Implementation of genetic evaluation for intramuscular fat in Norwegian beef cattle using ultrasound measurements

Technical Session 14

Beef cattle - genetic evaluation and recording

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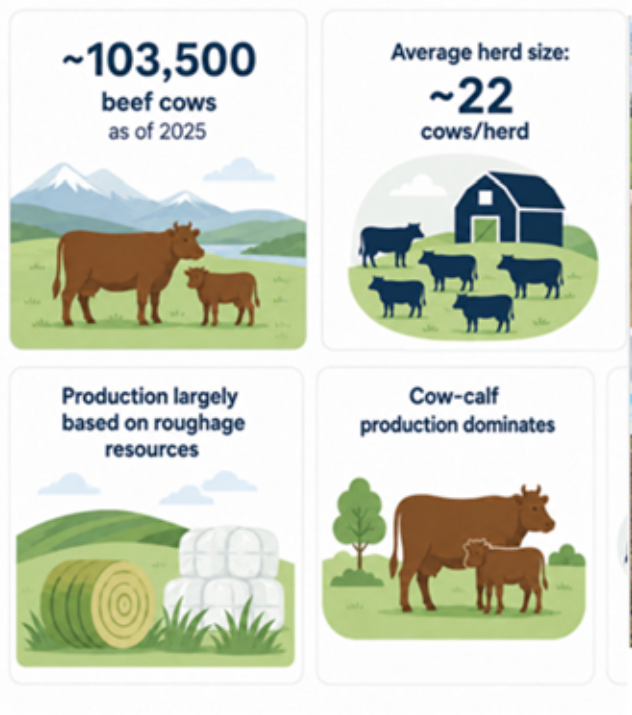
Norwegian suckler cow production



TYR
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Aim

- Estimate genetic parameters for ultrasound-recorded IMF, fat depth and muscle depth in Norwegian beef cattle
- Evaluate the robustness of the genetic evaluation model
- Implement IMF in routine genetic evaluation

