

Breeding strategies for early maturity in beef cattle

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Content

- ▶ Present master thesis
- ▶ Material and method to get first results
- ▶ First results
- ▶ Outlook

Master thesis

Goal

- ▶ Predicting: Which strategy is suitable to breed for early maturity in beef cattle?

Definition of early maturity

- ▶ Animal with same price at the slaughterhouse but younger

Economic relevance

- ▶ Younger -> less costs for the farmer

Master thesis

Four strategies sorted by increasing complexity:

1. Carcass fat as auxilliary trait
2. Index over carcass traits
3. “Deviation in age at slaughter” from Berry, Cromie, and Judge (2017)
4. Growth models

-> Starting with strategies one and two

First result

- ▶ Index allows breeding for multiple traits simultaneously
- ▶ Goal: Selecting most economic animals (Hazel 1943)
- ▶ For each trait a breeding value
 - ▶ weighed according to economic relevance

Index

$$I = a^T u$$

where

a is the vector of economic weights \rightarrow not available

u is the vector of estimated breeding values \rightarrow available

- ▶ Carcass conformation, carcass weight and carcass fat for calves and adults each
 - ▶ Six breeding values \rightarrow six traits
 - ▶ Routeneley recorded by Proviande in slaughterhouses

Groups

- ▶ Calves are less than 180 d old
- ▶ Adults are between 180 and 701 d old

Carcass fat



Classified to fat class one and four

Image source: Proviande

Carcass conformation



Classified to decreasing conformation classes

Image source: Proviande

Economic weights

- ▶ Definition: Change in profit per change in carcass trait (Brascamp, Smith, and Guy 1985)
- ▶ Simplification:
 - ▶ Costs constant
 - ▶ Price per kg carcass weight as profit
- ▶ Prices from August 2018, based on payment system CHTAX
 - ▶ For calves and adults on different levels but same pattern
 - ▶ Shown: prices for adults

Carcass fat

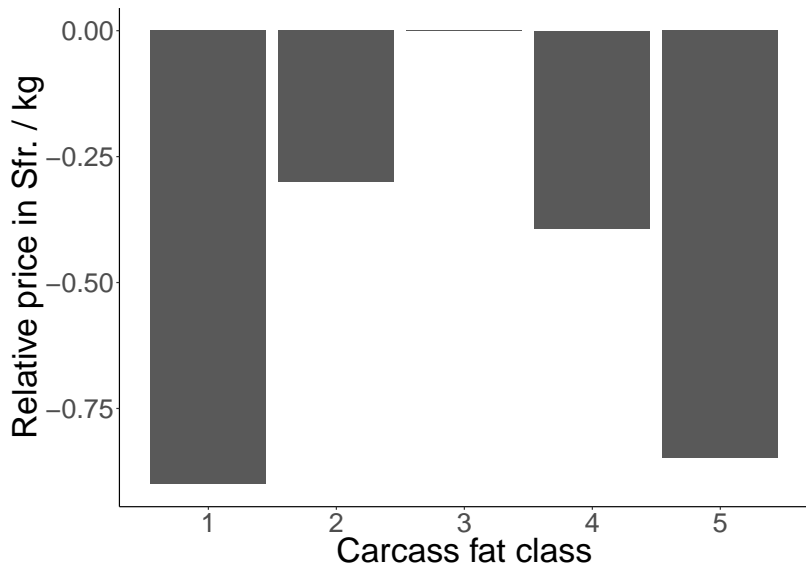
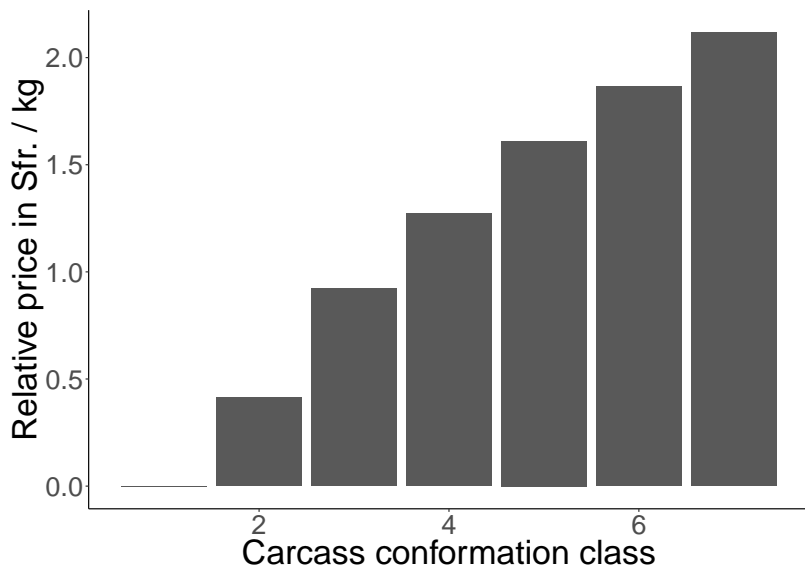
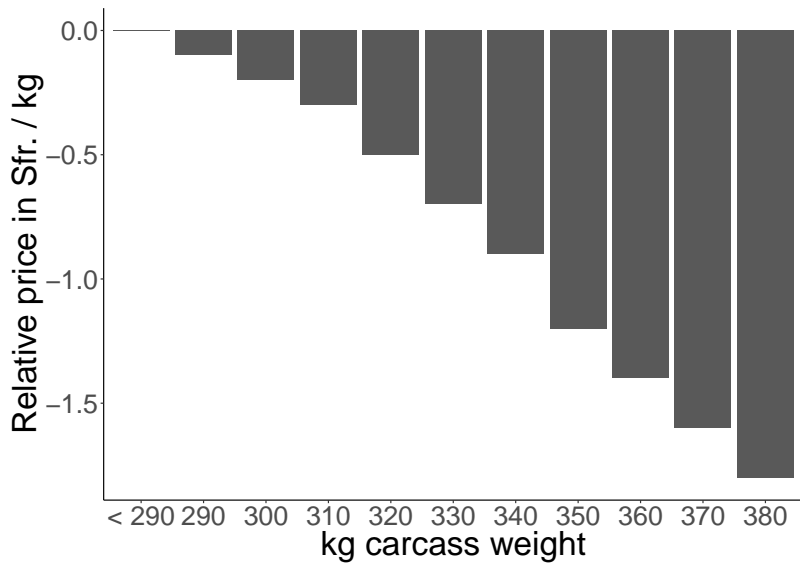


