

The economic value of saved feed in dairy breeding goals

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SEGES



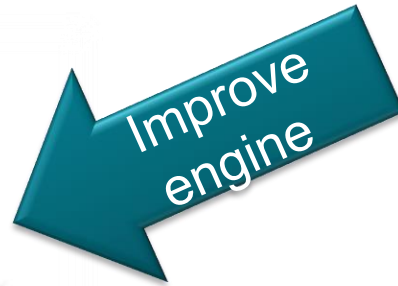
Background for feed efficiency

- Feed costs account for approximately 88 % of the variable farm costs
- Genetic variation is well documented in lactating cattle

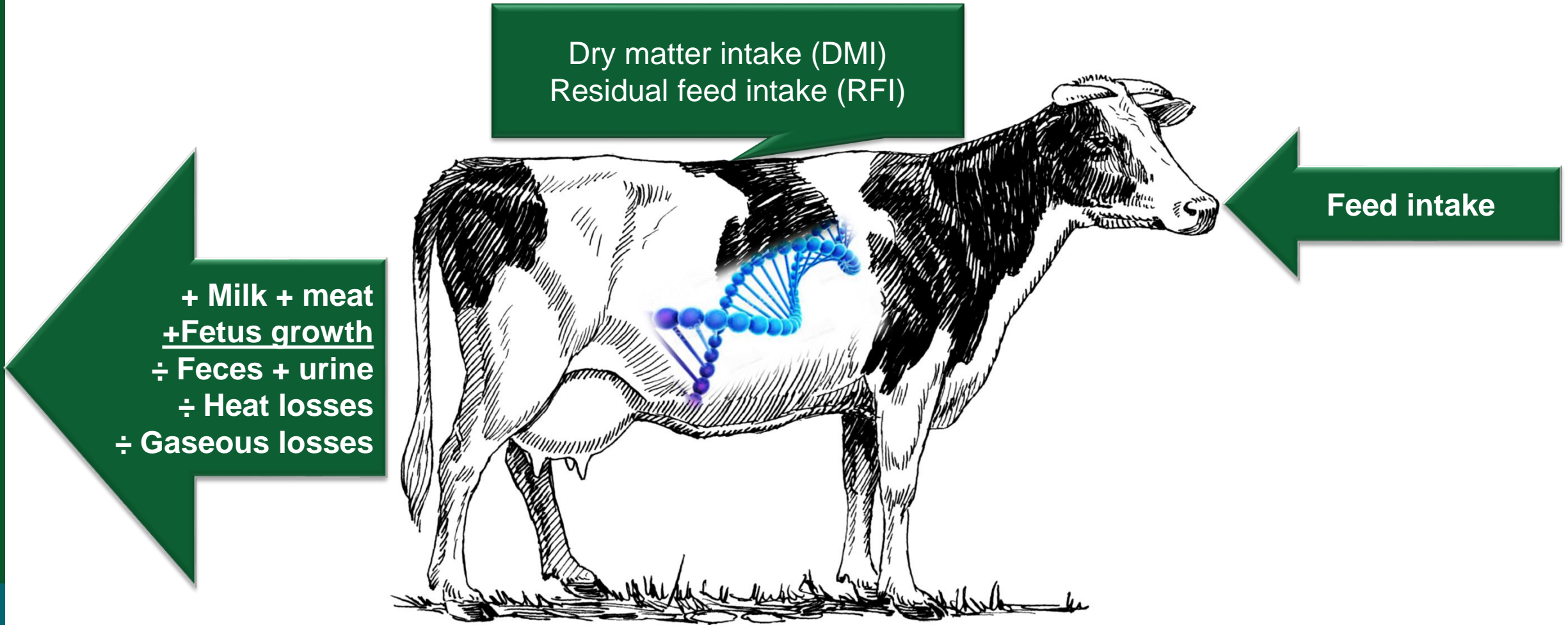
The overall aim – Saved Feed

Opportunities:

1. Improve metabolic efficiency
2. Consider maintenance costs

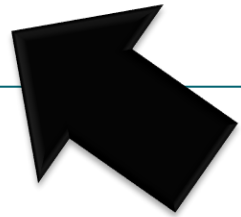


Feed efficiency traits



Feed efficiency traits – pros and cons

Trait	Ability to detect efficient animals	Genetic evaluation	Relation to mobilization	Double counting
DMI				
RFI				