Breeding for higher IMF in Aberdeen Angus

2022

Unofficial EBVs

IMF-selection of AI-bulls

2023

Insemination of cows with high EBV for IMF

2024

Selection of first test candidates

2025

IMF included in routine genetic evaluation

Data recording

Data recording

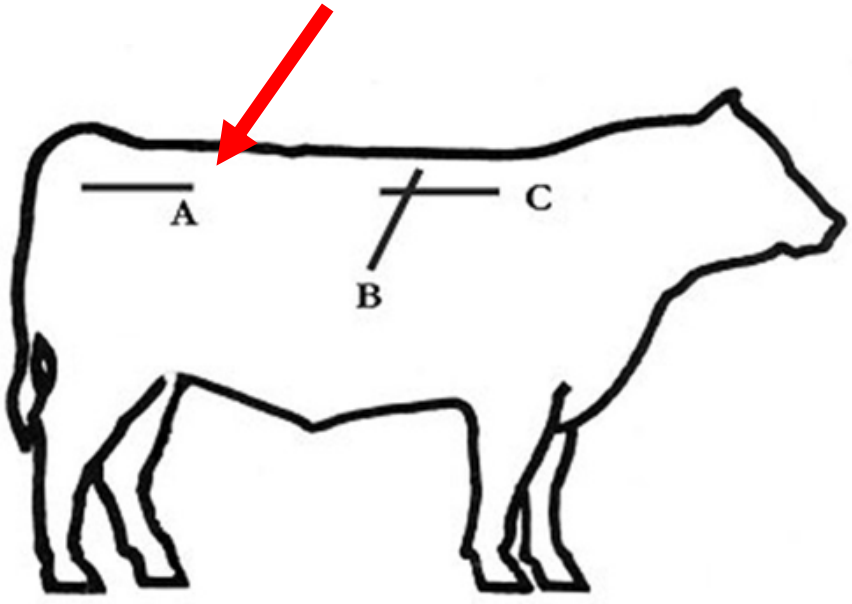
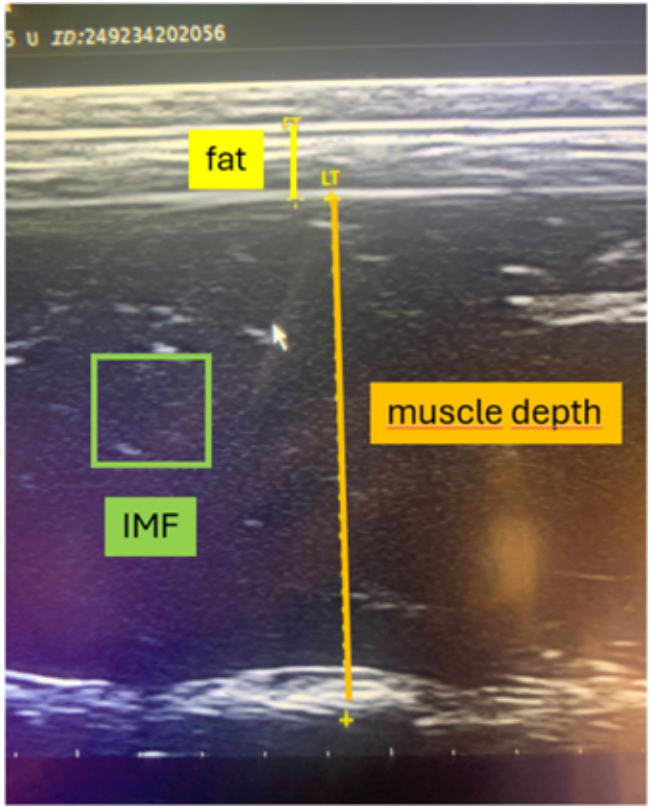


Figure 3.3. Areas of interest for ultrasound evaluation of carcass characteristics

Dataset



Traits

- Fat, in mm
- Muscle depth, in mm
- Intramuscular fat (IMF), in % → average IMF % within squares calculated by equations in the devices

Animals

- Bulls and heifers, age 290-455 days (380)
- Dataset 1: 12,748 animals (2008-2022)
- Dataset 2: 4,525 animals (2023-2024)

- Outliers removed

Descriptive statistics dataset 1

Breed	N	IMF %	Fat, mm	Muscle, mm
Aberdeen Angus	**2,489**	**2.39 (1.03)**	**3.62 (1.64)**	**58.6 (9.4)**
Charolais	4,990	1.87 (0.90)	2.97 (1.53)	68.2 (10.4)
Hereford	**1,928**	**2.25 (0.99)**	**3.64 (1.76)**	**59.8 (9.8)**
Limousin	2,003	1.71 (0.86)	2.72 (1.38)	71.7 (10.5)
Simmental	1,338	2.25 (0.99)	3.58 (1.78)	70.2 (9.4)

Models

Within breed

$$y = year + sex + device + classifier + interpreter + age\ (sex) + herd * year + animal + e$$

