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Impact of genetic and farm traits on carcase characteristics of extensively fattened beef

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Reduce climate gas emissions

- Reduce methane emissions
- Intensify production
- Reduce animal numbers

Increase food security

- Reduce feed-food competition
- Use grasslands for food production

→ **Increase grassland use efficiency**

- Prioritize milk production & increase longevity of dairy cows
- Use dairy-beef cross-breeds for fattening on pasture

Image source: swissmilk

Using dairy-beef crosses for pasture fattening

Which beef bulls are best suited to produce crossbred calves in extensive pasture fattening systems???

Research question:

Are **breeding values** of beef bulls **reliable predictors** for the fattening results of cross-bred offspring in extensive pasture fattening?

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Database from Swiss animal trader for pasture fattened beef (2010 onwards)

58'158 Carcases:

- Animal ID
- Marketing Channel / Label
- Sex
- Birthday + Slaughter date → Age at slaugther
- Conformation score & fat cover score
- Slaughter weight → Daily growth rate
- Breed, Breed_Father, Breed_Mother
- Fattener ID:
    - Transhumance (Yes/No)
    - Zone (Valley/Mountain)
    - Altitude

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Distribution of genotypes

Beef	DairyXBeef	Dairy	Dual purpose	Other
7'722 (13%)	18'655 (32%)	1'067 (2%)	2'446 (4%)	28'268 (49%)

Brown Swiss	Swiss Fleckvieh	Holstein & Red Holstein	Simmental	Original Brown	Grauvieh
Limousin (9858)	Limousin (2292)	Limousin (5073)	Limousin (1470)	Limousin (1123)	Limousin (1304)
Angus (807)	Simmental (442)	Simmental (269)	Simmental (1170)	Original Braunvieh (482)	Grauvieh (364)
Simmental (653)	Angus (354)	Angus (189)	Angus (326)	Braunvieh (172)	Angus (249)

→ Limousin by far most used beef breed for pasture fattening
→ Simmental und Angus share second and third place

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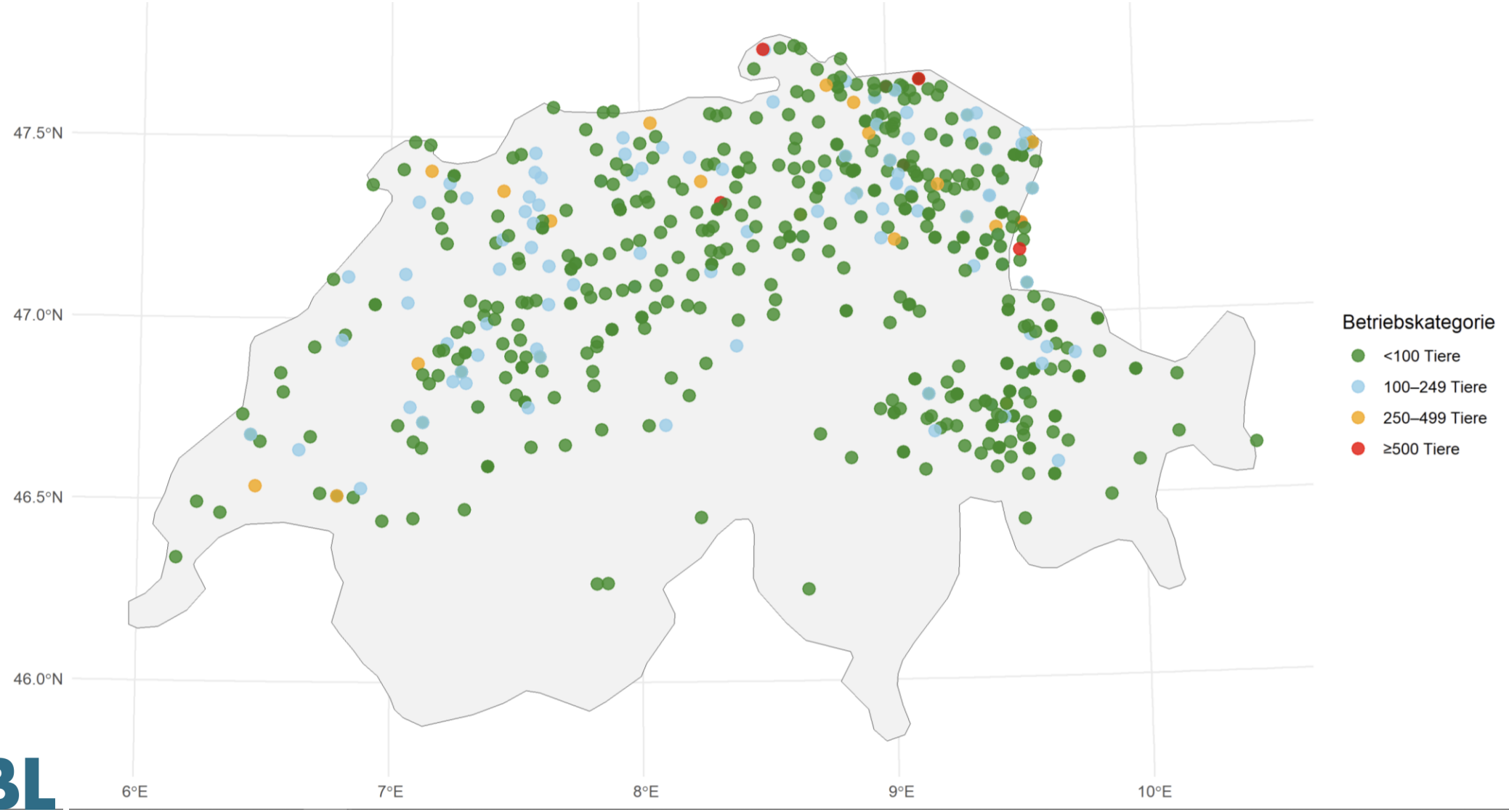
Size and distribution of fattening farms across Switzerland



