

Continuous estimation of feed efficiency across the lactation

Problem

Feed efficiency is a priority for dairy sector. This is traditionally estimated by residual feed intake (RFI). Yet the current methodology does not provide enough flexibility as predictors may vary during the course of lactation.

Solution

A new methodology based on a multi-trait random regression model that estimates RFI in a dynamic and continuous manner across the lactation.

Outcome

This approach allows a continuous and more precise estimation of the RFI over time, accounting for varying correlations between predictors and free from all time-related issues. RFI for each cow at each day of lactation is estimated as the difference between the actual intake and the intake predicted from the three other traits using the multi-trait random regression model

Practical recommendations

- The model needs continuous repeated measurements (every week or every day) across the lactation, possibly without missing data.
- The amount of data available is important: a sufficient number of cows with enough individual measurements is necessary for the model to work well (reach convergence).
- The model deals relatively smoothly with missing data. However, deduced individual effects that are out-side the range of the actual measurements should not be used as prediction.
- This approach is adaptable, and improvements are possible, for example by adding a pedigree or genomic information that would allow to separate the genetic effect from the environmental effect.

On-farm application

Individual intake measurements are mostly limited to experimental farms for now, therefore it is still difficult to apply the model to the commercial farms. However, it can be adapted and used in a genetic or genomic selection context, with the aim of establishing a genomic selection on RFI.

"GENomic management Tools to Optimize Resilience and Efficiency - GenTORE" is an H2020 project which aims to develop innovative genome-enabled selection and management tools to empower farmers to optimize cattle resilience and efficiency in different and changing environments.
www.gentore.eu



Authors

Pauline Martin, Nicolas Friggens, Vincent Ducroq –[INRAE](https://www.inrae.fr)

Publication

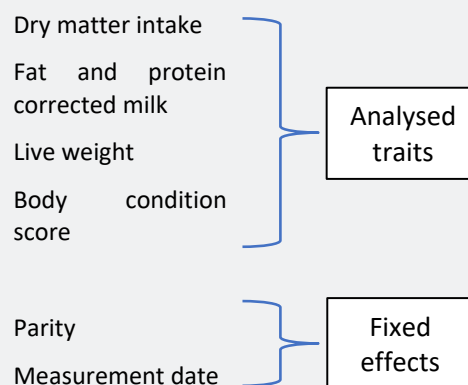
A new method to estimate residual feed intake in dairy cattle using time series data
<https://doi.org/10.1016/j.animal.2020.100101>

Keywords

Correlations, Dynamic approach, Feed efficiency, Lactation, Parameters, Multi-trait Random regression

Application

Predictors used in the multi-trait random regression model



Outputs of the model

RFI for each cow at each day of the lactation
Correlations within predictors across time (including RFI)
Correlations between predictors (including RFI) at each time and across time