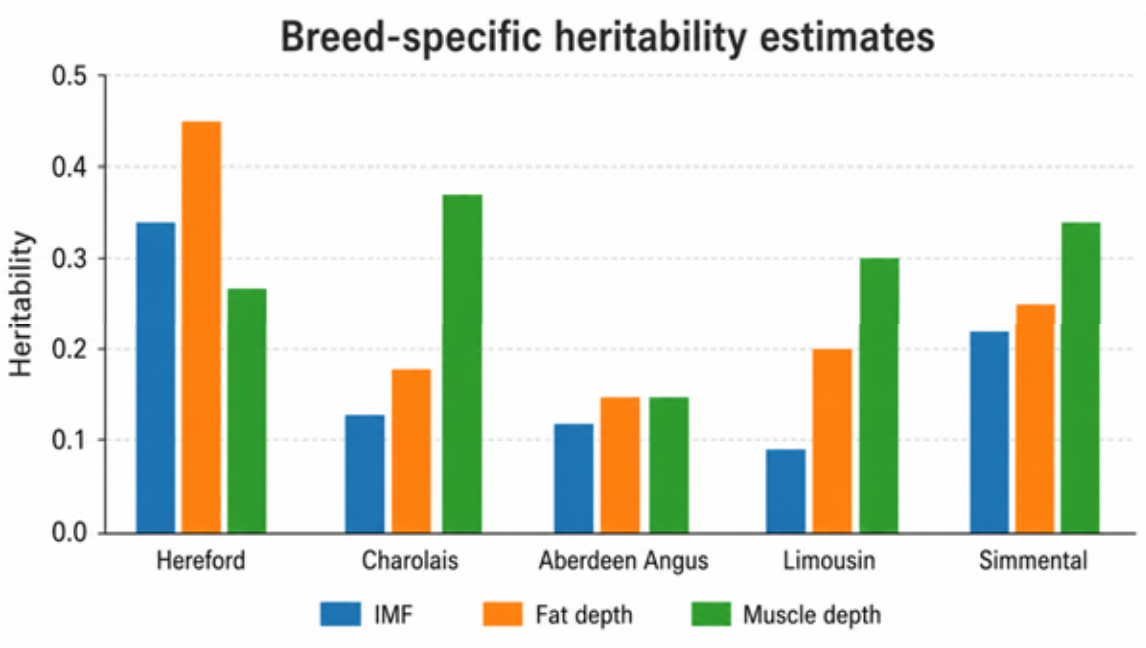
Fixed | Regression | Random

Multi breed

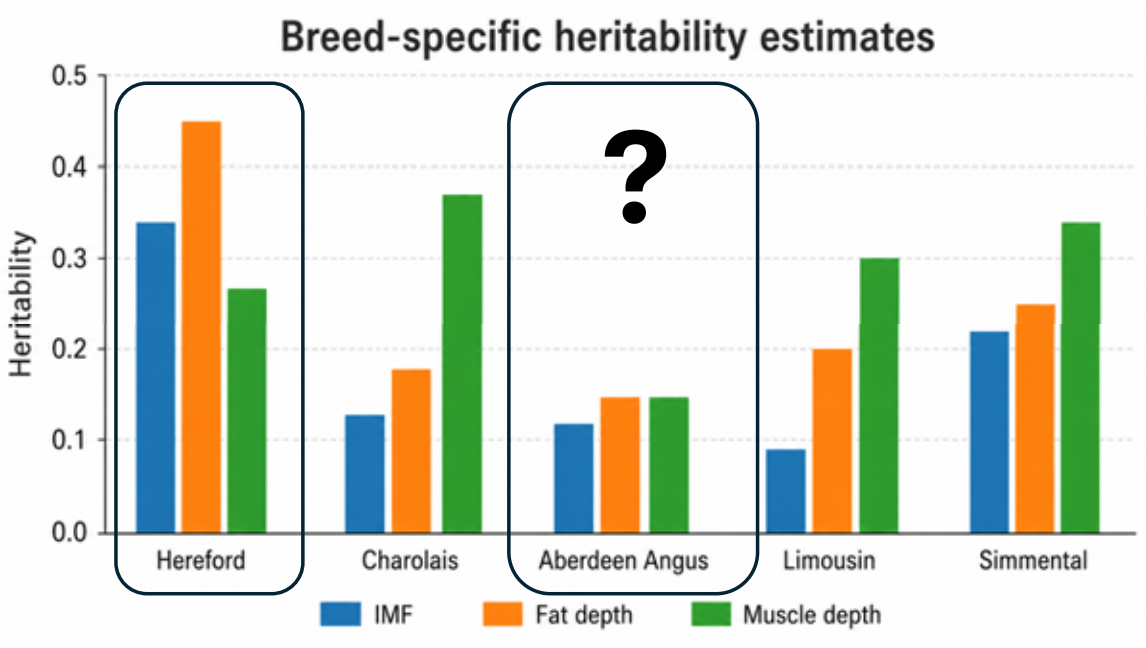
$$y = year + sex * breed + device + classifier + interpreter + age\ (sex * breed) + herd * year + animal + e$$