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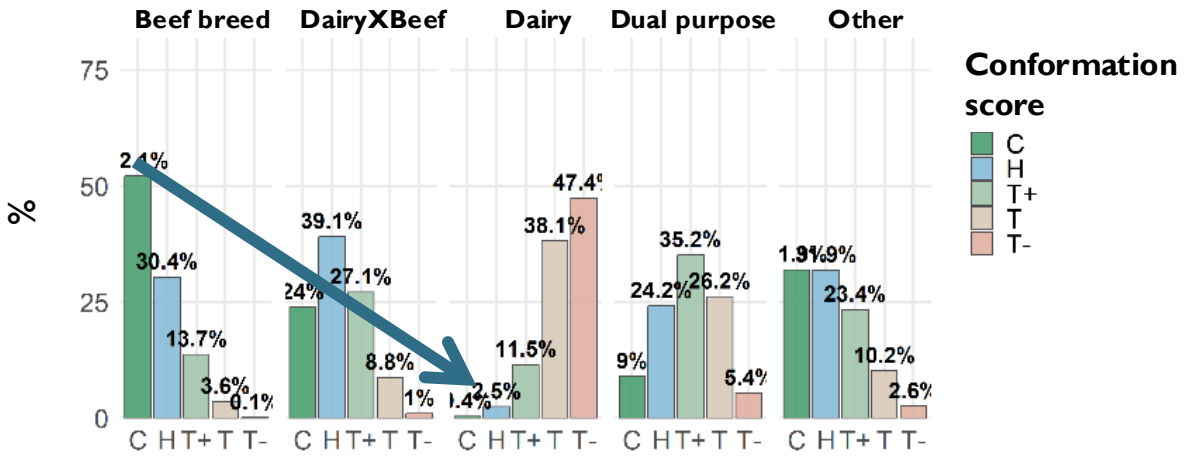
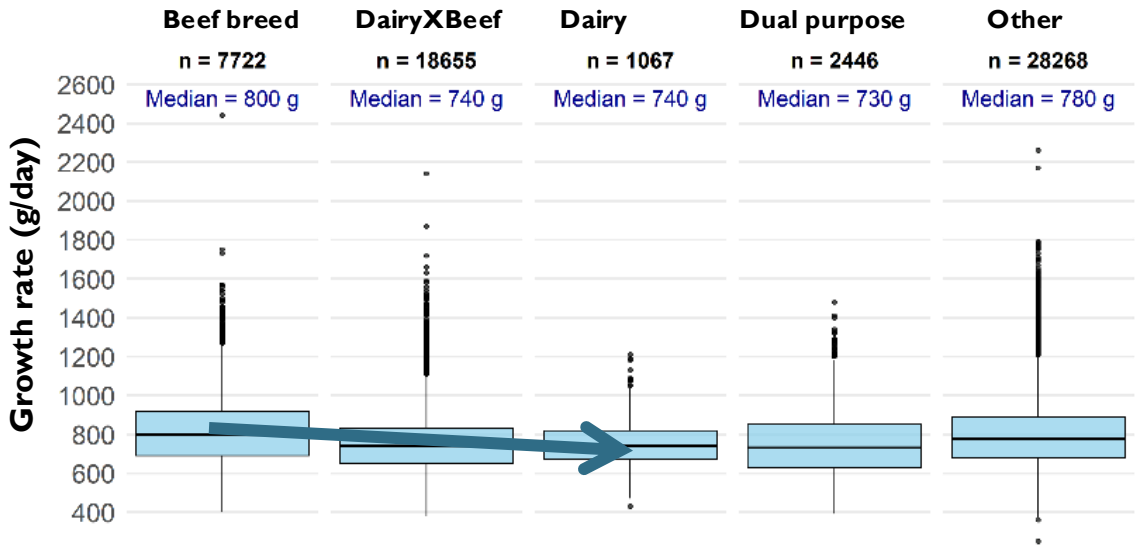
Genotype

