Future sustainability of organic and low-input milk production:
Challenges and solutions
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Do existing feed rationing programmes suit high forage diets?

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SOLID | Sustainable Organic and Low Input Dairying

Introduction (1)

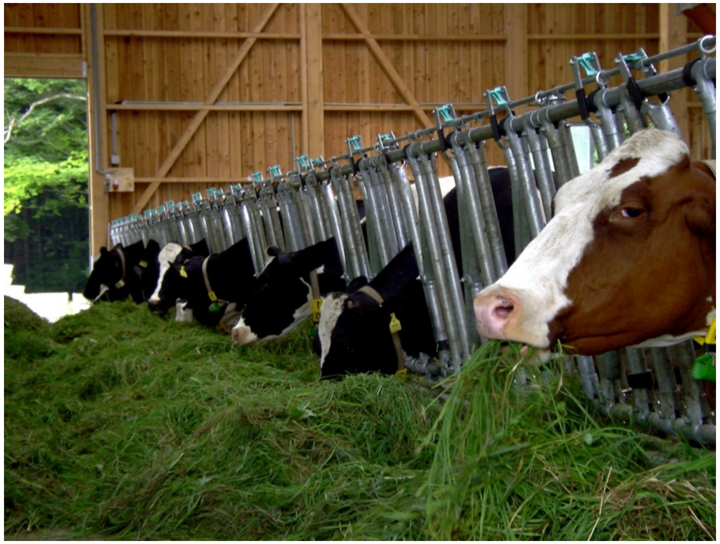
- **No general answ**er possible
- Depends on the **actual feeding programme** used
  - Many programmes available
  - Differ substantially due to historical reasons: Different feed evaluation systems without scope for harmonisation
  - Specific strengths and weaknesses
- **Background?**

Organic & low input systems

Nutrient & energy density

Bulky, quantity

Ingestion time



Gut fill

Gut mass

Digestive activity

Heat production

Energy for production

Yield

Dong et al. (2015)

Energy requirements & high forage diets

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Effects of diet forage proportion on maintenance energy requirement and the efficiency of metabolizable energy use for lactation by lactating dairy cows

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Energy requirements & high forage diets
(Dong et al., 2015; contd.)

- **Conclusion:**
  Dairy cows managed under **low-input or organic** farming regimens may require **more feed energy for maintenance** than those reared in **high concentrate input** systems. Using the **current energy feeding systems** to ration dairy **cows** managed under **low-concentrate input systems** may **underestimate their nutrient requirement**.

Energy requirements & high forage diets

(Dong et al., 2015; contd.)

- Cows offered diets with **forage proportions of 60 – 100 %** would require approximately **11 % more energy for maintenance** than those offered diets containing **forage proportion of < 30 %**.

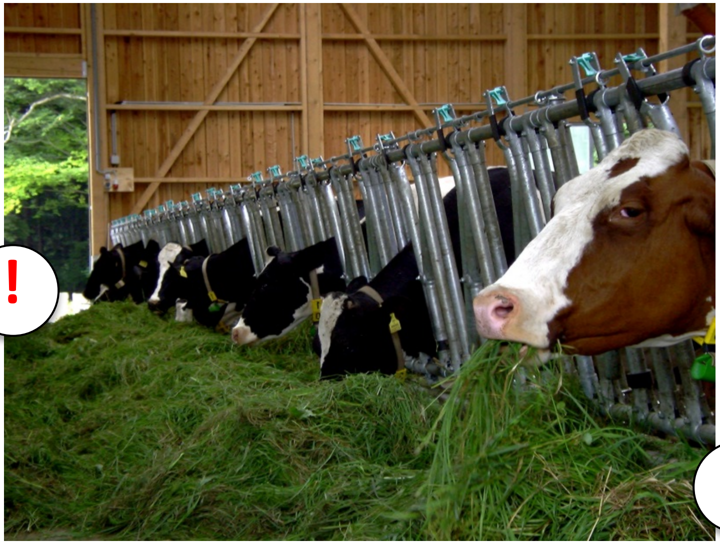
Trait	Forage proportion		Difference
	30 – 59 %	100 %	
ME_m, $MJ/kg^{0.75}$	0.653	0.676	3.5 %
MEm, MJ/d (BW = 600 kg)	79.16	81.95	2.79 MJ = 3.5 %

2.79 MJ ≈ 0.57 kg milk

Conceptual framework ration programming

Environment incl. feeding system

Feed intake !



Breed
BW !
Gravity
Lact. no.
Activity, ...

? Requirement

Dietary nutrient profile ?