However, the overall problem is lack of feed intake records

Saved Feed (mod. of Pryce et al., 2015)

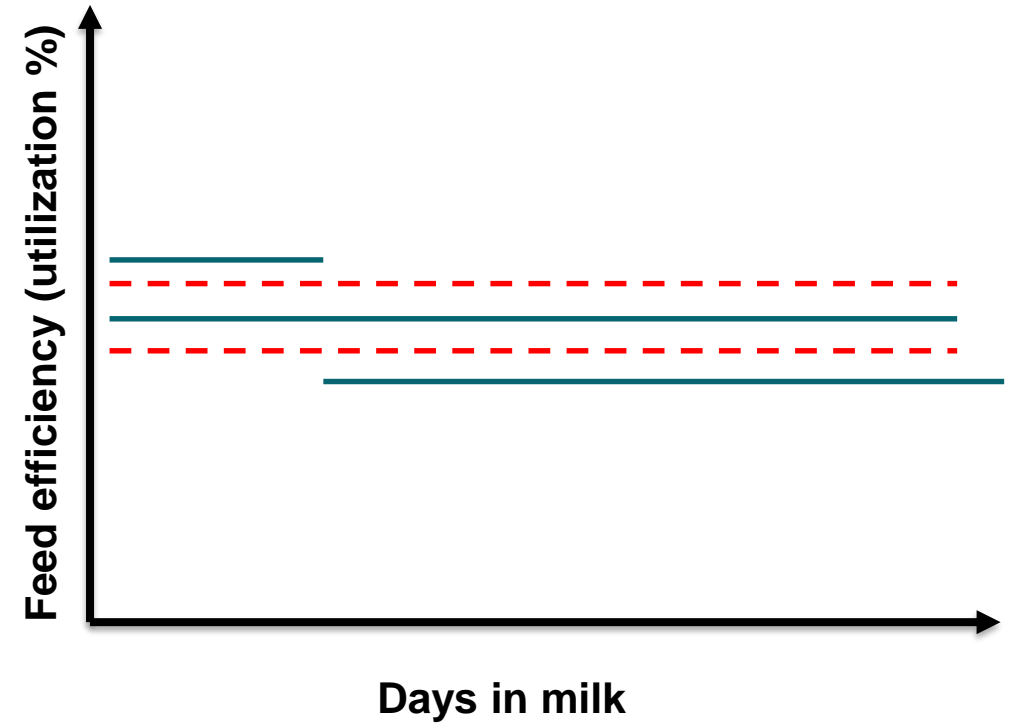
$$EBV_{(\text{Saved Feed})} = V_1 \times EBV_{(\text{Maintenance})} + V_2 \times EBV_{(\text{RFI})}$$

- Units of EBV: kg dry matter per annual cow
- For maintenance the economic value = feed price
- **But is the economic value of RFI = feed price?**



