

Assessing feed efficiency in grazing dairy cows through infrared thermography

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Introduction

- Genetic selection for feed efficiency is constrained by cost and difficulty of measuring individual feed intake.
- An alternative is to measure biological proxies of feed efficiency, which can be implemented at farm-level.



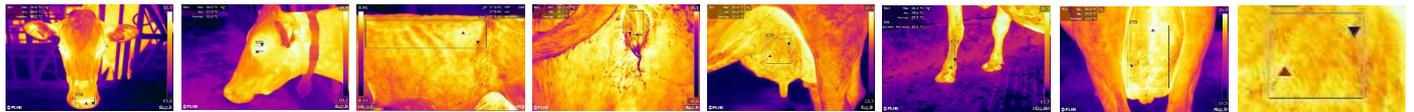
Dairy cows eating on pasture

Objective

- Determination of feed efficiency of Swiss Fleckvieh and Holstein
- Explore use of infrared thermography (IRT) to predict feed efficiency in dairy cows

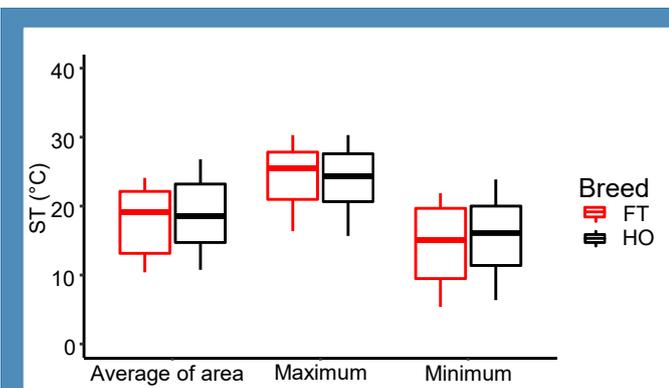
Material and Methods

- 14 Holstein (HO) and 14 Swiss Fleckvieh (FT) cows were investigated at two time points (mid and late lactation).
- Over a 7-day measuring period the individual herbage intake (n-alkane marker method) of each cow was estimated.
- Surface temperature (ST) was recorded (FLIR T620) after morning milking, indoors, at multiple body locations.
- Feed efficiency was measured as Feed Conversion Efficiency (FCE, energy-corrected milk yield / dry matter intake) and Residual Feed Intake (RFI, effective minus required dry matter intake).



ST measurement point of multiple body locations

Results



Boxplot of ST at head of grazing HO and FT

Best 4 regressions : Surface temperature with FCE

Parameter	Flank Left	Ribs Left	Head	Ear
R ²	0.49	0.44	0.40	0.39
R ² Fix Effect	0.52	0.51	0.51	0.50

Best 4 regressions : Surface temperature with RFI

Parameter	Flank Left	Head	Ribs Left	Ear
R ²	0.32	0.32	0.27	0.27
R ² Fix Effect	0.33	0.34	0.32	0.30

Linear correlation between ST and feed efficiency

- Body ST was positively correlated with FCE (R²: 0.01-0.49) and negatively with RFI (R²: 0.00-0.32).
- FCE and RFI were best explained respectively by left flank average ST and left flank average minimum ST.
- Fixed effects (breed and measurement period) were considered, 55% of FCE was explained by backside maximum ST and 43% of RFI was explained by flank average ST and nose average ST.

Conclusions

- A very weak to moderate relationship between surface IRT and feed efficiency was observed.
- ST deviations associated with changes in ambient temperature and humidity could influence the IRT recordings.
- Surface IRT in combination with other proxies (e.g. blood metabolites) could improve prediction for feed efficiency.

