Output of EIP Projects Template

TITLE: Future Farming Scotland

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PROJECT COORDINATOR: Soil Association Scotland

PROJECT PARTNERS: N/A

PRACTICE "ABSTRACT" SUMMARY

Future Farming Scotland (FFS) was a knowledge, skills and innovation programme for farmers and crofters across Scotland interested in using sustainable management practices for productive and profitable farming and land use.

FFS involved the delivery of knowledge transfer and skills development events – farm-based 'walk-and-talk' events and interactive workshops – and related information and dissemination activities. The emphasis was on low-input and low carbon farming practices focusing on soil, nutrient and grassland management, animal health and productivity, woodland creation and management, and organic farming techniques.

FFS also delivered field labs – a farmer-led approach to practical research and development – which brought together small groups of farmers with a researcher or facilitator to trial sustainable solutions for overcoming practical challenges in the field. (Watch a video here[1])

The overall outcome was to encourage the implementation of practices which were good for business, the environment and climate. Evaluation of FFS shows that: 88.7% of participants (over 1,000 land managers) had either implemented/or intended to implement sustainable land management practices as a result of participating in FFS; and that the total area of farmland where management practices had been implemented covered over 830 square miles.

[1] https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/field-labs/mob-grazing-scotland/

KEYWORD CATEGORY: Farming practice

PROJECT STATUS: Completed

MAIN FUNDING SOURCE: Rural Development

PROJECT PERIOD: 1 September 2015 to 31 October 2018

GEOGRAPHICAL LOCATION: All local authority areas in Scotland

TOTAL SPEND: £458,370

FINAL REPORT: follows next

Soil Association Scotland's Farming for the Future Knowledge Transfer Programme

Final Report for KTIF-001-2015

July 2019

CONTENTS

PROJECT TITLE / APPLICANT

1.1 Title

Future Farming Scotland: KTIF/001/2015.

1.2 Overview of Soil Association Scotland

The Soil Association, established in 1946, is the UK's leading charity working for healthy, humane and sustainable food, farming and land use. The Soil Association is registered with the Charity Commission for England and Wales, charity number 206862 and with the Office of the Scottish Charity Regulator, charity number SCO39168.

The Charity has a wholly owned subsidiary Soil Association Certification Limited, the UK's largest organic certification body. This is run as a not-for-profit company that delivers parts of the Charity's strategy and also generates financial returns that are put back into the Charity's wider work. It also audits other schemes including FSC and PEFC forestry standards.

The Charity is a company limited by guarantee and governed by Articles of Association. The governing body of the Charity is the Board of Trustees, who are also the directors for the purposes of company law. The Soil Association (charity and certification body) currently employs around 240 people across the UK, with 22 full-time equivalent staff based in Scotland. Income to the Charity for the financial year 2017/18 was £6,306,539, with around 10% of that income attributable to Scotland. Income is received from a range of sources including government grants, trusts and foundations, lottery, programme partner organisations and private donations.

Soil Association Scotland was created in 2002, to provide a focus for the Charity's work in Scotland. The Charity has a long and successful track record of working with the Scottish Government and partners organisations to deliver programmes of work around food, farming and land use. These programmes aim to demonstrate and enable practical solutions for transforming the way we way eat, farm and care for the natural world. Soil Association Scotland's current programmes include:

- Farming with Nature – a knowledge transfer programme aimed at farmers and crofters, which promotes 'win-win' land management practices to benefit business and the environment. (Jointly funded by the Scottish Government and the European Union, with partner funding from RSPB Scotland and Scottish Water.)
- Farming for the Future – a knowledge transfer and innovation programme aimed at land managers, which promotes low-input and low carbon land management and farming practices. (Jointly funded by the Scottish Government and the European Union, with partner funding from Quality Meat Scotland, Forestry Commission Scotland and Innovative Farmers.)
- Rural Innovation Support Service – a service which brings the right people together to help farmers and crofters across Scotland to and get their innovative ideas for solving a business challenge or develop a new opportunity off the ground. (Delivered as part of the Scottish Rural Network in partnership with Scotland's Agricultural Organisation Society (SAOS), SAC Consulting and Scottish Food and Drink.)
- Food for Life Scotland – which supports local authorities across Scotland to put more local food on the table and serve fresh, healthy, and sustainable meals in their schools through the Food for Life Served Here award. (Funded by the Scottish Government.)