Aim of this project

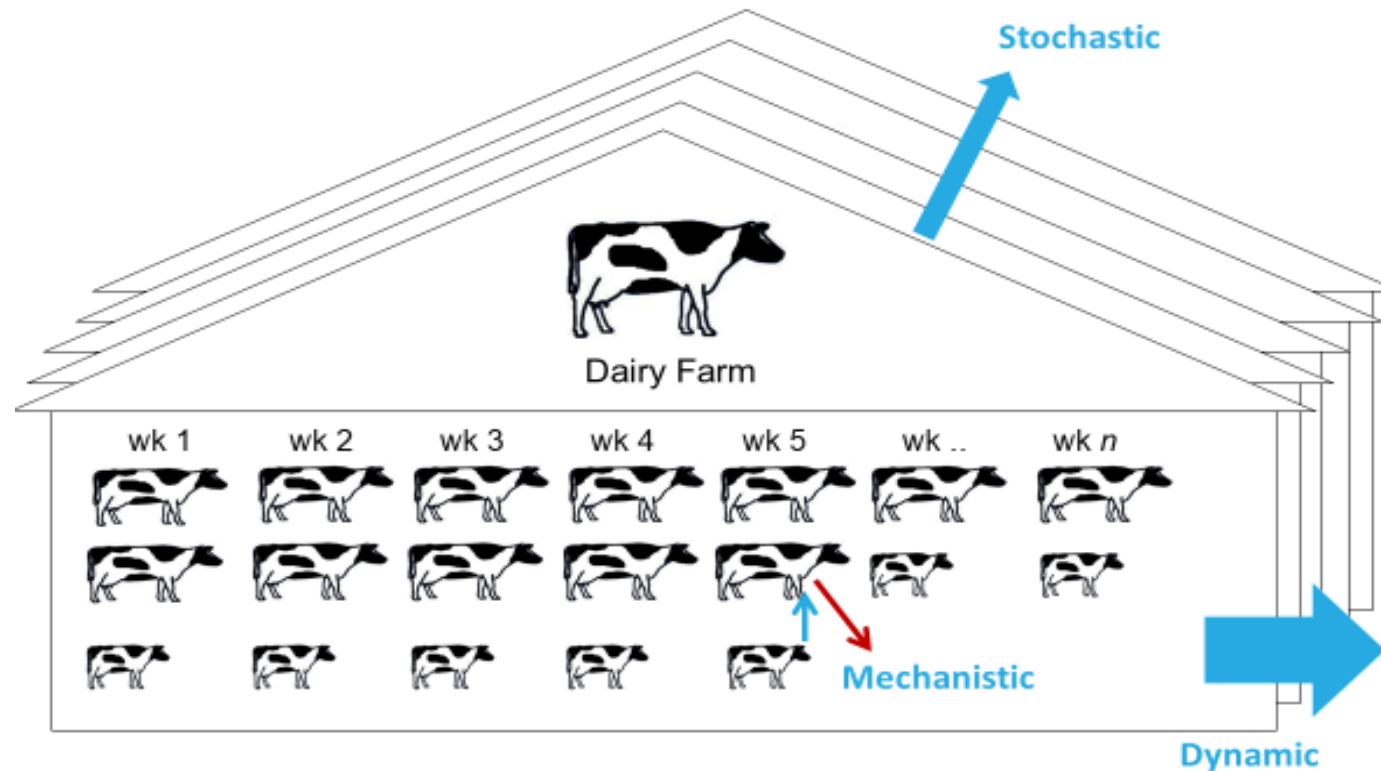
- Calculate the economic value of RFI
- We simulated the effects of:
 - Variation on feed efficiency
 - The effect of 1 versus 2 RFI traits within lactation



Methods

- Simulations performed in SimHerd (Østergaard et al., 2005)
 - › The general framework of SimHerd is **dynamic** (discrete weekly time-stepping)

