

Aim



Estimate genetic parameters for feed efficiency traits



Correlation with field traits



Estimate breeding values

Staur test station



- 80 bulls per year, 5 breeds
- 8 pens, 8 to 12 bulls per pen
- AI-bulls selected on phenotypes transformed to ranking-values
- 147-day test from 230 days of age
- Conformation incl. scanning, claw health, behavior, fertility, feed efficiency traits

Recording feed efficiency



- Automatic recording of all traits
- **Roughage** based feeding regime
 - Feed analyzes of all roughage → mixed to be uniform through test period
 - Feed bins registers the weight of the feed when the bull enter and leaves → the difference is the amount eaten at that visit
- **Concentrates** fed complementary to achieve a set average daily gain goal (breed specific)
- Animal **live weight** logged in concentrate feeding stations 8-10 times/day
- Additional manual weight at the start and end of test-period and weekly during test

Feed efficiency traits

- **Feed Utilization Potential (FUP)** = energy required to grow 1 kg of muscle

$$FUP = \frac{\left((total\ FEm_{roughage} + total\ FEm_{concentrate}) - \overbrace{(0.8 \times 0.0424 \left(\frac{BW_{start} + BW_{end}}{2} \right)^{0.75})}^{\text{maintenance energy requirement}} \right)}{total\ weight\ gain}$$

- **Average daily gain (ADG)** = Average weight gain during test period per day
- **Total roughage intake (GFO)** = Total intake of FEm from roughage in test period

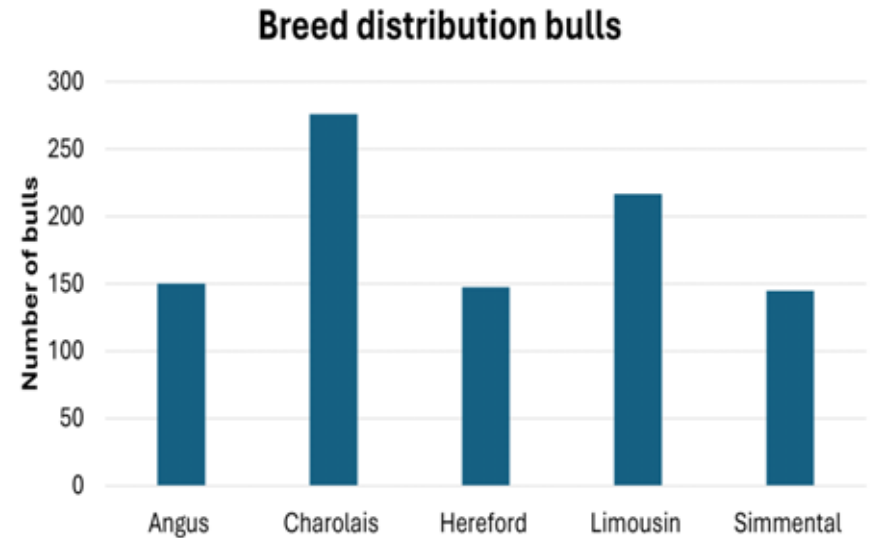
FEm = amount of energy in 1 kg barley

Data and model

- 935 bulls from 2013-2024
- Multivariate and multi breed model

$$\textit{Trait} = \textit{Breed} + \textit{Pen}(\textit{year}) + \textit{Year} + \textit{Bull} + \textit{residual}$$


Fixed



Field data

- Weaning weight 72,000 animals
- Slaughter traits 115,000 animals

Model same as in routine genetic evaluation = multi-trait and multi-breed

Heritabilities and correlations

| | Feed Utilization Potential | Roughage intake | Average daily gain |
|----------------------------|----------------------------|-------------------|--------------------|
| Feed Utilization Potential | 0.69 | | |
| Roughage intake | 0.91 ±0.04 | 0.68 | |
| Average daily gain | -0.11 ±0.15 | 0.27 ±0.15 | 0.41 |

- ✓ Very high heritabilities for FUP and GFO
- ✓ High, but unfavourable correlation between roughage intake and FUP
- ✓ Moderate and favorable correlation between roughage intake and gain
- ✓ Low, but favorable correlation between FUP and daily gain