2. EXECUTIVE SUMMARY

Future Farming Scotland (FFS) was a knowledge, skills and innovation programme aimed at individuals across Scotland working in the primary agriculture sector. FFS was managed and delivered by Soil Association Scotland and ran from 1 September 2015 to 31 October 2018. FFS was funded by the Scotland Rural Development Programme (SRDP) Knowledge Transfer and Innovation Fund (KTIF), which is funded by the European Agricultural Fund for Rural Development (EAFRD) and the Scottish Government. Co-funding was provided by Forestry Commission Scotland, Quality Meat Scotland and Innovative Farmers.

The purpose of FFS was to encourage and support the adoption of low-input and low carbon land management practices, and deliver a range of benefits for farming and the environment. The over-arching twin aims of FFS were to:

1. Build a strong knowledge and skills base for productive, profitable and sustainable agriculture and land use.
2. Increase the economic and environmental performance of Scotland's farms and crofts.

FFS was designed to meet industry need, and support SRDP, EAFRD and partner organisation priorities. FFS involved the delivery of expert-led knowledge transfer, innovation and skills development events (farm-based 'walk-and-talk' events, interactive workshops and field labs) and related information and dissemination activities. Topics focussed on soil, nutrient and grassland management, animal health and productivity, woodland creation and management, and organic farming techniques.

Over 1,200 farmers, crofters and other land managers participated in FFS events and activities across Scotland. An independent evaluation of FFS was undertaken to measure the effectiveness of the programme in meeting its aims and objectives. Overall, FFS has been a successful programme, especially in support of Aim 1 to build skills and knowledge. Key findings show that:

- FFS was valued by participants as providing high quality knowledge transfer events across various farming / land management topics
- There is strong evidence of marked increases across knowledge, ability / skills and confidence (particularly knowledge) amongst FFS participants.
- Results overall highlight a positive picture in terms of motivation and intention to adopt sustainable practices, and change in attitudes towards sustainable practices, especially in relation to biodiversity and climate change.
- Environmental and economic benefits from land management practice changes can be anticipated, but are too soon to properly observe.

An internal survey undertaken 6 months after the independent review, revealed that 88.7% of participants (over 1,000 land managers) had either implemented/or intended to implement sustainable land management practices as a result of participating in FFS; and that the total area of farmland where management practices had been implemented covered over 830 square miles.

The independent evaluation highlighted a range of recommendations based on lessons learned to inform future work including; encouraging repeat attendance/longer-term engagement with land managers; developing activities around harder to engage with topics e.g. sustainable management of on-farm water resources and pollution; and exploring how to develop indicators and monitoring protocols to track changes in land management over longer periods of time.

The most important lesson learned by Soil Association Scotland has been the value of a robust, independent evaluation to inform and improve programmes of work.

3. PROJECT DESCRIPTION

Summary

Future Farming Scotland (FFS) was an award-winning knowledge, skills and innovation programme aimed at people working in the primary agriculture sector across. The programme ran from 1 September 2015 to 31 October 2018. (An extension of two months to the original end date was approved by the Scottish Government.) The purpose of FFS was to encourage and support the adoption of low-input and low carbon land management practices to benefit farming and deliver a range of longer-term economic, environmental and social benefits.

FFS was delivered by Soil Association Scotland in partnership with Quality Meat Scotland, Forestry Commission Scotland and Innovative Farmers (a Soil Association UK-wide programme). FFS involved the support of a wide range of other organisations including NFU Scotland, James Hutton Institute, Cairngorms National Park and Woodland Trust Scotland.

Activities

FFS involved the delivery of knowledge transfer and skills development events and related information and dissemination activities, which encouraged farmers and crofters to think differently and try new ways of doing things. The emphasis was on low-input and low carbon farming practices focusing on soil, nutrient and grassland management, animal health and productivity, woodland creation and management and organic farming techniques. In addition, FFS ran a series of field labs – a farmer-led approach to practical research, development and innovation.

Events and workshops: these were practical farm-based events and interactive workshops held at locations around Scotland designed to encourage discussion, knowledge sharing and peer-to-peer learning. Each event / workshop was led by expert speakers/facilitators and accommodated between 10–25 people. Farm-based events were a mix of one-day and half-day formats and featured presentations from expert speakers and a Q&A session, followed by a farm-based walk and talk to showcase best practice in action. Interactive workshops were held at indoor venues and provided practical hands-on activities around soil testing and analysis.