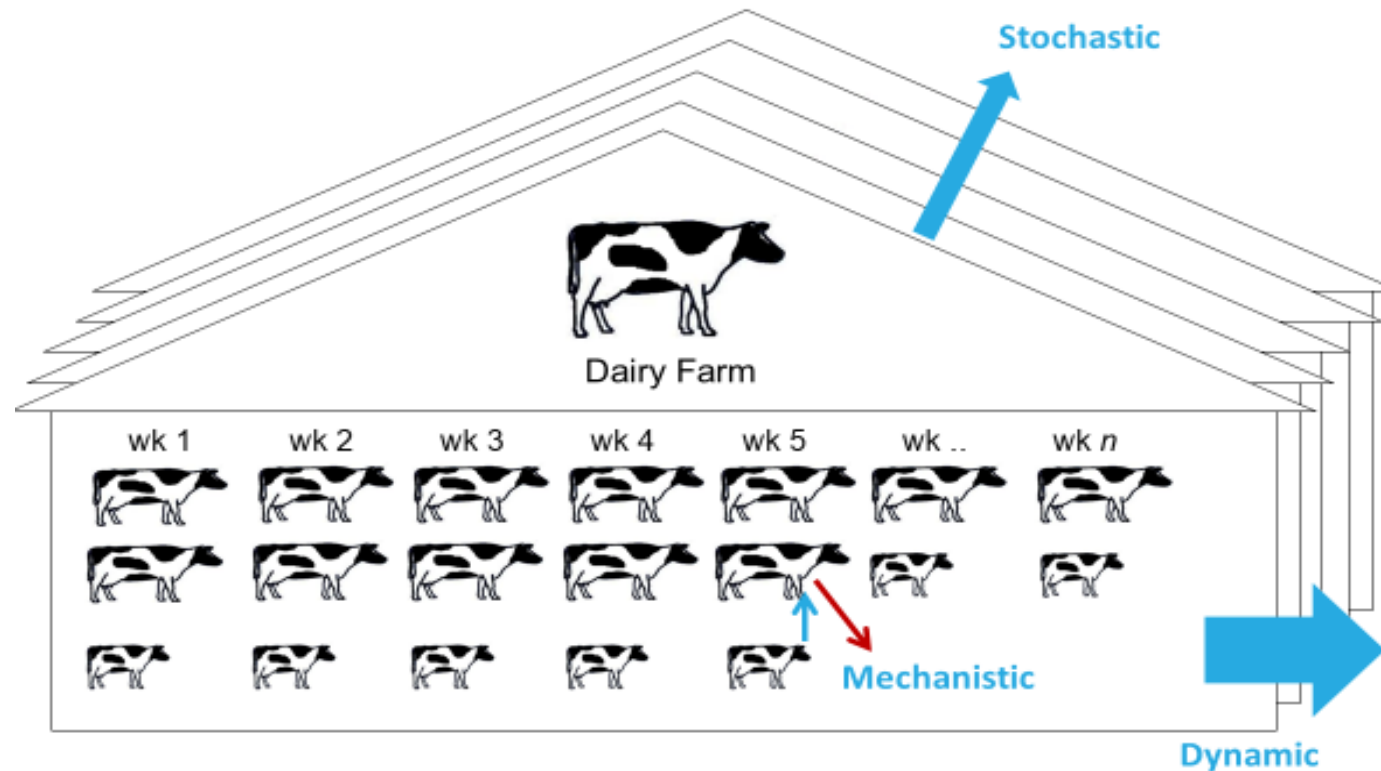
The model



Methods

- Simulations performed in SimHerd (Østergaard et al., 2005)
 - › Discrete events have individual variation at cow level - **stochastic**

