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Farm level emissions and nitrogen use estimates Scottish Farm Business Survey

RESAS
Rural & Environmental Science and Analytical Services

Development of farm level emissions and nitrogen use estimates from the Scottish Farm Business Survey

Pacioli 2023

SAC CONSULTING | Part of Scotland's Rural College (SRUC)

SRUC

SEFARI

Scottish Government
Riaghaltas na h-Alba
gov.scot

SRUC SEFARI RESAS Rural & Environmental Science and Analytical Services

New experimental official statistics

Farm Business Survey 2021-22: Farm level emissions and nitrogen usage - gov.scot (www.gov.scot)

www.gov.scot/publications/farm-business-survey-2021-22-farm-level-emissions-and-nitrogen-usage/

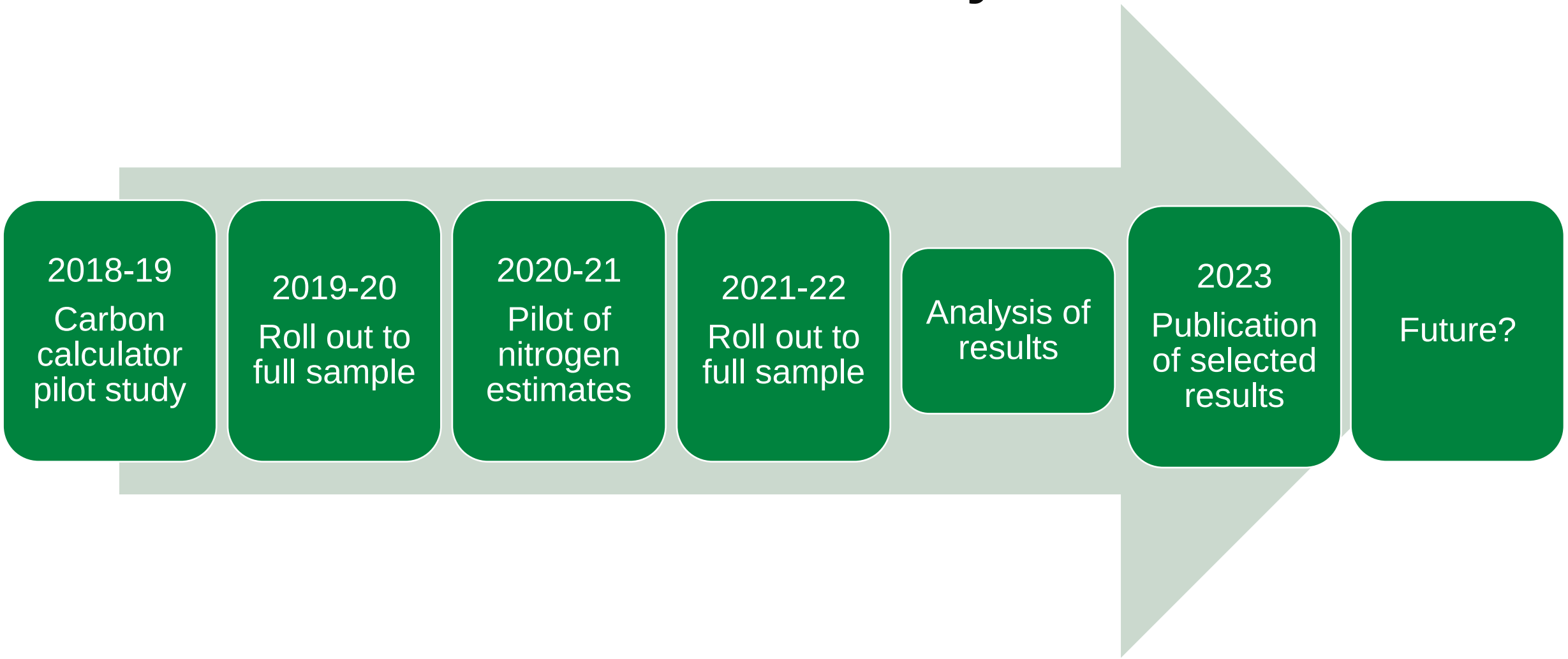
Background

- Scottish Government and SAC Consulting, Scotland's Rural College (SRUC)

- Agricultural policy reform
- Sustainable and regenerative farming
- Climate change plan

- Farm Business Survey
- Impact of measures taken under agricultural policy

Scottish Farm Business Survey



Carbon audit – AgreCalc - www.agrecalc.com

- Developed by SAC Consulting
- Online tool used to calculate resource use efficiency of a farm
  - Emissions for whole farm (and enterprise) and per unit of product
  - Carbon dioxide, Methane, Nitrous Oxide
  - All mainstream agricultural enterprises included
  - Benchmark performance indicators and simulate mitigation measures
- based on the life cycle assessment (LCA) framework
- uses the IPCC Tier I and Tier II guidelines as well as national figures from the UK National Greenhouse Gas Inventory
- PAS2050:2011 certified

