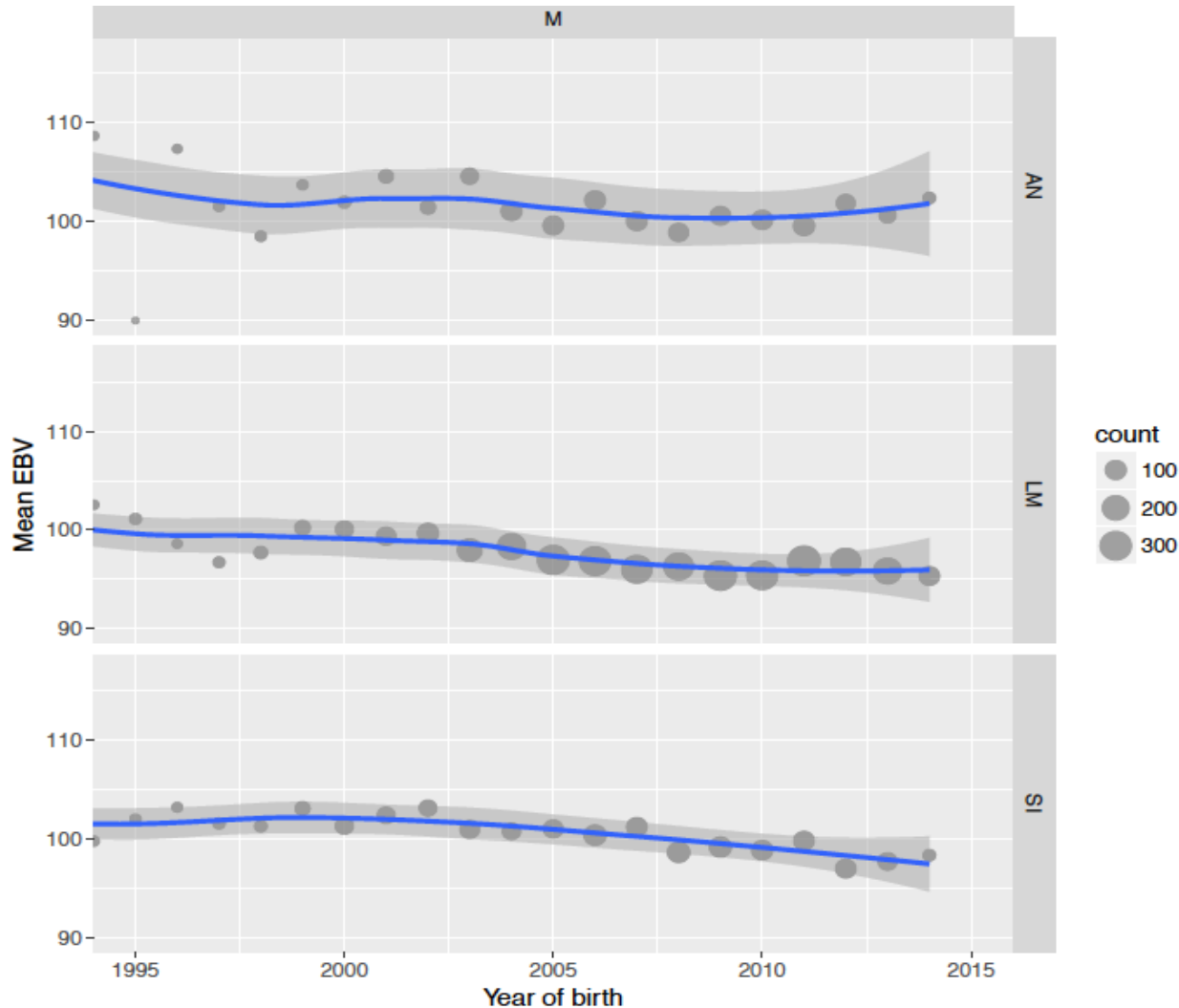Legends to interpret correlations: Close to zero   Low   Moderate   High

Variance component estimation with Software VCE (Groeneveld)
Standard errors between 0.02 and 0.05

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Comparison of EBVs with phenotypic data
(Top 10% vs bottom 10% EBVs sires, CCc, Braunvieh)

Genetic Trends Carcass Fat Adults

Observation of Swiss Beef Cattle Association : decline in carcass fat

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Negative genetic trend for carcass fat adults

Next Steps

- Build an Index for carcass traits

- Implementation of Genomic Selection for carcass traits

- Test approach by Berry et al. (2017) who defined the trait „deviation in age at slaughter"

  Berry, D. P., A. R. Cromie, and M. M.Judge. 2017. "Rapid Communication: Large Exploitable Genetic Variability Exists to Shorten Age at Slaughter in Cattle." *Journal of Animal Science* 95 (10): 4526–32. https://doi.org/10.2527/jas2017.2016

- Follow development in Interbeef

International challenges

- **Availability of carcass data:**
  > limited in most countries
  > available in Switzerland

- **Phenotyping differences:**
  Ultrasound scanned fat
  Ultrasound muscle depth
  Visual muscle score
  Mechanical grading machines

INTERBEEF
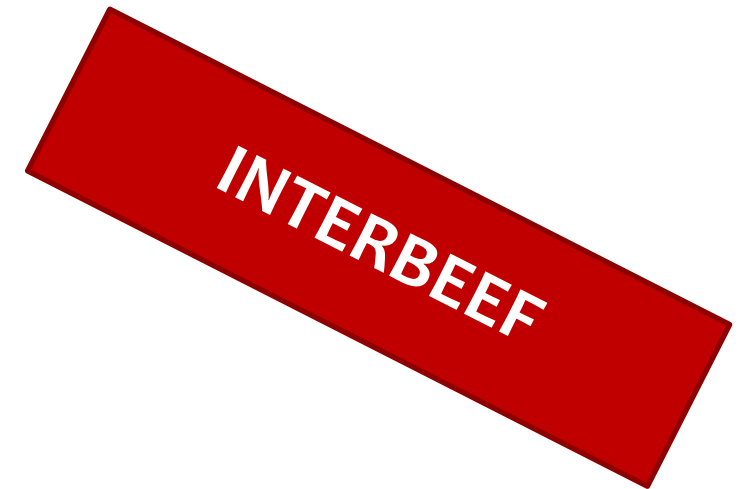
Take home message

- Implementation of the new model in July 2018 (Routine Evaluation with Mix99 (Luke))

- Carcass fat represents a first tool for improving early carcass maturity in beef cattle.

Thank you for your attention!