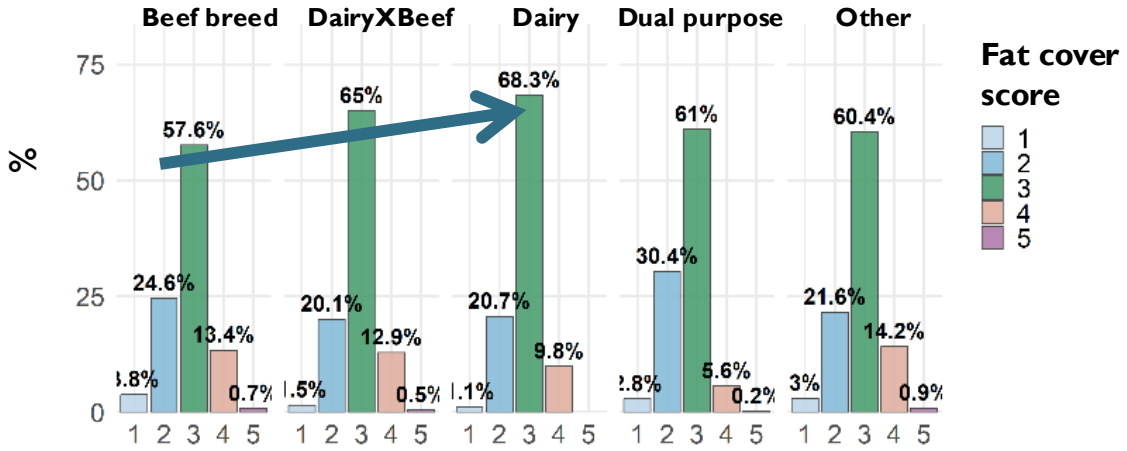
Conformation



Growth rate



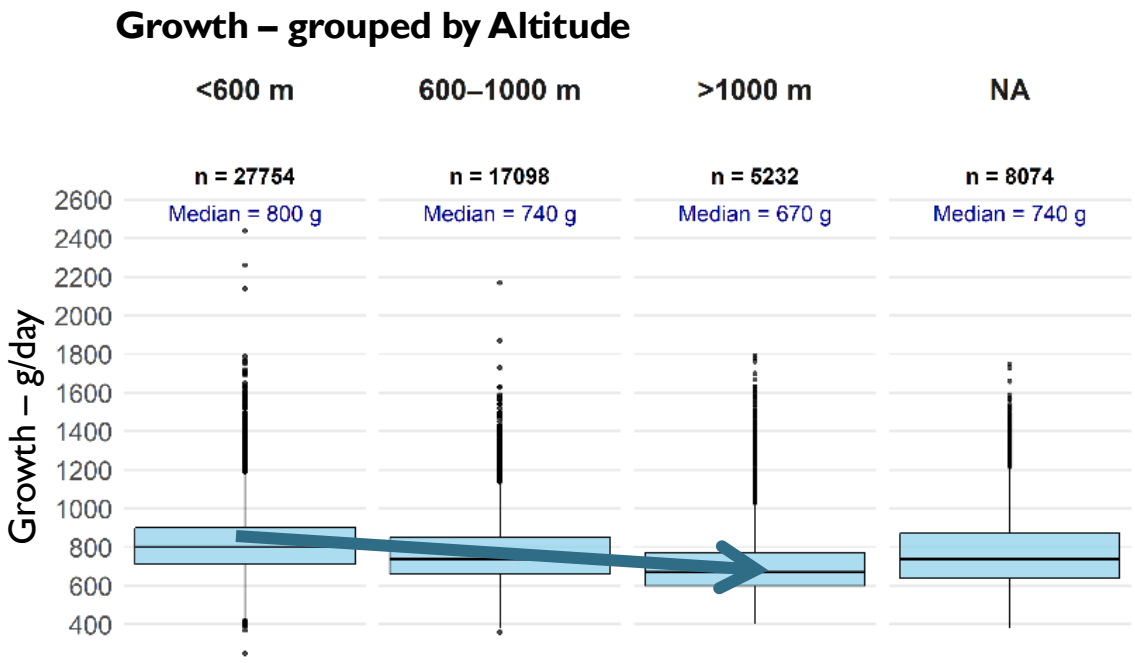
Fat cover



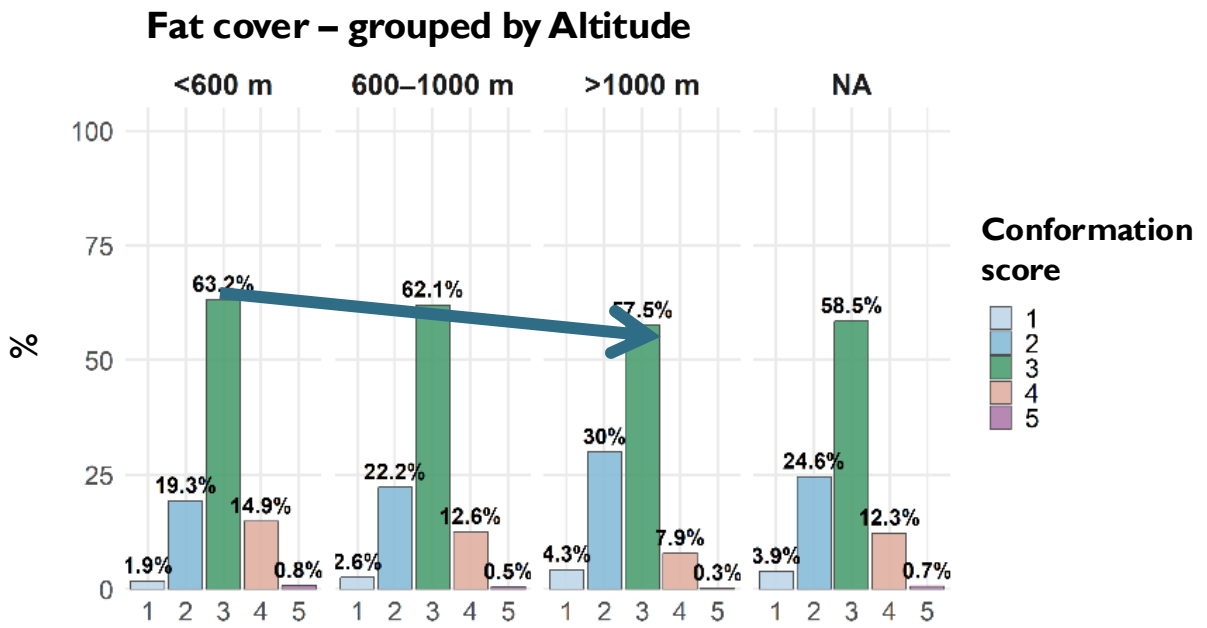
Strong impact of beef genotype on **conformation score**.

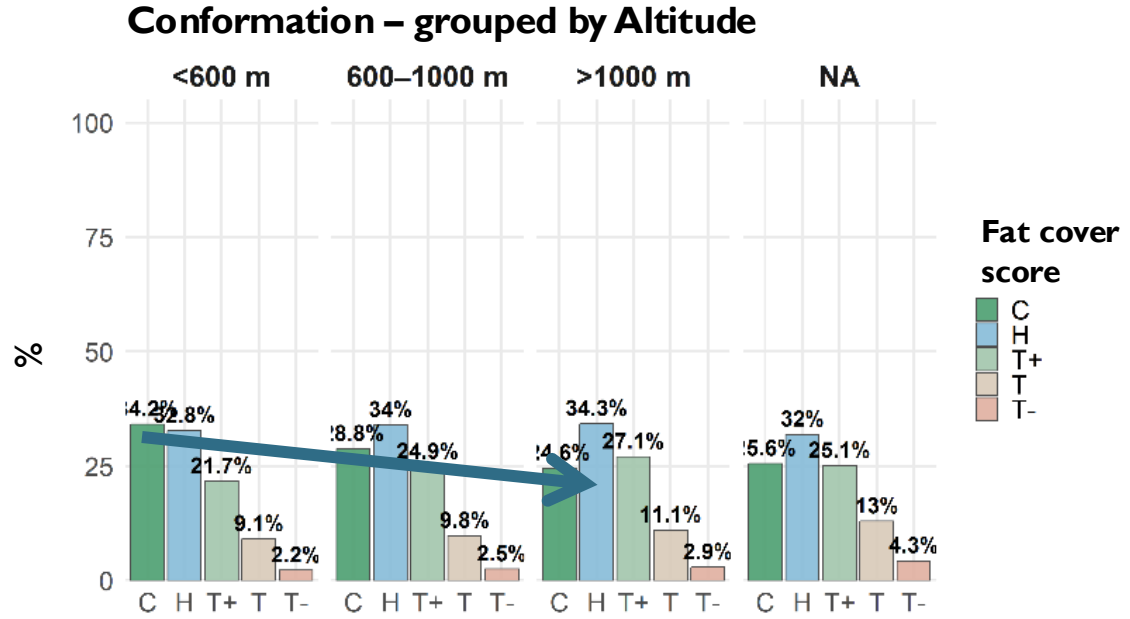
→ DairyXBeef outperform dual-purpose breeds in all characteristics.