Conferences: these were one day annual events which brought together large groups of farmers, industry bodies and experts together to promote knowledge transfer and exchange with a focus on topical subjects around low-input and sustainable farming.

Field labs: these brought together small groups of farmers with a researcher or facilitator to trial potential solutions for overcoming practical on-farm challenges. Labs were led by farmers with input from expert facilitators/researchers, aimed. Typically, the same group of farmers would meet 3-4 times over the life-time of the lab (usually 12-18 months) to follow the progress of testing novel/innovative management practices in the field.

Advice and guidance: sign-posting to further guidance and advice was offered to all FFS participants to encourage and support the implementation of new management practices. This was provided at events and by phone and e-mail. Contacts and links to access further guidance and advice was also emailed to participants who said they wished to receive further information.

Resources: bespoke information packs were produced for each event / workshop containing copies of presentations, fact sheets, further reference sources, case studies and information about the host farm/agricultural business.

Communications: this involved using a range of sources to promote all aspects of FFS including social media; editorial industry journals; case studies and short films; and attendance and presentations at external events e.g. Royal Highland Show.

Monitoring and evaluation: the internal M&E framework involved collecting quantitative and qualitative information to measure and report the progress of the FFS activities against KPIs and targets, and evaluating evidence-based impacts and outcomes using affordable and appropriate methodologies. An independent study was commissioned to provide an impartial evaluation.

Opportunities and problems addressed

Future Farming Scotland (FFS) was informed through direct engagement with farmers and key stakeholders (including NFU Scotland, Quality Meat Scotland, Innovative Farmers and Forestry Commission Scotland) and designed to address SRDP and EU-RDR priorities. The programme focused on knowledge transfer activities which promoted evidence-based best practice to support industry demand, and address a range of key economic, environmental and social issues affecting Scottish farmers and crofters.

Industry

Soil, nutrient and grassland management

Good soil, nutrient and grassland management are fundamental building blocks for productive and sustainable farming, and a vital component in the regulation of ecosystems services. In particular, a key objective of FFS was to increase farmers' knowledge, skills and understanding to be able to identify and resolve issues which affect their own soils, and improve its health, productivity and sustainability.

The Scottish livestock sector accounts for around 50% of all agricultural output, 80% of land used for agriculture, and delivers important economic and social benefits especially in fragile rural areas. The rough pastures and grasslands used for low input extensive livestock systems also sequester and store huge amounts of carbon. A key priority for the livestock sector is to increase its productivity and profitability and continue to reduce its carbon footprint in a changing climate and economic landscape.

Woodland creation and management

There is increasing interest amongst farmers and crofters in the multiple environmental and economic benefits afforded by trees on farms and crofts – protection from soil erosion, shelter for livestock and crops, pollution abatement, provision of wood fuel, habitat for wildlife and timber/wood for sale etc. FFS aimed to raise awareness of the economic and environmental benefits of trees on farms and crofts as a holistic package to farmers and crofters using the guiding principle "the right tree in the right place".

Organic farming

FFS supported the SRDP National Priority for organic farming by raising awareness of and encouraging interest in organic production across all appropriate programme activities. Organic principles under-pinned many of the practices – e.g. using green manures – promoted by FFS.

Environmental

Soil and water quality

Erosion and climate change are cited by the Scottish Soil Framework as the biggest threats to Scotland's soils. Climate change will also exacerbate soil erosion, pollution and flood damage, but the threats can be minimised if appropriate strategies are adopted.

Farms which increase their soil organic matter should improve water retention and drainage, and reduce the risk of soil erosion, flooding and diffuse pollution into freshwater and marine bodies. Evidence shows that trees on farms can also deliver these benefits and in addition help absorb harmful ammonia emissions from livestock.

GHG emissions

The agricultural and related land use sector in Scotland accounts for around 22% of total GhG emissions. Emissions from the agriculture sector are largely non-CO_2 gases, with half due to nitrous oxide (N_2O) and around 40% due to methane (CH_4). The main cause of agricultural N_2O emissions is the application of synthetic fertiliser to agricultural soils.