Heritabilities and correlations incl. field data

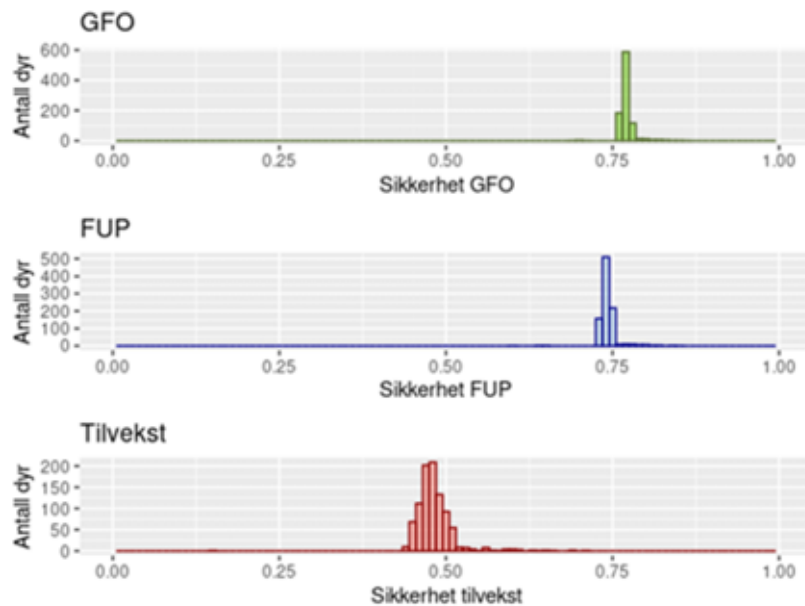
| | Feed Utilization Potential | Roughage intake | Average daily gain |
|----------------------------|----------------------------|-----------------|--------------------|
| Feed Utilization Potential | 0.70 | | |
| Roughage intake | 0.88 ±0.04 | 0.68 | |
| Average daily gain | -0.11 ±0.15 | 0.32 ±0.13 | 0.46 |
| Weaning weight | -0.04 ±0.07 | 0.25 ±0.07 | 0.49 ±0.09 |
| Slaughter weight* | | 0.22 | 0.55 |
| Fat group* | 0.27 | | |

*Preliminary results from bi-variant analyzes

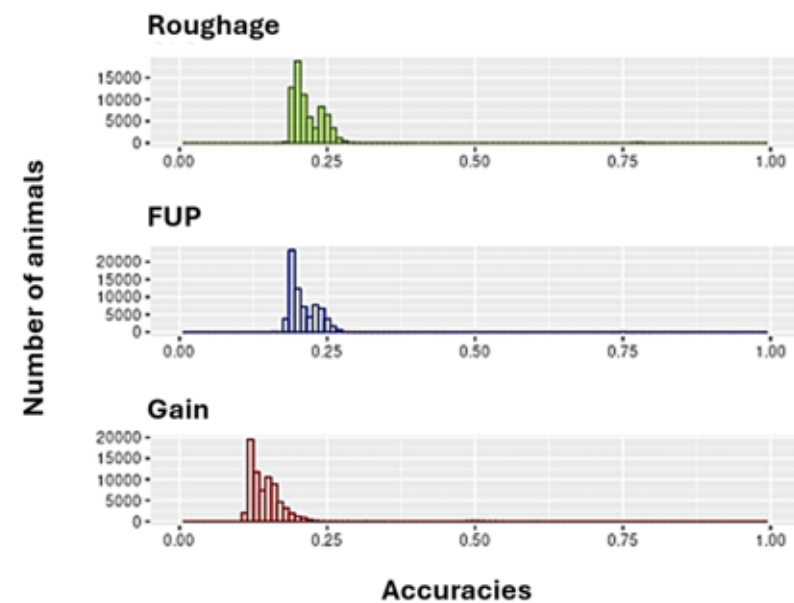
Current field traits are not strong enough correlated with GFO and FUP to support reliable selection for these traits outside the test station.

Accuracies of EBVs – test station traits

Sires with phenotypes from test



Offspring of tested sires



Accuracies of EBVs – test station + field

- **3,800** animals with EBV for **GFO** when including weaning weight
- **1,600** animals with EBV for **FUP** from bi-variant fat group
- **< 500** animals with EBV for **GFO** from bi-variant slaughter weight

To conclude



- ✓ Staur provides valuable phenotypes for feed intake and feed efficiency
- ✓ The traits are heritable, and results support EBV-based selection
- ✓ Genetic progress for GFO and FUP has been limited so far
- ✓ Current field traits are not strong enough to replace phenotyping at test station



Thank you for your attention!

TS 14 Beef cattle - genetic evaluation and recording

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