Nitrogen estimates

- follows guidance from the EU Nitrogen Expert Panel for assessing nitrogen at farm level
- assumes standard quantities for the nitrogen content of inputs and outputs for each year:
  - It includes estimates for nitrogen in most purchased operating resources and feed, no estimate for farm grown feed/fodder
  - Seed quantities are estimated assuming best practice sowing rates
  - Limited information on type of fertiliser, slurry, FYM, compost, and application methods, manure estimates based on average animal numbers
  - Output estimates are made for crop products (including sale fodder), livestock sold and livestock products
- Does not estimate changing status of nitrogen in soils
- Limited information is available about the use of clover for biological fixation of nitrogen. Organic farms are excluded (around 5%)

Understanding our results

- Communicating differences/limitations
- Confusion with other estimates
- Complex (and little) data
- What are the important outputs?

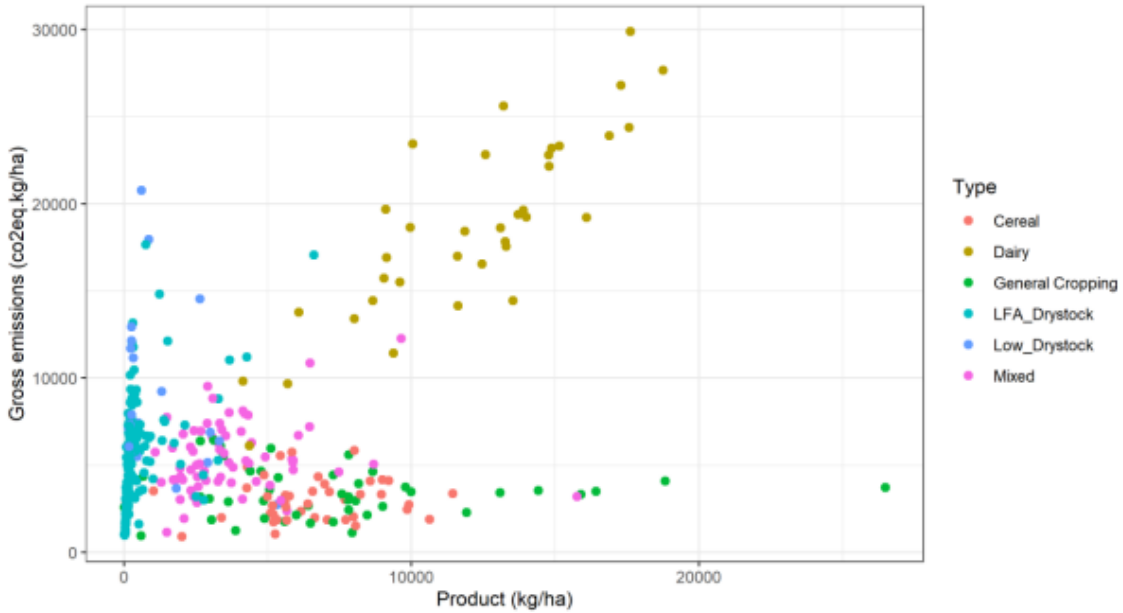
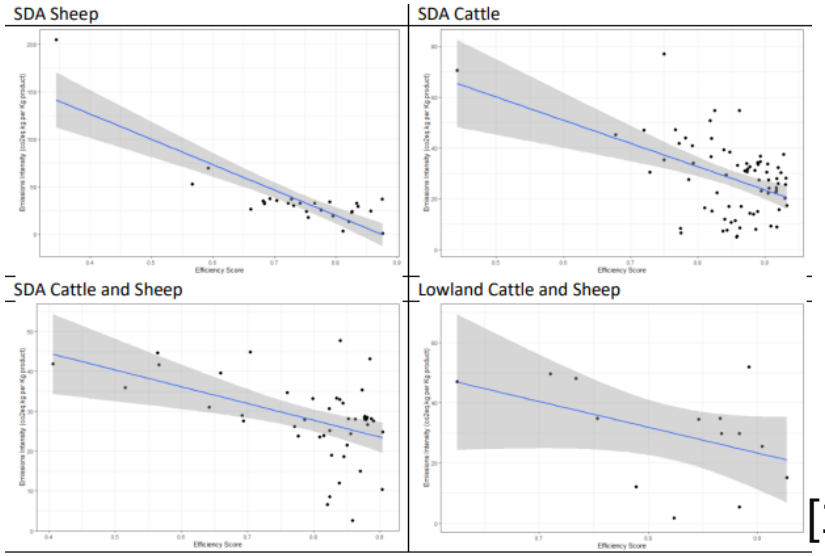


Figure 4 Gross GHG emissions by product produced for all farm types, Kg and kgCO_2e per ha

Greenhouse gas emissions from Scottish farming: an exploratory analysis of the Scottish Farm Business Survey and Agrecalc (ed.ac.uk)

