Sheep breeding and management strategies to meet future challenges in the Scottish hills

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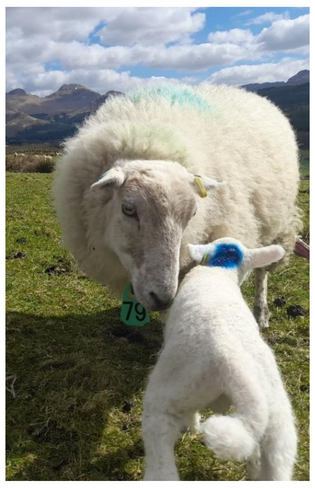
Introduction

Scottish hill and upland sheep are adapted to produce high-quality protein from poor-quality marginal land. With increased focus on climate change, efficiency and environmental impact of livestock production, "*Breeding and managing Scottish hill sheep to meet future economic, environmental and climatic challenges*" assesses genetic selection and/or crossbreeding, alongside management strategies, to achieve these goals.

High genetic merit Scottish Blackface ewe and lamb



Crossbred (Scottish Blackface X Lleyn) ewe and lamb.

Methods

A research flock of 600 hill ewes are being recorded on an extensive hill farm in West Perthshire, alongside environmental parameters. Data will be combined to assess strategies for sustainable hill sheep production.

Experimental plan:

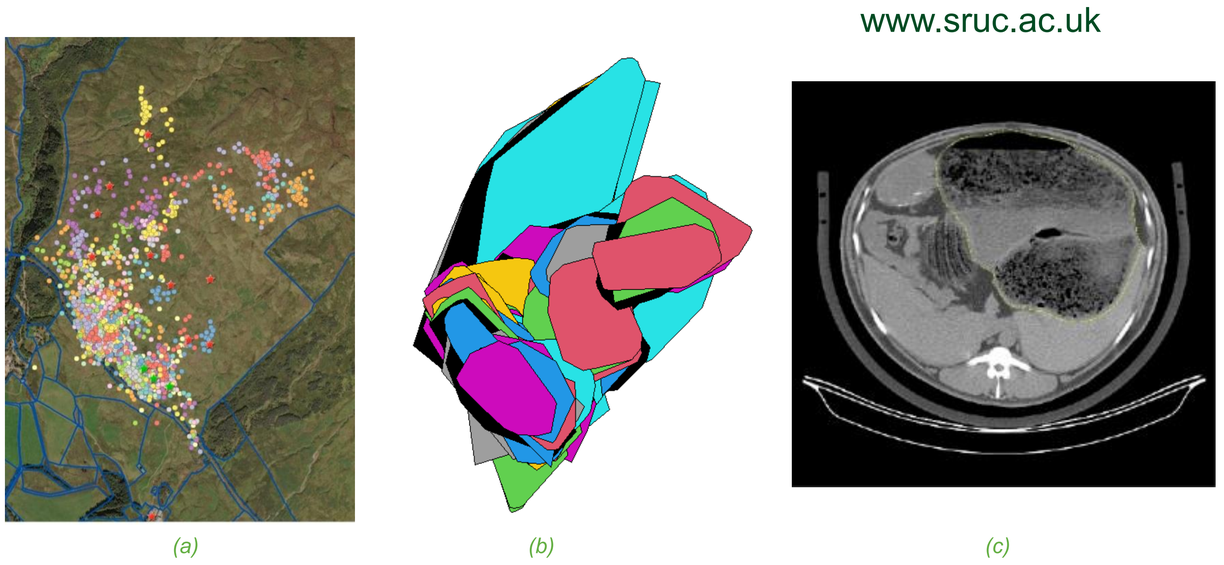
- **High index Scottish Blackface (SBF) ewes n = 200**
- **Crossing SBF x Lleyn as comparison n = 400**
- Genetic selection for:
  - Production
  - Health and welfare
  - Resilience
  - Efficiency
  - Reduced environmental impact
- Monitor:
  - Grazing resource
  - Animal location
  - Biodiversity
  - Environmental parameters (sensors)

Results to date

Ewes (n~600/yr) and lambs (n>2500) have been recorded for pedigree, maternal and lamb performance across 3 production years. Breeding values and selection index values informed breeding stock selection.