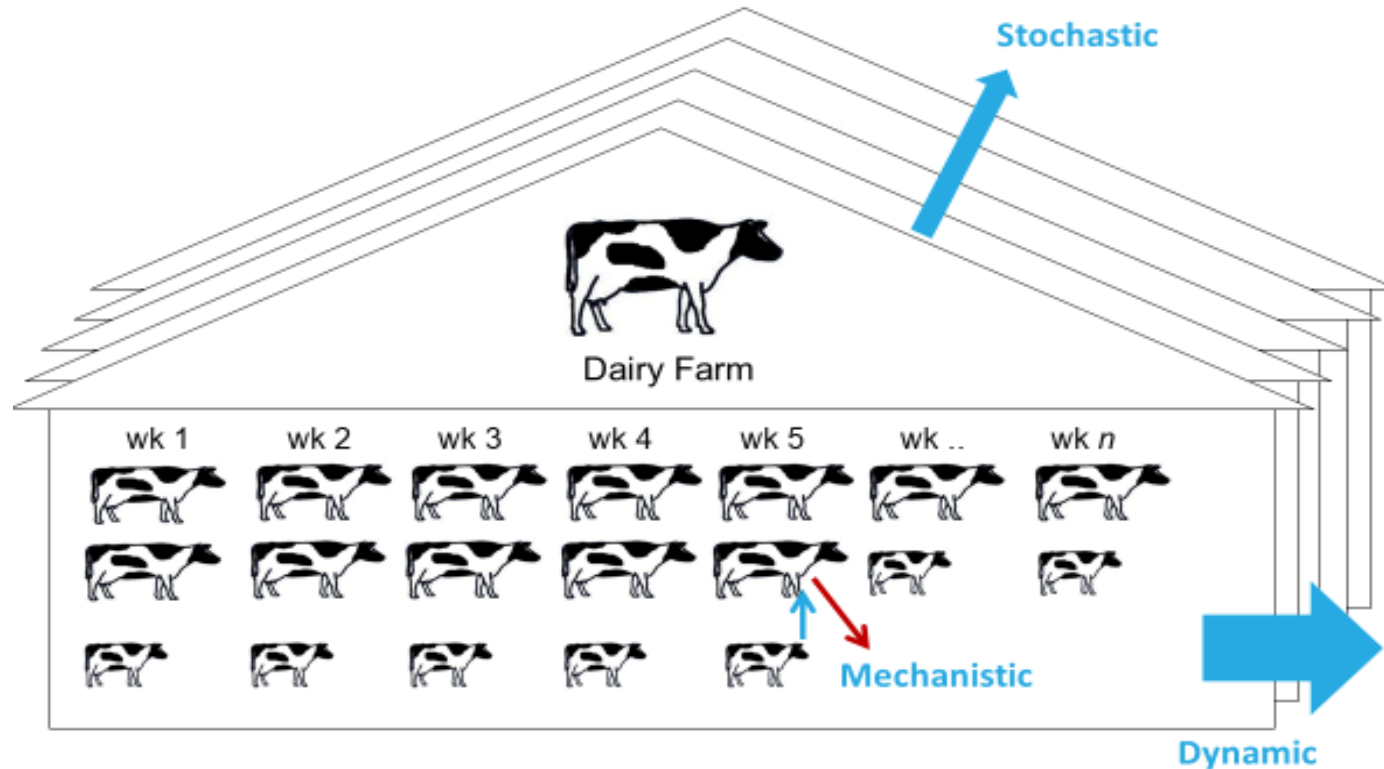
The model




Methods

- Simulations performed in SimHerd (Østergaard et al., 2005)
 - › The herd performance is simulated conditionally independent of the individual animal, makes the model **mechanistic**

The model



Feed efficiency in SimHerd

- $RFI = DMI^{\text{actual}} - DMI^{\text{predicted}}$
- $DMI^{\text{actual}} = \frac{((BW/200+1.5)+\text{fetus growth}+4.0*ADG+ECM*0.4)}{\text{Feed efficiency}} * \text{kg DM/SFU}$

- $DMI^{\text{predicted}} = b_1 \times ECM + b_2 \times BW^{0.75} + b_3 \times \Delta BW$
- › Regression coefficients are from Li et al. (2017)

Simulation setup

- There were four scenarios (A-D):
 - A. 1 RFI trait in lactation – variance not introduced
 - B. 1 RFI trait in lactation – variance introduced
 - C. 2 RFI traits in lactation - variance not introduced
 - Threshold at 84 DIM with a correlation of 0.55 between periods
 - D. 2 RFI traits in lactation - variance introduced
- Each scenario had 5 simulations, where the DMI ranged -2 to 2 kg from mean DMI

Calculating economic values from SimHerd output

- Definition of an economic value (Groen et al., 1997):
 - › The profit of one unit change in dry matter while keeping all other traits constant

- Then the economic value of RFI is:

$$\frac{\mathbf{Profit}_{\text{alternative}} - \mathbf{Profit}_{\text{basic}}}{\mathbf{Level}_{\text{alternative}} \times \mathbf{COWS}_{\text{alternative}} - \mathbf{Level}_{\text{basic}} \times \mathbf{Cow}_{\text{basic}}}$$

Results and discussion

- The economic value of RFI
 - › Varied from 0.16-0.18 €/kg dry matter ($P > 0.05$)
 - › Corresponds to applied feed price (0.17 €/kg dry matter)
 - › There were a difference in profit per annual cow of 1 versus 2 RFI traits ($P < 0.001$)
- Our results are similar with economic value applied by Kokko (2017)
 - › 0.17 €/kg dry matter

Conclusion

- The economic value of RFI corresponds to the applied feed price
 - › Method of estimating breeding values is very important!

Perspectives

Can be based on
current data from
practice 😊

Require feed intake
records 😞

$$EBV_{\text{(Saved Feed)}} = V_1 \times EBV_{\text{(Maintenance)}} + V_2 \times EBV_{\text{(RFI)}}$$

Acknowledgements

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