Altitude

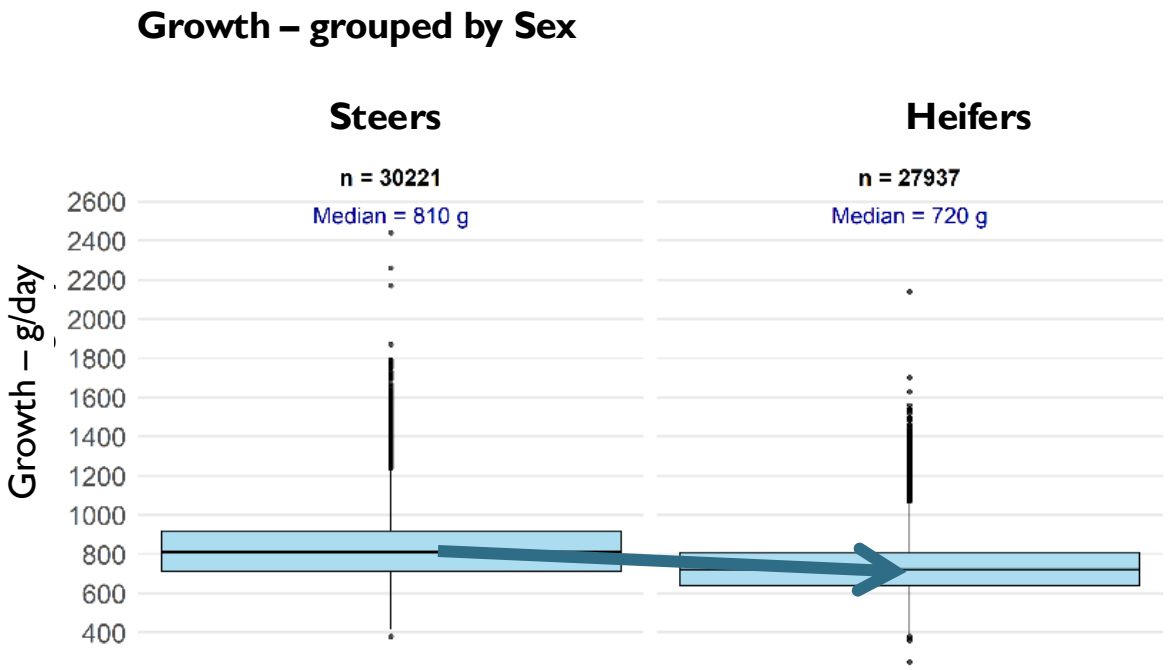


Increasing altitude of fattening farm decreases growth, fat score and conformation score moderately.