Farms which adopt alternative techniques including nitrogen-fixing legumes, green manures and crop rotation should reduce their direct N_2O emissions. CH_4 emissions originate from livestock production. Best practice advice suggests that livestock farms which improve their efficiency and productivity across the business can also improve their on-farm carbon balance.

Farms which increase the use of organic fertilisers and fertility-building leys with legumes and cover crops, should further the production of soil organic matter which removes CO_2 from the atmosphere and stores it in the soil. Ensuring the viability of extensive livestock farms will help maintain significant carbon stores in rough pasture and grassland. Farms that plant trees should improve their on-farm carbon balance and make a valuable contribution to the Scottish Government's woodland planting objectives.

Biodiversity

Low-input and organic farming practices promoted by FFS rely on diverse ecosystems to keep farms resilient to pests and climatic challenges and maintain soil fertility, which in-turn protect agro-ecosystem services and support biodiversity. Environmentally-friendly management practices promoted by FFS – e.g. using clover leys – should reduce the need for artificial fertilisers and pesticides that cause diffuse pollution, and are beneficial for wildlife including natural predators and pollinators.

Non-intensive livestock farming plays a key role in maintaining iconic landscapes and wildlife habitats throughout Scotland, particularly in the Highlands and Islands where much of the land is classed as High Nature Value. Farms which create new native woodland will provide valuable habitat for a wide range of wildlife including pollinators and natural predators.

Economic

A key objective of FFS was to promote the reduced use of externally purchased inputs (including synthetic fertilisers, feed concentrates, etc.) by increasing recycling, re-use and efficient management of existing on-farm resources. All farms which adopt these principles should be able to demonstrate a range of tangible economic benefits including immediate financial savings as well as longer-term positive business impacts.

Productive on-farm woodland provides a range of commercial and cost saving opportunities: biomass for on-farm energy use; timber and wood fuel for sale; wood chip for livestock bedding and timber for fencing; cost-effective shelter and shade for livestock; and wind-breaks to reduce damage to crops.

Social

FFS aimed to help to reduce isolation amongst Scotland's farming community. Many farmers who have participated in previous Soil Association Scotland programmes commented on the social

aspects afforded by events, and welcomed the opportunity to meet-up, chat and mix with other members of the farming community.

Based on our previous experience, we anticipated that young people, women and those new to farming would be well represented – helping to address age and gender imbalances, keep young people in sustainable farming and support generational renewal and entrepreneurship.

4. FINANCE

Sum awarded

The total budgeted cost for FFS was £460,727. A maximum KTIF grant of £345,545 (75% of total costs) was awarded with co-funding provided by Quality Meat Scotland, Forestry Commission Scotland and Innovative Farmers.

There was a small underspend of £2,003.79 on the KTIF grant which represents less than 0.6% of the grant. This underspend on grant was due to the actual costs for the independent evaluation and event materials costing slightly less than originally budgeted.

Detail of spend

Spend on KTIF/01/2015 over lifetime of the programme

Project Development	
Agricultural Development Managers	£54,994
Delivery	
Agricultural Development Managers	£136,045
Recruitment	£550
Telephone	£1,813
Management	
Management, finance, evaluation and reporting staff	£26,161
Administration	
Project Officer	£38,787
Speakers' fees	
Expert speakers/facilitators	£48,134
Host farmer	£1,966
T&S	
Project staff travel and subsistence	£18,841
Event costs	
Venue hire & catering	£20,489
Materials	
Resources for events	£14,994
Films, website content etc	£2,291
Publicity	
Adverts for events	£16,635
Communications Officer	£20,773
Evaluation	
External study and evaluation	£15,545
Sub Total	**£418,018**
In-kind	
Provision of technical expertise	£6,800
Provision of expert speakers/facilitators	£20,300
Provision of farming expertise for events	£5,625
Provision of resources/materials	£2,925
Provision of IT, HR, Finance	£4,700
Sub Total	**£40,350**
GRAND TOTAL	**£458,368**

5. AIMS AND OBJECTIVES

Future Farming Scotland (FFS) had two key aims and associated objectives.

Aim 1 and objectives: build a strong knowledge and skills base for productive, profitable and sustainable agriculture and land use amongst Scotland's rural communities by:

- Reaching and engaging new audiences of farmers, including new entrants and young people, to build their knowledge and skills for low-input and sustainable farming.
- Encouraging and enabling continuous professional learning and development for all farmers.
- Facilitating knowledge exchange, mentoring, networking and collaboration between farmers.
- Fostering and supporting farmer-led innovation.