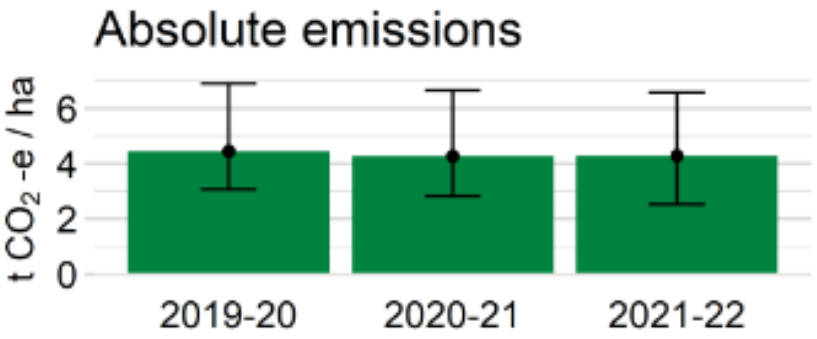
Research and engagement

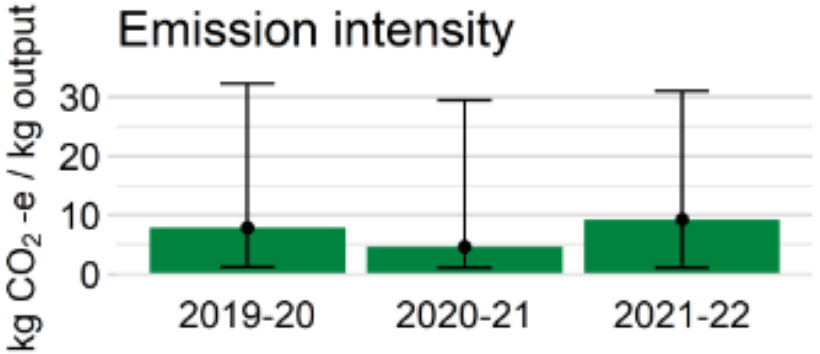
- Greenhouse gas emissions from Scottish farming: an exploratory analysis of the Scottish Farm Business Survey and Agrecalc (ed.ac.uk) https://era.ed.ac.uk/handle/1842/38972
- Exploring the emissions intensity of Scottish sheep and cattle livestock farms — SRUC, Scotland's Rural College [1] https://pure.sruc.ac.uk/en/publications/exploring-the-emissions-intensity-of-scottish-sheep-and-cattle-li
- SEFARI fellowship
- Experimental statistics

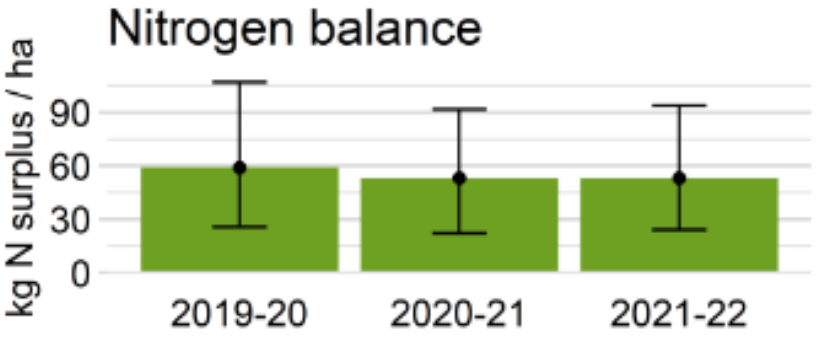


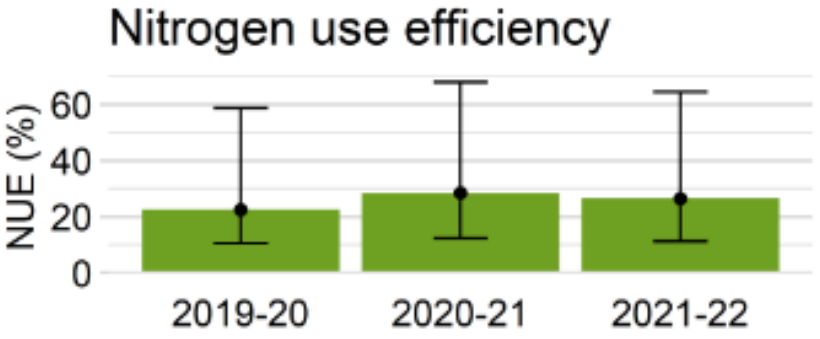
[1]

Focus on key outputs









Results are shown for the average (median) farm.
Error bars demonstrate the spread of data from the lower to upper quartile.

Greenhouse gas emissions have remained stable for the average Scottish farm over the last three years.

The average farm nitrogen balance (the amount of nitrogen that might be lost to the environment) in 2021 is lower than the first estimate made in 2019.

First iteration – future development

- Baseline - monitoring average farm carbon footprint and nitrogen use
- Timeseries of emissions and nitrogen use on real farms
- Estimates for the whole industry and at Scotland level are available through Scottish Greenhouse Gas Statistics and the Scottish Nitrogen Balance Sheet

- Availability of the data for research
- Experimental
- We wish to involve users in our assessment of suitability and quality. If you use this data we would like to hear from you, please get in touch with us at agric.stats@gov.scot.