How to deal with feed efficiency in NTM?

Rasmus S. Stephansen and Morten Kargo
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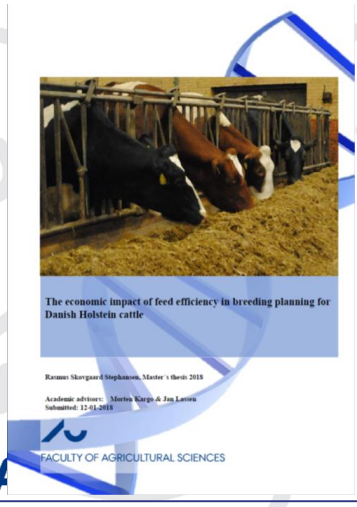
Acknowledgements



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Comments from NAV Workshop 2017

- Feed efficiency is an important trait in relation to
  - Economic importance
  - Carbon footprint

Why consider feed efficiency?

- Feed costs accounts for approximately 88 % of variable farm costs
- Considered in breeding goals for broilers and slaughter pigs
- Genetic variation is well documented

The overall aim – save feed

Opportunities:

1. Consider maintenance costs

2. Improve metabolic efficiency

Improve engine

Smaller engine

Saved Feed

Saved Feed = Maintenance + Metabolic Efficiency

Maintenance

- Smaller cows have less maintenance requirements than big cows

- ~1 kg dry matter per 100 kg body weight
  - Corresponds to ~30 % of energy requirement
  - 0.18 €/kg DM

Maintenance in relation to NTM

- 3.2 €/ kg MBW

- Genetic SD 5.3 kg MBW (Manzanilla Pech et al., 2016)
  - Reliability = 0.90

- NTM value ≈ 1.6 €/index unit

Maintenance requirements

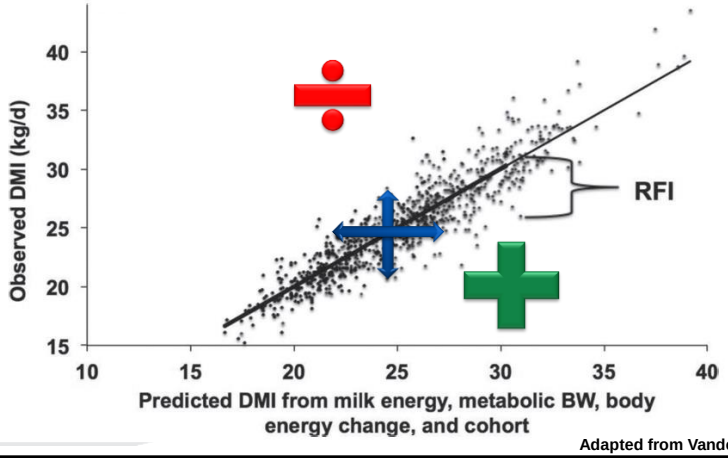
Require knowledge and data from:

- **Body weight (heritability ~0.5)**
- **Correlated traits (genetic correlation >0.45)**
  - **Stature (heritability ~0.5)**
  - **Chest width (heritability ~0.3)**
  - **Body depth (heritability ~0.25)**

Manzanilla Pech et al., 2016

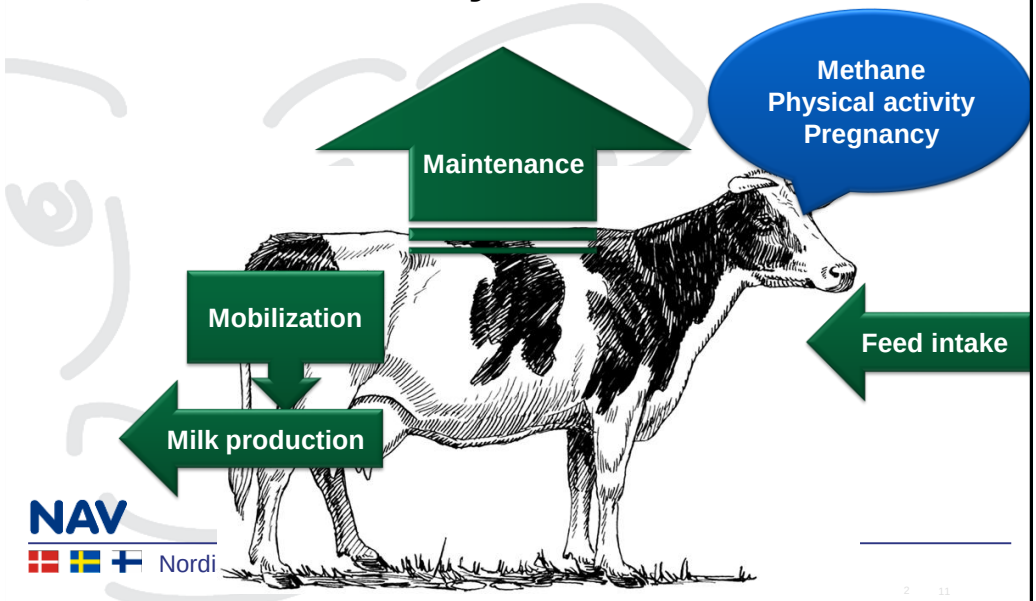
Residual Feed Intake ~ Metabolic Efficiency (ME)