Aim 2 and objectives: increase the economic and environmental performance of Scottish agriculture by promoting and supporting the practical implementation of actions which:

- Improve long-term business viability.
- Reduce use of external inputs.
- Increase on-farm efficiency.
- Improve animal health and welfare.
- Protect and enhance agro-ecosystems and biodiversity.
- Cut greenhouse gas emissions and sequester carbon.

6. PROJECT OUTCOMES

6.1 How aims / objectives were achieved

An independent evaluation[2] was commissioned by Soil Association Scotland to examine the effectiveness of the KTIF-funded Future Farming Scotland (FFS) programme in achieving its aims and objectives. The evaluation was undertaken by Collingwood Environmental Planning Limited (CEP), a consultancy specialising in strategic and practical sustainability issues. The evaluation looked at:

- **Key processes**
  - The different types of FFS events (one-off events, field labs); and
  - Information resources produced to support FFS events.
- **Key outcomes:**
  - Changes in knowledge, skills / ability and confidence amongst participating farmers and land managers;
  - Adoption of best-practice actions / sustainable land management techniques;
  - Delivery of related environmental impacts / benefits.

The evaluation shows strong evidence in support of meeting aim 1 and its objectives for building skills, knowledge and innovation, but provides a more mixed picture for aim 2 to improve environmental and economic performance.

CEP notes that some of the outcomes for the latter are more likely to be longer term and are therefore too soon to measure. CEP also notes that some objectives (e.g. reducing reliance on external inputs such as nitrogen-based fertiliser) appear harder to address.

[2] Dr. P. Phillips, I. Cotton and W. Sheate: Evaluation of Soil Association Scotland's Knowledge Transfer Programme - Future Farming Scotland. Collingwood Environmental Planning, July 2018

The evaluation was organised according to a project logic model (updated by CEP to include change in attitude, intention and behaviour), evaluation framework, and theory of change (developed from a targeted literature review). This was used to inform all the evaluation activities, particularly with regards to designing data collection, conducting data analysis and reporting. Key evidence in this section have been extrapolated from the CEP evaluation.

The evaluation framework was structured according to the main components of the evaluation logic model and theory of change. These included an evaluation of FFS activities, outputs, short-term outcomes (6 months – 1 year), medium-term outcomes (1-3 years) and impacts (>3 years).

Key outputs delivered – events and topics

FFS covered a wide variety of topics in a variety of locations (including upland / Less Favoured Area, island, lowland) and land capability for agriculture contexts (CEP key finding 1).

Figure 1: location of FFS events delivered by event type

The map (figure1) was prepared by CEP using secondary data provided by SAS and the online software ScribbleMaps. Blue pins = one-off events; green pins = field labs; blue pins with green top = locations where both one-off events and field labs have been held).

See the following annexes for description of each event

Annex 1: Soil management events
Annex 2: Grassland and nutrient management events
Annex 3: Woodland management and creation events
Annex 4: Field labs

Table 1 presents the total number of events delivered during the lifetime of the programme by event type (one-off event, field lab) and topic.

Table 1: events delivered by type and topic

Topic	Number of events delivered					
	One-off		Field labs		Total	
	No.	%	No.	%	No.	%
All topics	**40**	**69**	**18**	**31**	**58**	**100**
Soil management	20	50	6	33.3	26	45
Nutrient and grassland management / animal productivity and health	7	17.5	12	66.7	19	33
Woodland creation and management	13	32.5	0	0	13	22

Data captured by CEP highlights the following:

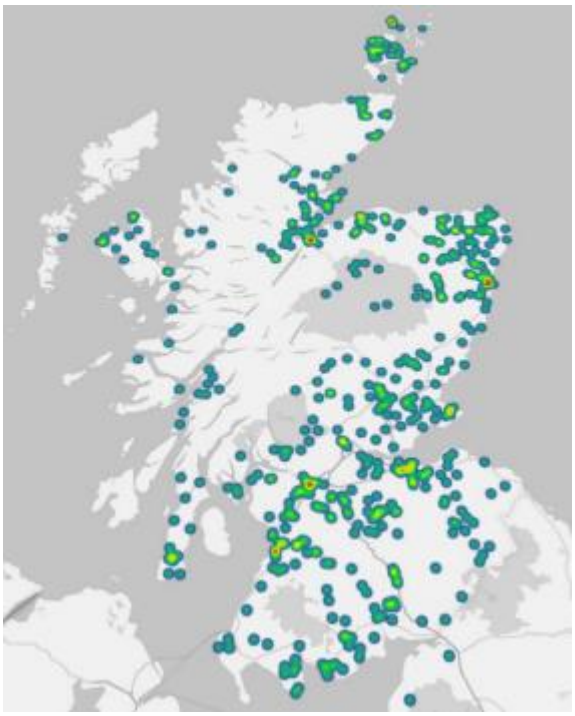
- A total of 58 events (one-off and field lab) have been delivered (an average of circa 19 events per year)
- More than twice as many one-off events have been delivered as field labs (69% to 31% of events respectively)

- Across both event types, ‘soil management’ was the topic covered most (n=26 / 45%) and ‘woodland creation and management’ the least (n=13 / 22%)
- ‘Soil management’ was the topic covered most in one-off events (n=20 / 50%) and ‘nutrient and grassland management / animal productivity and health’ the least (n=7 / 17.5%)
- ‘Nutrient and grassland management / animal productivity and health’ was the topic covered most in field lab events (n=12 / 66.7%) and ‘woodland creation and management’ the least (n=0 / 0%).

Key outputs delivered – participants

FFS has engaged with a reasonably diverse / balanced mix of participants, particularly in terms of age and gender. (CEP key finding 2). A total of 1,203 individuals participated in the programme. Of the attendees: 34% are female, 26% are new to farming < 5 years), and 40% are under 45 years old. Just over 70% of participants were farmers/crofters, 5% were foresters and the remaining 25% were involved in advisory work, agri-business and other agricultural related work.

Figure 2: location of Future Farming Scotland participants by postcode



CEP key finding 3: FFS was valued by its participants as providing high quality knowledge transfer events across various farming / land management topics (notably ‘soil’ and ‘grassland’ but all topics received good ratings on the whole). Crucially, both models of FFS event delivery (one-off events and field labs) were rated similarly in terms of quality (i.e. no statistically significant difference in quality of rating.

CEP key finding 4: Overall, the data suggest that all factors contributed positively to participant experience at FFS events. In particular, the quality / expertise of the facilitator and specialist were two aspects of the programme that were highly rated. Other aspects include the speakers, the agenda, and both the participative and practical nature of the events.

Key outcomes – knowledge, ability/skills and confidence

The CEP evaluation of FFS outcomes revealed strong evidence that participants had increased their knowledge, ability/skills and confidence of sustainable land management practices (CEP

report p21). (This was not specified or quantified as a key outcome in the original KTIF project application, but was added to the updated logic model by CEP.)

CEP key finding 5: survey results indicate marked increases across knowledge, ability/skills and confidence (particularly knowledge). Interviews reveal FFS is more about knowledge sharing and incremental change, rather than larger scale changes of management.

CEP key finding 6: participants who attend more FFS events may achieve better outcomes across all the cognition indicators (knowledge, ability/skills, confidence), as the achievement of these outcomes was found to be significantly lower amongst survey respondents who had attended one FFS event only.

Key outcomes – attitude, intention and behaviour

Outcomes 2 and 3 stated that 80% of participating farmers would implement **at least one best** practice management action by June 2019. Our follow-up survey carried out in December 2018 showed that 88.7% of participants had either adopted/or intended to adopt sustainable land management practices as a result of participating FFS.

Evidence of increased interest and motivation to adopt sustainable practices, and of actual adoption on the ground, is strongest for soil and grassland management techniques (CEP report p24). This potentially reflects that such practices are the easiest behavioural changes to implement.

CEP report p25: analysis of survey data revealed that participants had changed their attitude most positively towards 'farming and biodiversity', 'farming and climate change' and 'knowledge of other advisory services and support' with 68.1%, 55.9% and 53.4% of respondents respectively answering that they 'feel more positive and more inclined to address this topic on my own farm / holding' following their participation at an FFS event.

CEP key finding 7: the evaluation results overall highlight a reasonable picture in terms of motivation and intention to adopt sustainable practices, although there are key successes around 'soil' and 'grassland', perhaps because these topics are the most receptive to change.