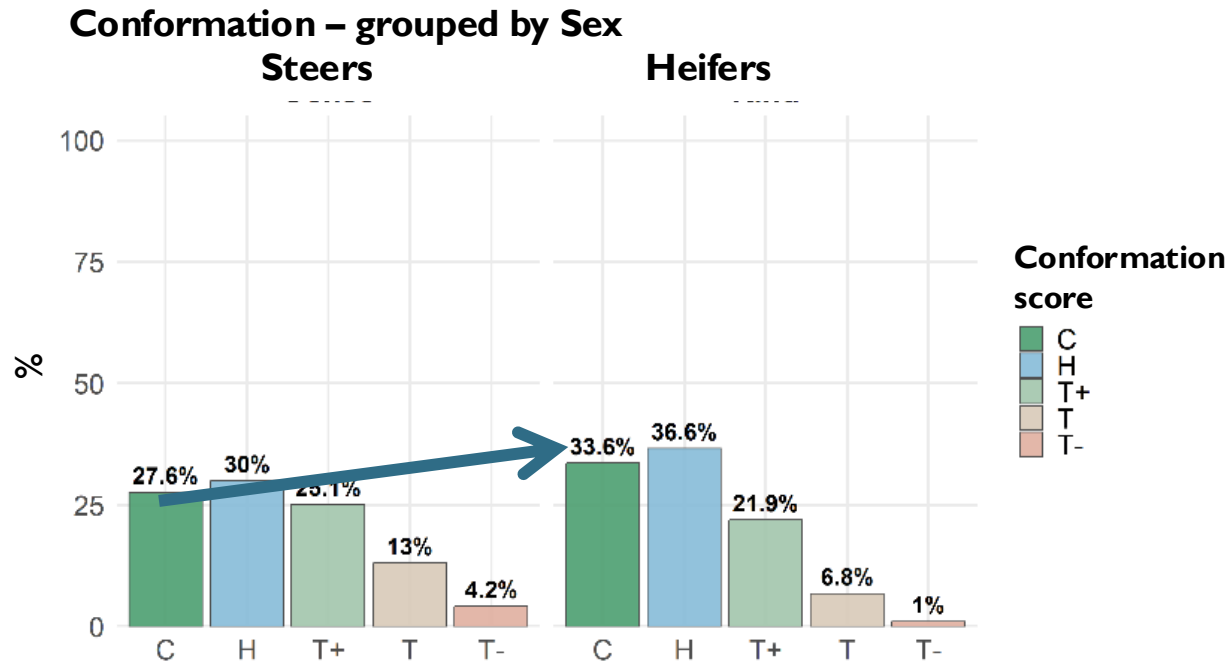


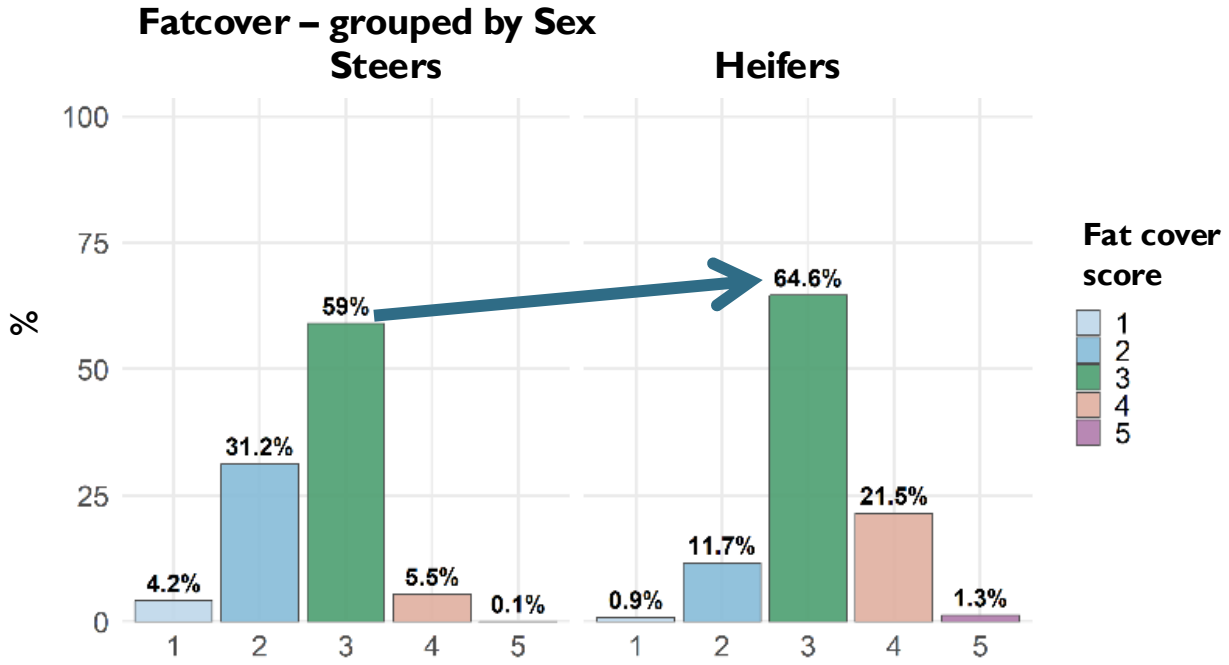


Sex



Heifers show a slower growth rate, but higher conformation and fat cover score





Are breeding values reliable predictors for the fattening results in extensive pasture fattening?