- **The difference between observed and predicted energy requirement**



Adapted from VandeHaar et al., 2016

Metabolic Efficiency



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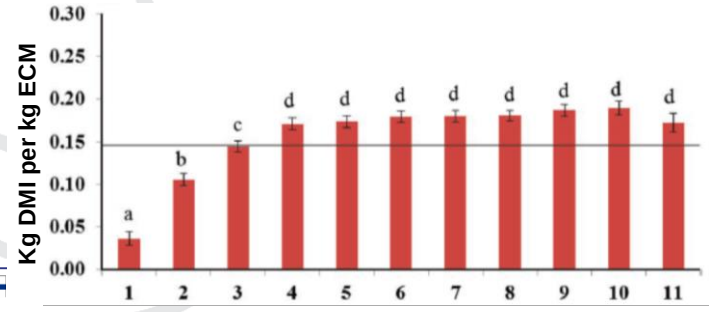
Implications of Metabolic Efficiency

- Easy to identify efficient animals
- Independent of performance
  - No need for adjustment of economic values of other NTM traits
- Complicated trait to evaluate genetically
  - Caused by mobilization

NAV Nordisk Avlsværdi Vurdering • Nordic Cattle Genetic Evaluation

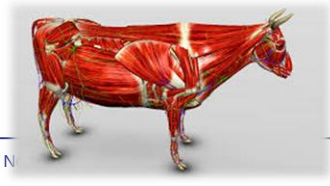
Genetic evaluation of ME

- ME models often assumes constant energy requirements per kg ECM across lactation
  - However energy requirements per kg ECM changes across lactation (Li et al., 2017)

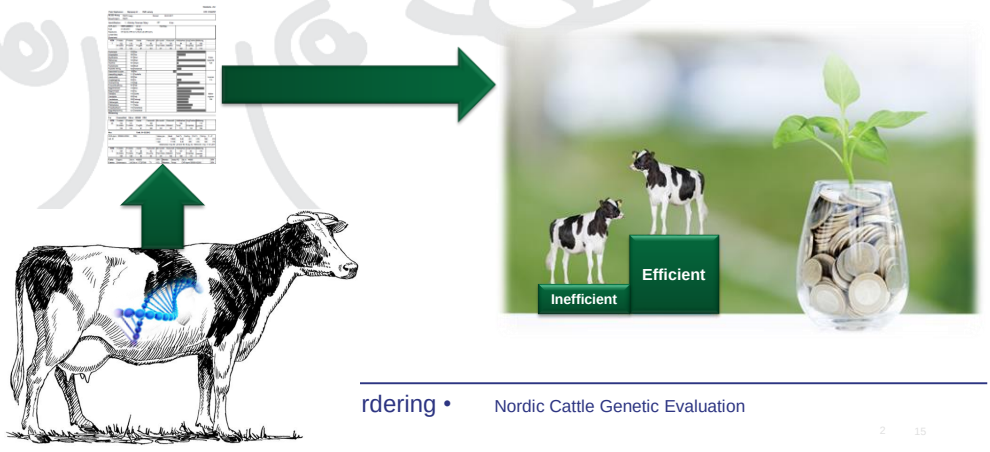


Mobilization and ME

- Assuming energy equality is problematic, because:
  - Fat is the most energy efficient body reserve
  - Body reserves mobilized in different periods
  - Water is mobilized together with body protein (4:1)



Simulation study of metabolic efficiency



Results from simulation study

- The economic value of ME is approximately
  - 55.3 €/kg DM (per annual cow)
  - 0.17 €/SFU
  - Corresponds to applied average feed price (0.18 €/SFU)

Metabolic Efficiency in relation to NTM

- 0.18 €/ kg DM
- Genetic SD 206 kg DM in a lactation (Li et al., 2017)
  - Reliability = 0.60
- NTM value ≈ 2.9 €/index unit

Metabolic Efficiency requirements

- Accurate and high amount of feed intake records
  - Most likely from commercial farms – currently difficult to get!
- Energy requirement observations
  - Milk production, maintenance, mobilization, etc.

Conclusion

Can be based on current data from practice ☺

Require feed intake records 😐

Saved Feed = Maintenance + Metabolic Efficiency

4.5 €/index unit = 1.6 (37%) + 2.9 (63%)

≈ 40% of economic value for yield