

LAMBS –FEED INTAKE & BEHAVIOUR

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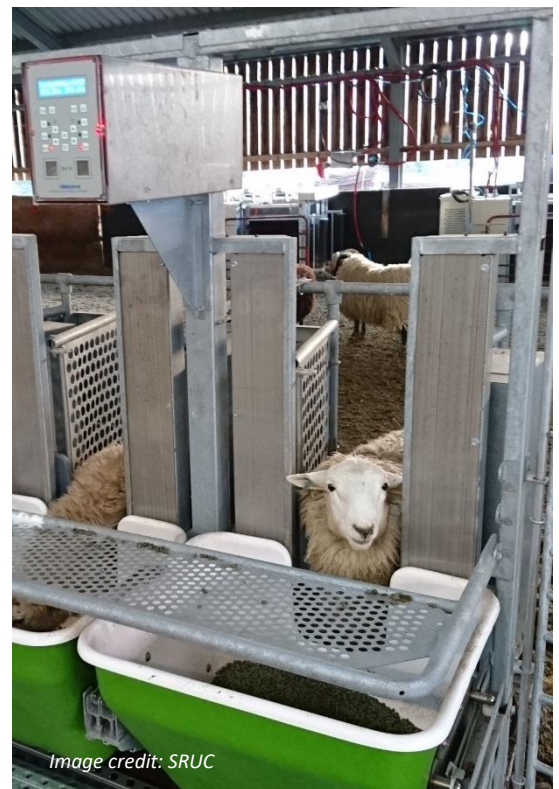
March, 2026

Overview

Experiments held at SRUC Hill & Mountain Research Centre with 239 and 392 lambs showed that 1) lamb body weight can help predict feed intake, and lamb feeding behaviour traits (feeding events, feeding frequency, feeding times) is a promising proxy to feed intake, and that 2) efficient lambs show different feeding behaviours.

Main Findings

- Experiment 1:
 - Lamb feed intake is well explained by average number of feeding events per day along with body weight (BW)
 - Residual Feed Intake is also well explained by average number of feeding events per day and BW, but with lower prediction accuracy than feed intake
 - Regressions including BW and feeding behaviour give higher prediction accuracies for feed intake than models including lamb growth and body composition
- Experiment 2:
 - Efficient lambs (with low Residual Feed Intake) have a lower number of feeding events and lower total feeding duration per day
 - Within each feeding event, efficient lambs have higher feed intake and feed for longer than inefficient lambs
 - There were no breed differences in the number of feeding events or their duration per day



Conclusions

- Recording lamb body weights will help predict feed intake.
- Feeding behaviour (number of feeding events per day) is a promising proxy to consider.
- Feed intake can be predicted more accurately than feed efficiency (RFI)
- Efficient lambs (low RFI) have different feeding behaviour than inefficient lambs (less, larger meals per day; less time spent eating, but longer individual meals per day)

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Introduction

Although ruminants are often mentioned when it comes to greenhouse gas emissions (GHG), for sheep in particular, their diets in Scotland are principally based on forage and grazing, utilising land that would otherwise not be suitable for growing crops or human food. Sheep breeders are keen to include feed efficiency in their breeding programmes, to understand how their animals can maximise the forage ingested on grazing lands. It is therefore important to acquire phenotypes for feed efficiency.

At present, technological tools that can record individual feed intake of animals reared indoors remains too expensive and not applicable to outdoor sheep systems in Scotland and the UK. It is therefore important to find out which proxy measurements could help predict individual feed intake without the need for costly equipment. It is also important to characterise feeding behaviour of efficient lambs as it may have important implications for management strategies aimed at optimising animal health and performance.

Experiment 1 - Proxies for feed intake (FI) in lambs in Scotland

Methods

In this study, 239 lambs (Texel x Scotch Mule) were housed collectively at SRUC Kirkton & Auchtertyre research farms, post-weaning, and fed grass-nuts with automatic feeders that record each individual animal visit (duration and quantity eaten) via electronic identification.

- Six weeks of feed intake (FI) recording after two weeks of adaptation.
- Daily feed intake was averaged over the period of recording, expressed as daily dry matter intake (DMI).
- Lambs were weighed on a weekly basis (bodyweight – BW)
- At the start and end of the experiment, body composition was measured in all lambs with ultrasound (US), and they also were CT-scanned.
- Two criteria of feed efficiency were derived from these measurements: **Feed Conversion Ratio (FCR)** and **Residual Feed Intake (RFI)**.

The data from lambs phenotyped in 2021 ($n = 120$ lambs) were used as the training data set to develop prediction equations, which were validated on the data from lambs phenotyped in 2022 ($n = 119$ lambs).

For all predictions, the R^2 of models (proportion of phenotypic variance explained by the model) are reported for the training and validation sets,

Proxies tested:

Different traits were considered as putative proxies for feed intake and feed efficiency:

- Average daily DMI for feed intake
- Average daily number of feeding events (meals) for feeding behaviour

Results:

- Feed intake was well explained by average number of meals per day along with body weight ($R^2_{\text{train}}=0.80$).
- Regressions including BW and feeding behaviour gave the highest prediction accuracies for feed intake ($R^2_{\text{valid}}=0.78$), higher than models accounting for growth and body composition
- RFI was also well explained by feeding behaviour along with BW ($R^2_{\text{train}}=0.72$; $R^2_{\text{valid}}=0.65$), but with lower accuracy than feed intake
- For feed conversion ratio (FCR), the best predictions were obtained with models using BW, average daily gain and body composition assessed by ultrasound ($R^2_{\text{valid}}=0.58$).

Conclusions

Recording lamb body weights will help predict feed intake.

Feeding behaviour is a promising proxy to consider.

Feed intake can be predicted with higher accuracy than feed efficiency computed at RFI

Experiment 2 – Feeding behaviour in efficient lambs

Methods

In this study, a total of 392 male lambs (Scottish Blackface and Lleyn crosses) over 4 years were housed collectively, post-weaning, at SRUC Kirkton & Auchtertyre research farms and fed grass-nuts with automatic feeders which record each individual animal visit (duration and quantity eaten) via electronic identification.

- Six weeks of feed intake recording after two weeks of adaptation.
- Feeding duration, number of feeding events (bouts), and individual feed intake were recorded.
- Residual Feed Intake (RFI) was calculated for each animal.
- Lambs were classed as 'efficient', 'intermediate', 'inefficient' based on their RFI (lowest, medium, highest, respectively).

Results:

- Feeding duration and number of feeding events per day were lower for the lambs in the efficient group
- Within each feeding event, efficient lambs had higher feed intake and fed for longer than inefficient lambs
- There were no differences between the breeds of lambs regarding the number of feeding events or feeding duration per day.

Conclusions

Efficient lambs have different feeding behaviour than inefficient lambs.

Selecting lambs on their RFI is a useful measure of feed efficiency and feeding behaviour.



Policy Implications

- Recording of feed efficiency in sheep systems is expensive and difficult but provides important insights into optimal strategies to improve flock efficiency, reduce waste and minimise environmental impacts, whilst maintaining production targets.
- Recording of proxies such as live weights and feeding behaviour traits may provide more accessible methods to obtain information on feed efficiency in sheep flocks for use in breeding or management decision-making.

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