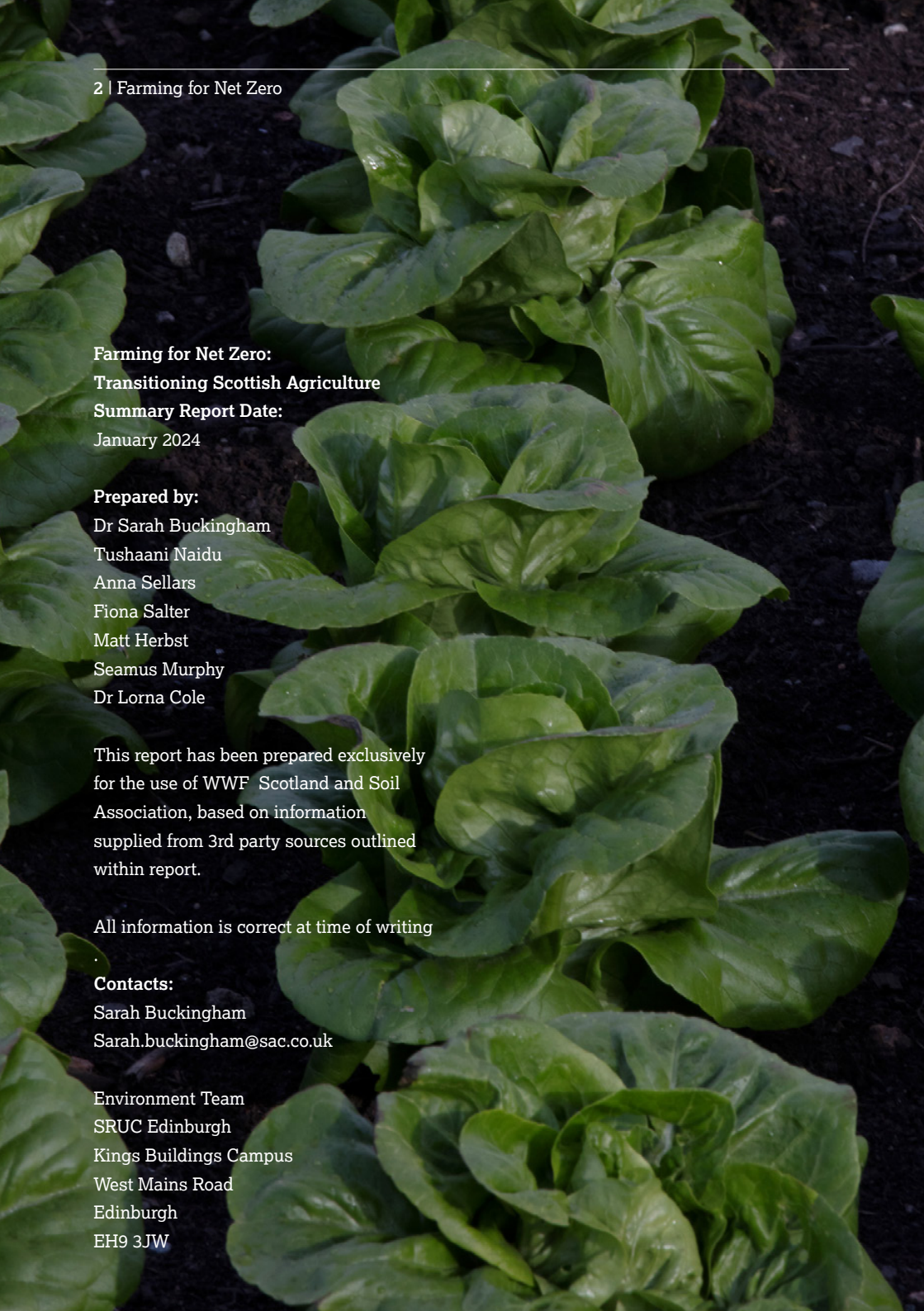
Farming for Net Zero: Transitioning Scottish Agriculture

Summary report
January 2024



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Prepared by:
Dr Sarah Buckingham
Tushaani Naidu
Anna Sellars
Fiona Salter
Matt Herbst
Seamus Murphy
Dr Lorna Cole

This report has been prepared exclusively for the use of WWF Scotland and Soil Association, based on information supplied from 3rd party sources outlined within report.

All information is correct at time of writing .