Image source: Proviande

Carcass conformation

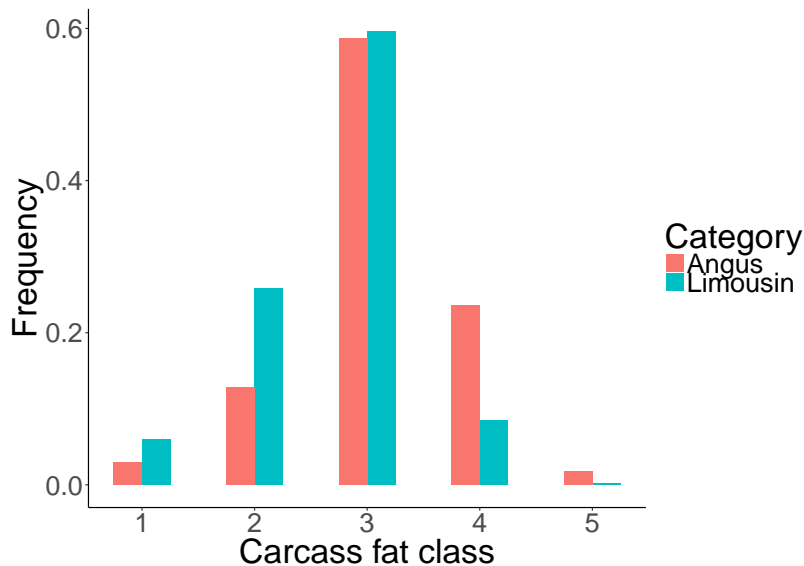


Carcass weight



Breeds

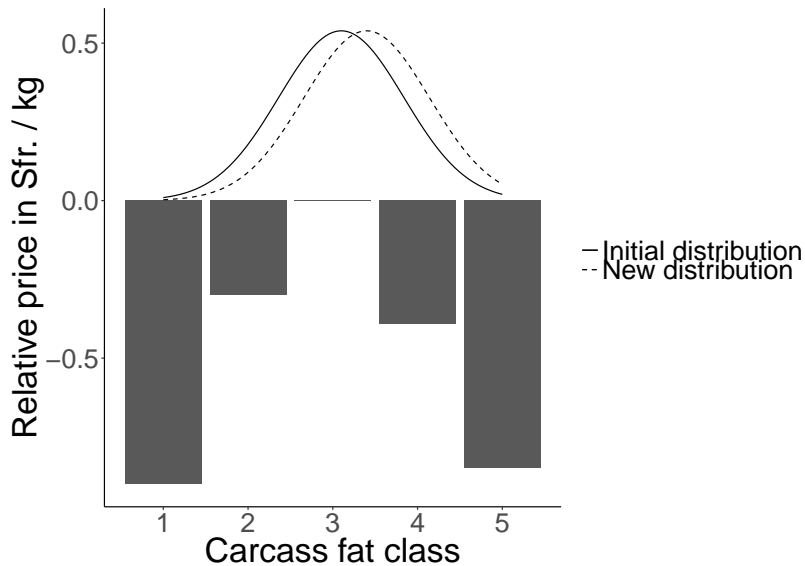
- Same prices, different distributions \rightarrow animals from 2010 - 2015



Method

- ▶ Programm R using own functions (R Core Team 2017)
- ▶ Mean difference in price per difference in trait
- ▶ Model potential increase in population mean \rightarrow scaling up to one unit

Method Exemplary



Relative economic weights

Trait	Angus	Limousin
Calves conformation	0.19	0.16
Adults conformation	0.10	0.08
Calves fat	0.05	0.07
Adults fat	-0.01	0.02
Calves weight	-0.49	-0.92
Adults weight	-0.03	-0.03

- ▶ Per genetic standard deviation -> comparable
- ▶ Carcass conformation in relation to carcass fat more important for Angus than Limousin
- ▶ Negative economic weights for carcass weight
- ▶ Calves more important than adults

Discussion

- ▶ Profit in price change per carcass weight -> Underestimation of carcass weight
- ▶ Costs not considered
- ▶ Explains differences to Åby et al. (2012), where carcass weight has highest positive economic weight.
- ▶ Breeding values corrected for age at slaughter
 - ▶ The lower the age the higher the breeding values
 - ▶ Negative weight for carcass weight -> Breeding for animals which grow slowly

Outlook

- ▶ Evaluation of strategies: Carcass fat and index
- ▶ Tool: Genetic Gain
- ▶ Genetic Gain \rightarrow Improvement of carcass traits per year
- ▶ Characterization of the two other strategies

In association with

QUALITAS⁺

References

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