Fixed | Regression | Random

Within breed - heritabilites



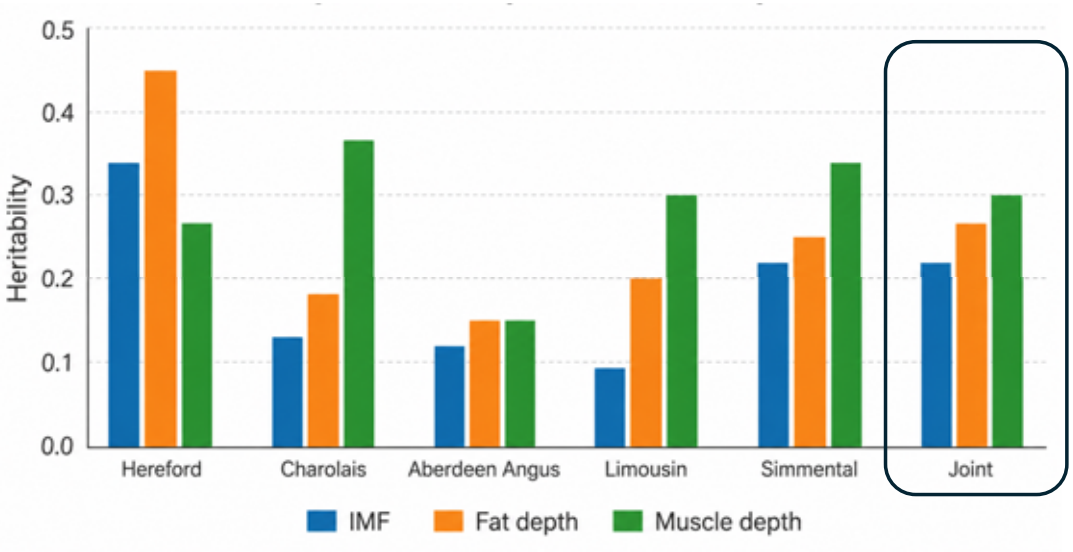
Within breed - heritabilites



- Angus has very low h^2 for all traits.
- Explanation? Coat color? Excitability?