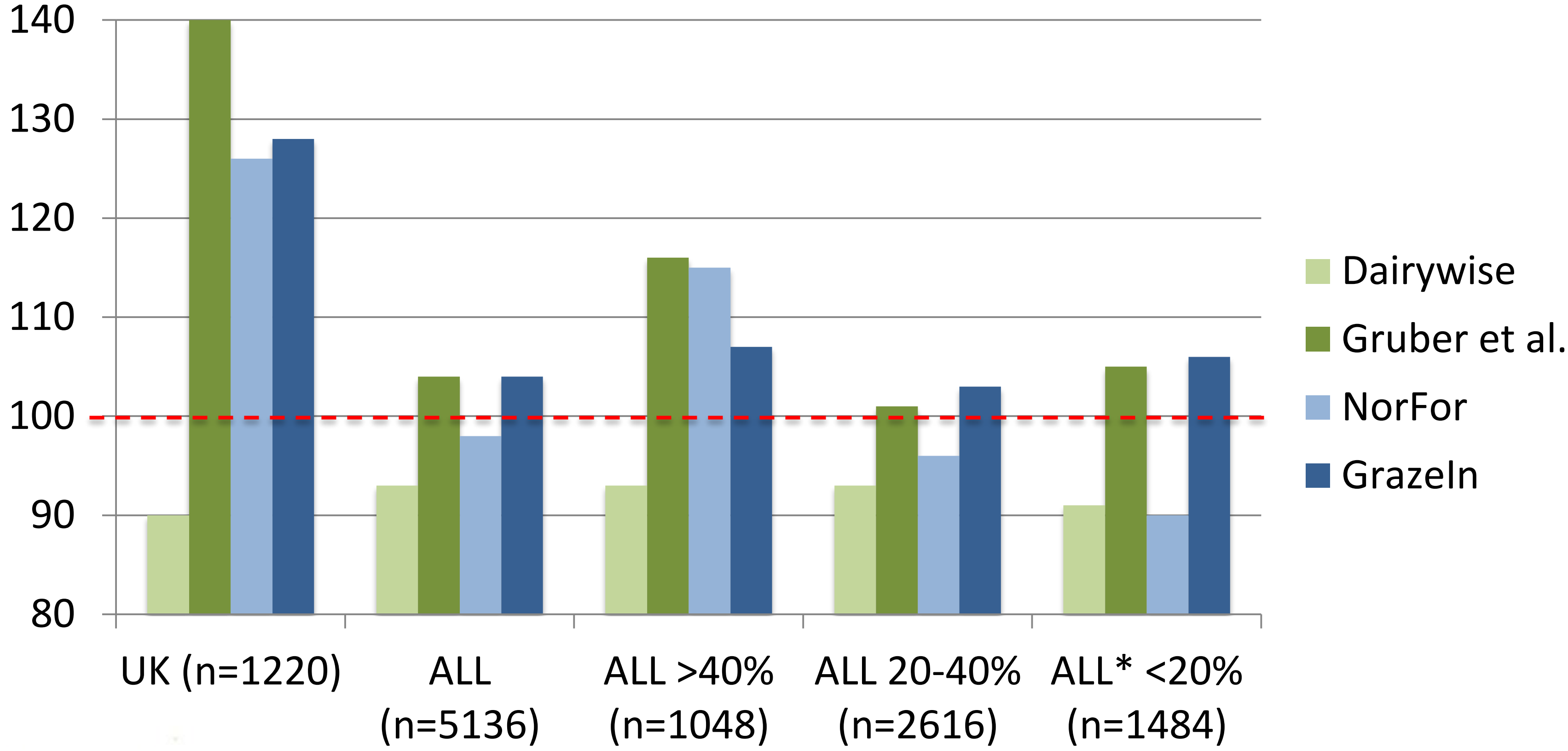
Yield

Estimated feed intake: comparison of different models (Baldinger, 2014)

- **Dataset for SOLID DSS**
  - UK: AFBI, n=305, HF & Jersey x HF, moderate concentrate input (33.5 %)
  - AUT: AREC, n=876, BS & specific HF strain, low concentrate input (23 %)
  - FIN: Luke, n=144, Finn. Ayrshire & HF, high concentrate input (42 %)
- **Estimated feed intake**
  - DairyWise: NL
  - Gruber et al.: DE & AUT
  - NorFor: DK, IS, NO, SE
  - GrazeIn: F

Predicted DMI, % of actual DMI

(Baldinger, 2014)



Conclusions

- There is **no universal "best model"** (rationing programme)
- **Suitability** of model depends on quality of **input data** ("rubbish in – rubbish out"!)
- For selecting an appropriate model, **conditions** under which the (empiric) model had been **built** need to be considered (advantage of models developed in the region?)
- Focus on precision of feed evaluation system (energy, protein) only will result in **biased assessment** of different rationing programmes

Suggested procedure (1)

- **Take what you've got** (model, rationing programme)
- **Secure high quality input data** (feed quality, body weight, expected yield & milk solids content, …..)
- **Measure feed intake**
- **Compare estimates and real values** for herd average or groups of cows (feed intake, yield, milk solids content, ….)

Suggested procedure (2)

- Use **additional information** to assess correctness of model (rationing programme)
  - Milk protein & urea
  - Faeces texture
  - Body weight, body condition, backfat thickness
  - Feeding behaviour
  - ……………
- Estimate degree of **variability** within herd
- Document **consequences** of **dietary changes**

Thank you