Method: Rank correlation test

Ranking of all AI bulls with more than 30 offspring according to their:

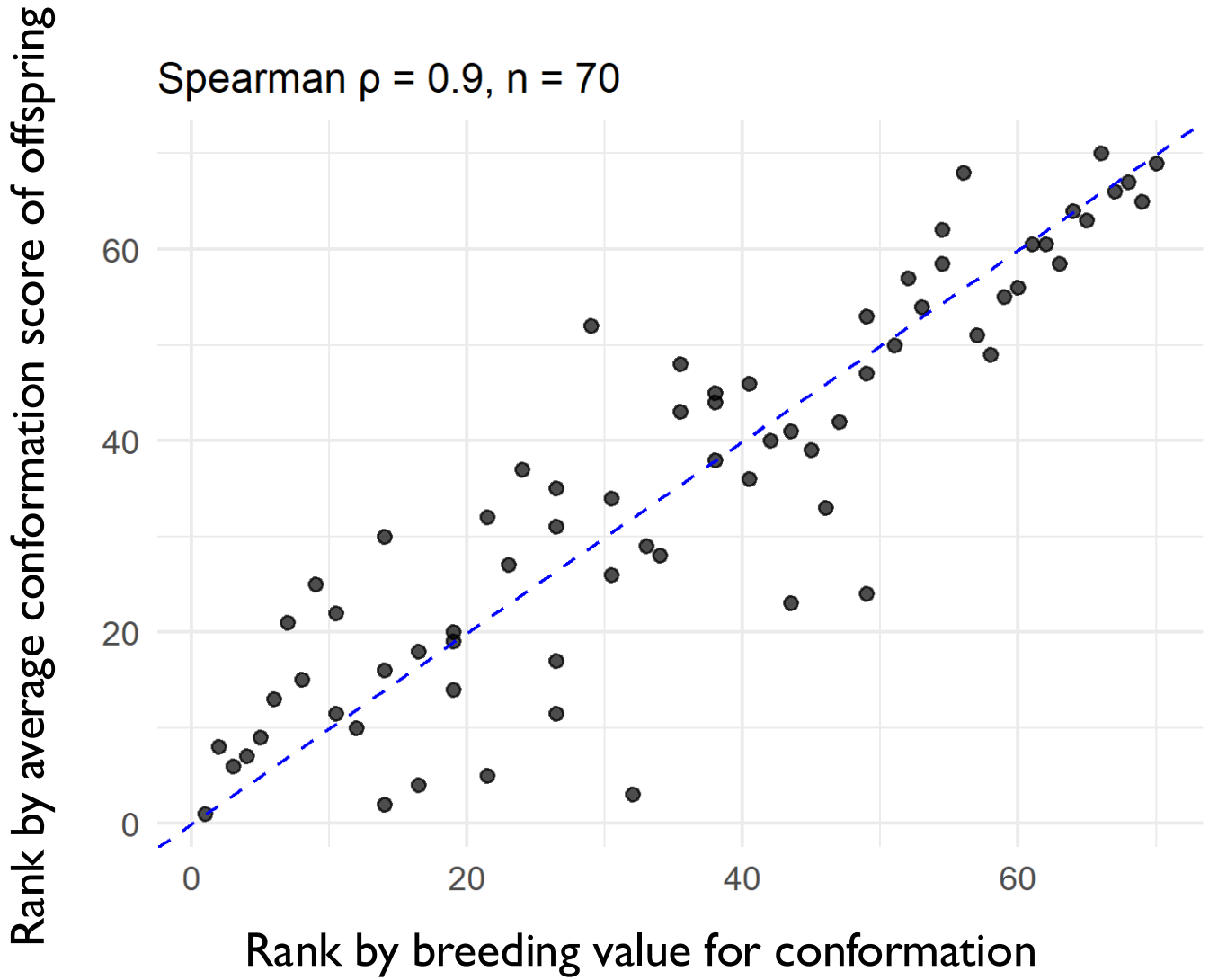
- Average fattening results of offspring
- Breeding value