Results multi-breed evaluations

Heritabilities

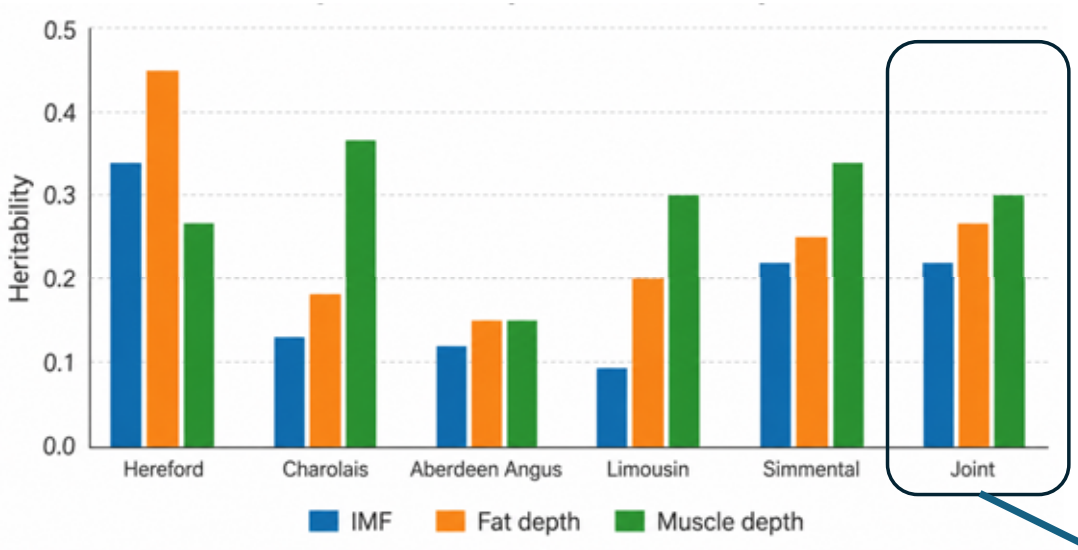


Genetic correlations

IMF ↔ fat depth	0.94
IMF ↔ muscle depth	-0.15
fat depth ↔ muscle depth	-0.04

Results multi-breed evaluations

Heritabilities



Genetic correlations

IMF ↔ fat depth	0.94
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fat depth ↔ muscle depth	-0.04

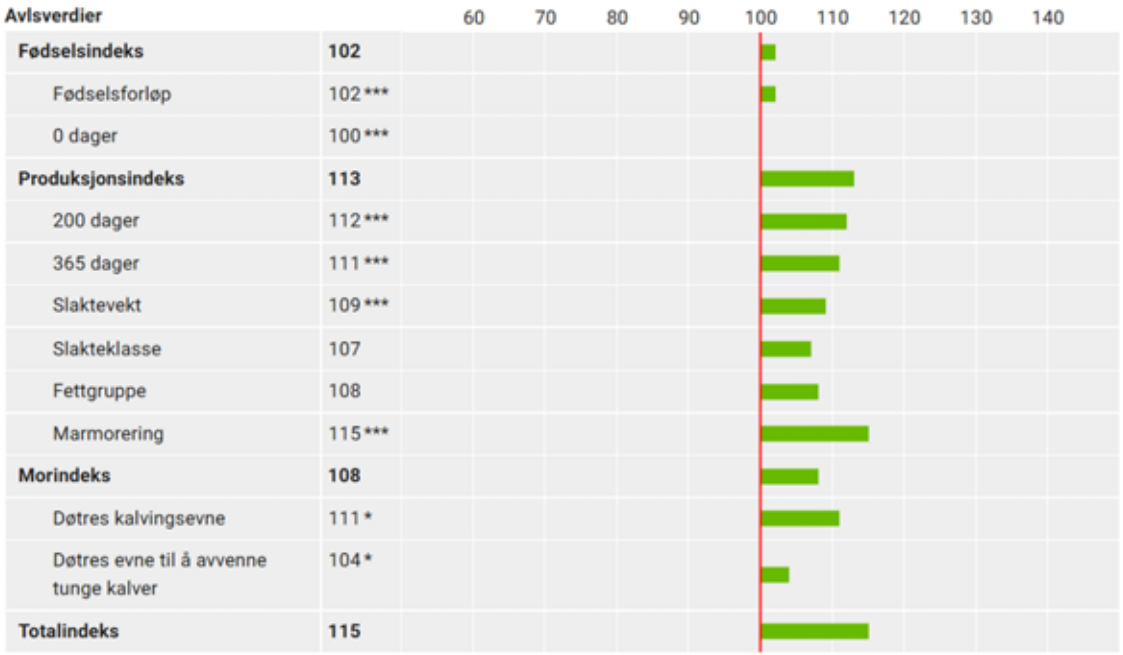
Used in genetic evaluation

To sum up

- IMF is included in genetic evaluation → published as a single trait, not in total merit index (TMI)
- If IMF gets an economic value, it should be included in a breed-specific TMI
- Because IMF is strongly correlated with fat depth, increased emphasis on IMF may also influence fatness
- Selection program for IMF in the Aberdeen Angus

To sum up

- IMF is included in genetic evaluation → published as a single trait, not in total merit index (TMI)
- If IMF gets an economic value, and becomes part of the breeding objective, it should be included in a breed-specific TMI
- Because IMF is strongly correlated with fat depth, increased emphasis on IMF may also influence fatness
- Selection program for IMF in the Aberdeen Angus



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Thank you for your attention!

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