Each year, ~100 representative lambs have been recorded for individual feed intake/efficiency and CT scanned to calculate carcass composition and rumen volume (a methane predictor). Preliminary analyses identified significant breed differences and substantial within-breed variation (e.g. Fig.1 shows differences in residual feed intake, RFI). Environmental data collected from on-farm sensors will be combined with production data to assess climate resilience.

To assess grazing patterns and resource use, individual animal locations have been monitored. GPS collars have collected locational data from a sub-set of ~55 ewes on the hill at different times of year. Preliminary differences in grazing location patterns on the hill have been identified across and within breed types.



(a) *(b)* *(c)*

Images resulting from GPS collar (a,b) and CT scanner (c) data collection, allowing quantification of traits such as % time spent on different vegetation communities (a), home range (b) and rumen volume (c) of individuals

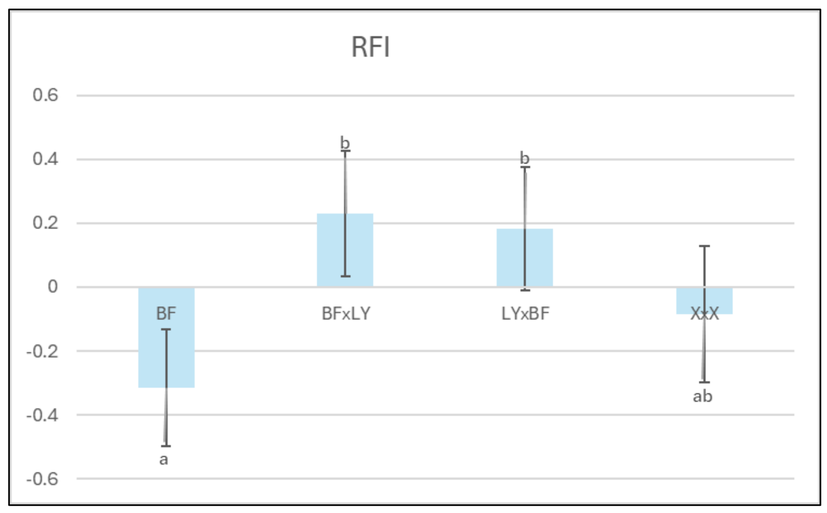
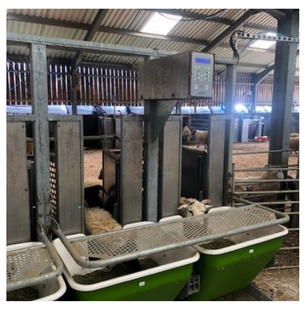
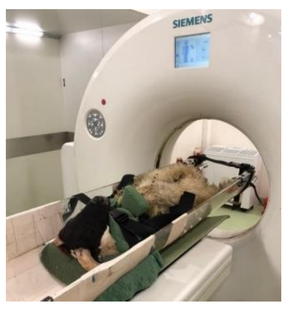


Figure 1: Average residual feed intake (RFI) of different breed types (BF=Scottish Blackface; LY = Lleyn; X = cross between BF and LY) fed grass nuts post-weaning. Lower values suggest greater efficiency at converting feed into an increase in body weight. Bars sharing a common letter (a or b) are not statistically significantly different

Impact

- Project developed and monitored in collaboration with a stakeholder group (farmers, land-managers, levy bodies, industry) with substantial reach across the Scottish sheep industry
- Project data feeds into the national hill sheep genetic evaluations to produce breeding values and selection index values for project sheep that are comparable to commercial flocks
- Transfer of genetic stock between the research flock and other commercial hill flocks in the UK provides an established mechanism for dissemination of improved genetics to industry
- SRUC Hill and Mountain Research Centre provides an unrivalled upland demonstration platform to exchange knowledge with a variety of visiting stakeholders each year
- The aim is to equip hill and upland sheep systems, and associated businesses, with the genetics and management strategies to meet future challenges





Technologies used to record sustainability traits include feed intake recording equipment, CT scanner and GPS collars

Acknowledgements

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