for (1) conformation score, (2) fatness score, and (3) slaughterweight.

Spearman rank correlation test between the two ranks.

N=70 bulls were ranked in total.

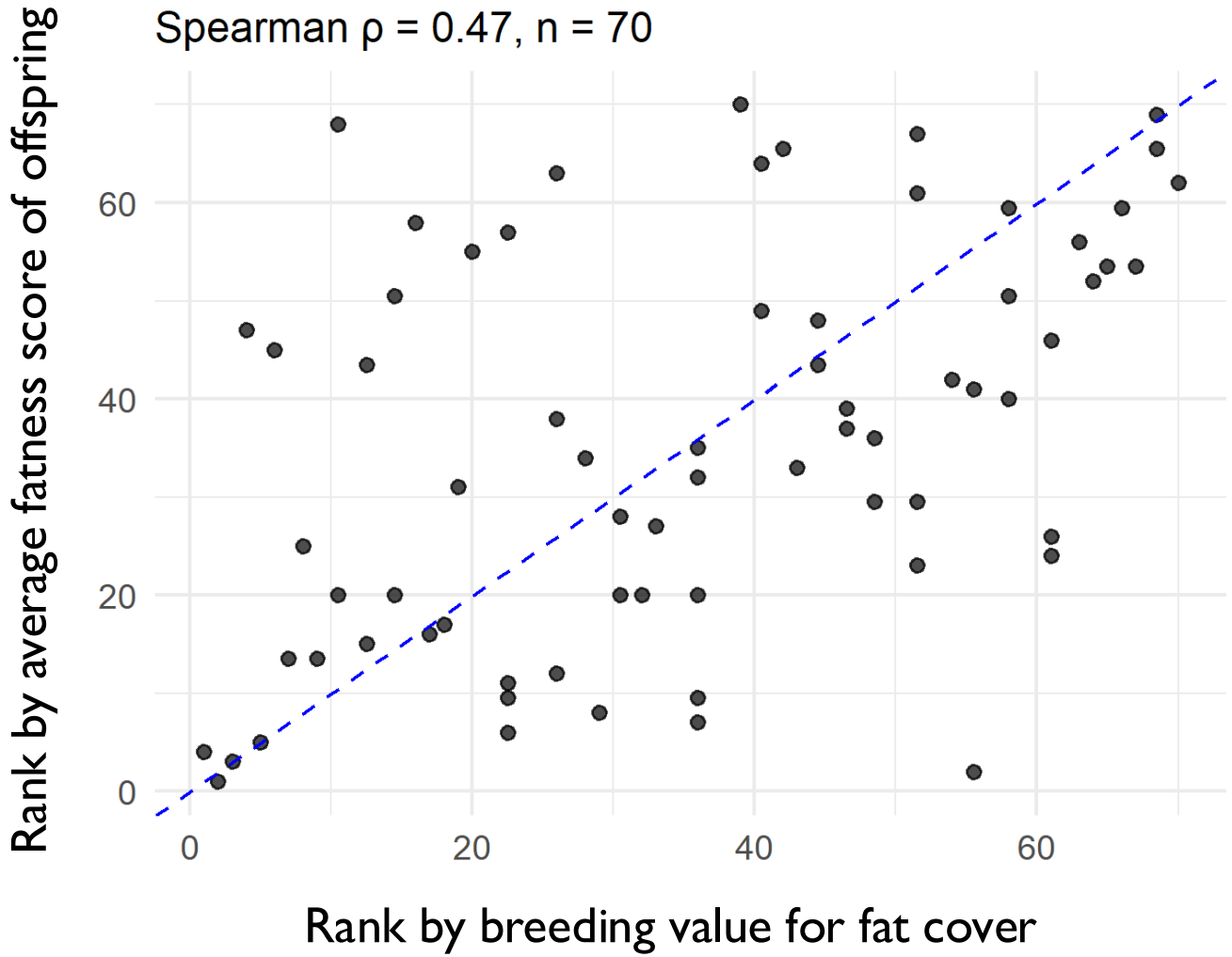
Conformation



Results:

- High correlation level
- Rank correlation statistically significant (p-Value < 2.2e-16)

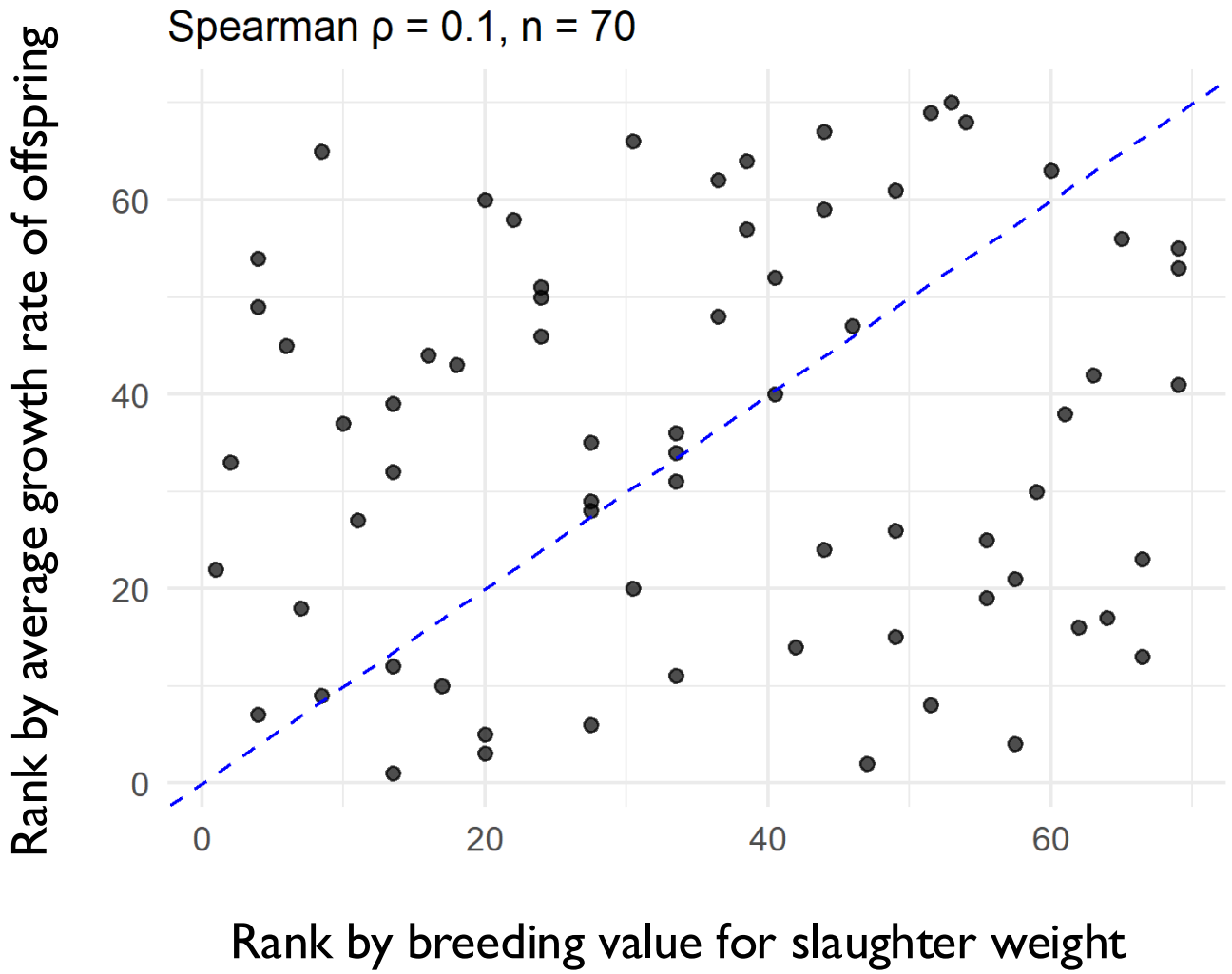
Fat cover /fatness score



Results:

- Moderate correlation level
- Rank correlation statistically significant (p = 3.843e-05)

Growth / slaughter weight



Results:

- Very low correlation
- No statistical significance of correlation (p = 0.3875)

Conclusion

- **Conformation** highly dependent on genotype. Breeding value (of father) is a good predictor for conformation in offspring, even for DairyXBeef in extensive fattening systems.
- **Fatness** has moderate correlation to breeding value.
- **Growth** rate has no correlation to breeding value.
- **Altitude** of fattening farm decreases growth rate, fat score and conformation score of extensively fattened cattle.