Contacts:
Sarah Buckingham
Sarah.buckingham@sac.co.uk

Environment Team
SRUC Edinburgh
Kings Buildings Campus
West Mains Road
Edinburgh
EH9 3JW

Introduction

Scotland's farmers and crofters are key to restoring nature, reducing emissions, and supporting rural communities while working to produce food and other goods.

As our dominant land use, agriculture has a vital role to play as part of the solution to climate change and nature loss. Although some land managers have taken steps to manage their land in climate- and nature-friendly ways, Scottish agriculture remains our second biggest emitter of greenhouse gas emissions and a leading cause of nature loss. To remain on track to reach net zero as a nation by 2045, the sector will need to make dramatic reductions in emissions in the coming years.

Farmers and crofters cannot be expected to respond to this challenge alone. New and ambitious agricultural policy must provide stability to farmers and crofters and support them to reduce emissions and restore nature while continuing to produce nutritious food.

The Agriculture and Rural Communities (Scotland) Act, which was passed by the Scottish Parliament in summer of 2024, set out the framework for how public money will be used to support Scottish farmers and crofters in the future. Over the next year, decision-makers have an opportunity to ensure that the policy mechanisms delivered through this legislation support a thriving, resilient, and productive agriculture sector in a net zero Scotland. This will include changing how agriculture is funded, ensuring that all farmers can take positive steps to decarbonise, reduce dependence on external inputs, and weave nature back into their farmland.

Agricultural Reform in Scotland

The Agricultural Reform Route Map published by the Scottish Government focuses on sustainable and regenerative agricultural practices as the criteria to deliver support payments for farmers.

For this report, a three-phase review of the scheme was carried out to:

i. Analyse the proposed four-tier scheme design
ii. Evaluate funding requirements across the proposed scheme design, and
iii. Investigate the scale of uptake required to meet net zero targets

The recommendations set out in this report are a first step in developing a meaningful response to the policy questions facing Scottish agriculture. This report analyses the Scottish Government's Agricultural Reform List of Measures and reveals a mix of practices that are already supported by the Basic Payment Scheme or could be easily implemented, as well as challenging interventions that will require additional funding which sit on Tier 2 and above.


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Agri-reform measures mapped to the proposed 4-Tier payment scheme

Agri-Reform Measure	Included in Tier 1 Basic Payment	Optional within Tiers 2+
Winter cover	Yes	Yes
Minimum/No Tillage	No	Yes
Efficient / Reduced use of inorganic fertilisers and lime	Yes	Yes
Efficient / Reduced use of synthetic pesticides	Yes	Yes
Use of N fixing crops	No	Yes
Diversify crop rotation and break crop rotation period (esp. for root crop)	Yes	Yes
Inter-cropping, under-cropping and mixed cropping (e.g. peas and barley) and avoid monoculture	No	Yes
Arable/ley rotations (transition from arable to arable/livestock mix)	No	Yes
Biodiversity cropping and silvo-arable systems	No	Yes
Silvo-arable systems	No	Yes
Diverse sward species content (legumes-herb-grass mixtures) and use of herbal leys	No	Yes
Regenerative grazing (mob, strip, adaptive multi-paddock grazing) on improved grassland	No	Yes
Bird friendly Crop Operations	Yes	Yes
Silvo-pastures	Yes	Yes
Arable and Silage/Hay Crop Margins	Yes	Yes

Agri-Reform Measure	Included in Tier 1 Basic Payment	Optional within Tiers 2+
Water Margins	No	Yes
Retain and Enhance in Field Biodiversity Cropping and Features	No	Yes
Enhance existing Hedgerows	Yes	Yes
Manage Grazed Habitats	Yes	Yes
Retain Traditional Cattle	No	Yes
Summer Hill Cattle Grazing	No	Yes
Introduction of Small-Scale Tree and Shrub Planting	No	Yes
Supporting and incentivising improved beef cattle nutrition	Yes	Yes
Supporting and incentivising genetic improvement of beef cattle	Yes	Yes
Support maintaining and improving beef cattle health	Yes	Yes
Supporting appropriate uptake of feed products which reduce enteric methane emissions in beef cattle	No	Yes
Supporting and incentivising improved dairy cattle nutrition	Yes	Yes
Support and incentivise genetic improvement of dairy cattle	No	Yes
Support maintaining and improving dairy cattle health	Yes	Yes
Supporting appropriate uptake of feed products with reduce enteric methane emissions in dairy cattle	No	Yes
Supporting and incentivising improved sheep nutrition	Yes	Yes
Support and incentivise genetic improvement of sheep	No	Yes
Support maintaining and improving sheep health	Yes	Yes

The report highlights a lack of data availability and guidance. This is primarily due to the complexity of measures, as they are dependent on interactions with ecological systems, available equipment, technology, technical knowledge and financial capacity.

While the report lists the top measures based on their greenhouse gas abatement potential, data gaps mean that not all measures are directly comparable. Therefore, it is crucial to understand the underlying assumptions and uncertainties for more accurate and meaningful comparisons.

An evaluation of the abatement potential, economic cost, and quality of evidence reveal certain measures are low hanging fruits. This includes reducing synthetic inputs, diverse swards and better livestock nutrition as well as genetics. Barriers to uptake will remain a challenge. Limited trials of these measures in Scotland increase the perceived risk of implementation, along with upfront costs and initial yield reduction amid tough market conditions. These barriers must be considered and addressed to ensure a successful roll out of the Agriculture Reform framework and reduce farmer resistance to these schemes.

Key Considerations

- Available data varies across different spatial and temporal scales, which can result in difficulties making standardised comparisons.
- Some agri-reform measures are difficult to measure and monitor due to the complexity of these systems, large variability in application, and difficulties in accounting for interactive effects on GHG emissions.
- Data availability ranges across the agri-reform measures and so some datasets are more robust than others or provide greater insight into the associated underlying uncertainties within the available data. Conflicts between data reported can be challenging to unpick without detailed understanding of method and parameters of models used.
- There are practical and financial challenges in collating raw field GHG data.
- GHG fluxes and soil carbon sequestration potential vary temporally and spatially, therefore, require high replication of sample points to provide meaningful representation and statistical robustness of outputs.

- GHG mitigation potential of individual measures is difficult to measure in the field as these management practices are rarely conducted in isolation and there are interactive effects from the mixture of practices applied annually as well as legacy effects from past management.
- Where individual mitigation potentials are estimated, there are challenges when attempting to estimate the combined and cumulative effects from a collection of management practices being applied. In addition, the interactions within food production systems where there is a lack of standardised approaches for quantifying GHG emissions, carbon capture potential and overall environmental sustainability index for a particular product. For example, conversion to organic might reduce a farm's carbon footprint, but due to lower yields may actually increase carbon per unit output. There are also discrepancies in what the unit output should be to best represent 'sustainability' within agricultural practices.

In addition to the challenges associated with quantifying mitigation potential, the report also highlights several practical barriers that may hinder the uptake of agri-reform measures, such as;

- A lack of underlying data/knowledge to provide effective guidance to land managers. This can lead to a lack in confidence in terms of the effectiveness of a particular practice and therefore have increased risk associated with its implementation. Inconsistent evidence.
- A lack of communication, guidance and advice to provide education/ understanding of how best to incorporate/implement new/different practices.
- Risks associated with costs and productivity that management changes and adopting new practices/approaches may have (e.g. loss of crop yield). This could include market volatilities which may lead to reluctance.
- A lack of legislative support and government incentives.
- Limited opportunity to change practices (E.g. tenancy/ownership, lack initial investment costs).
- A reluctance towards changes due to personal opinions and circumstances.

Recommendations

1 More monitoring of on-farm activities

Further implementation of evidence- driven mitigation approaches are needed if net zero targets are to be achieved. To better grasp the scale of uptake required to make significant contributions to net zero there needs to be further data captured in relation to current on-farm activities in relation to the agricultural reform measures and management practices contributing to greenhouse gas mitigation. If the current rate of uptake is better understood, then more targeted efforts can be made in relation to developing on-farm greenhouse gas mitigation and removal strategies across different land uses.

2 Further research into emissions associated with agricultural reform measures

There is currently little quantitative evidence on the long-term effectiveness of greenhouse removal strategies outlined, this is most likely due to the risk of implementing a potentially high cost, high uncertainty strategy. Therefore, further research is needed to evaluate efficacy, longevity of effectiveness, potential negative side-effects, knock-on effects and tradeoffs as well as financial investments required.

3 Addressing barriers to uptake and supporting the adoption of new and different practices across farm types

There is a need to better understand barriers to uptake in order to develop and implement strategies to drive further uptake of greenhouse gas mitigation approaches. This can be achieved through further education and consultancy services. Financial support from government and associated agencies will likely be needed to encourage and assist with the adoption of new and different management practices, particularly where additional resources or new technologies are required. Further research, guidance, and technical capacity development support should be implemented in tandem to ensure schemes are fit for purpose and successful in delivering resilient, sustained low carbon farming.

Click here to read the full report

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