CEP key finding 8: the evaluation results overall suggest a reasonable positive picture in terms of change in attitudes towards sustainable practices, especially in relation to certain topics (e.g. biodiversity and climate change).

CEP key finding 9: a high proportion of survey respondents changed their land management practices in relation to 'soil' and 'grassland', and a reasonably large portion did so for large amounts of land. Changes were less pronounced for other topics.

CEP key finding 10: although some respondents did reduce their on-farm inputs, especially in terms of artificial fertilisers, more respondents did not, especially for herbicides.

The CEP evaluation prepared two illustrative case studies where rich data was available, enabling the evaluation questions to be explored in detail in relation to specific FFS events / topics. Following these criteria, case studies were prepared for: soil management events; and grassland management events. CEP found that was not unsurprising that these topics emerged as the best candidates for case studies as most of the FFS events held during the project lifetime related to these topics It follows, therefore, that these were also the topics that were covered most frequently at the events attended by survey respondents. (See Annex 5.)

6.2 Milestones

Table 2 sets out actual outputs and short to medium term outcomes achieved by FFS against milestones set in KTIF project grant application.

Table 2: FFS programme outputs and outcomes

FFS outcome 1 Increased number of farmers and crofters accessing knowledge and skills development activities for low-input and sustainable farming		
KPI	**MILESTONE**	**ACTUAL ACHIEVED**
Number of individuals participating in project	1,000 plus unique individuals by 31 October 2018	1,203 unique individuals participated in activities
Number of training days delivered	1,300 plus days delivered by 31 October 2018	1,212 training days delivered
Number of repeat participants at events	300 plus repeat participants by 31 October 2018	287 were repeat participants
FFS outcomes 2 & 3 Increased number of farms using best practice actions for: • Soil, nutrient and grassland management; animal health and productivity; woodland creation and management; organic production • Improving environmental and economic performance e.g. reducing external inputs; increasing use of on-farm resources; creating habitat; creating new income stream/s		
KPI	**MILESTONE**	**ACTUAL ACHIEVED**
Percentage of farmers implementing actions	80% by June 2019	88.7% said that they adopted or planned to adopt best practice action

7. LESSONS LEARNED

7.1 Issues and challenges

As part of the independent evaluation, CEP identified key lessons learned and good-practices. Key lessons learned related to success factors to knowledge exchange for both one-off events and field labs (p46):

- Events that are based on topics of common interest (observed here as 'soil' and 'grassland'), are most receptive to change (for example due to a supportive policy environment) are likely to lead to greater outcomes such as increased on the ground adoption of sustainable management practices.
- Trusted and respected speakers/specialists and facilitators in particular enhance participants' enjoyment of the knowledge exchange event.
- Participants who attend more than one knowledge exchange event, and in particular follow the programme by attending multiple events, achieve better outcomes across all the cognition indicators - knowledge, ability/skills, and confidence.

CEP's key lessons learned related to barriers to knowledge exchange (p46):

- Time and location were considered the two principle barriers for interview participants to access knowledge exchange events. It is a strength that the programme runs events across Scotland and in different biophysical contexts, and at different times of the week (e.g. including the weekend).
- Designing a knowledge exchange programme to a diverse audience can prove challenging, particularly if different members of the land management and farming industry have opposing views.

CEP's key lesson learned related to implementation of sustainable land management practices (p26):

- Inexpensive and quick and easy to implement practices (e.g. on-farm soil testing) had a higher uptake than more expensive and complex management practices such as woodland creation. This may also be due in part to a longer lead in-time required to make large scale changes. This is reflected in our own on-going analysis of survey data.

7.2 Impacts

Impacts are the longer-term results that the programme aimed to achieve in the, and would not normally be quantifiable within the lifetime of the programme. However, the CEP evaluation and our own surveys and case studies, provide an early insight into the likely longer-term social, environmental and economic impacts of the programme.

Social

A key outcome was the development of social networks (bonding capital) between land managers who had participated in the programme (CEP report p27).

CEP key finding 11: the evaluation results suggest a reasonably successful picture as social capital (bonding, bridging and link capital) has been enhanced at least 'somewhat' across all types of capital. Improvements are likely to be most pronounced in relation to 'bonding capital', which suggests that any alteration of social norms may be more pronounced in communities of place. (See Annex 6 for case study.)

Environmental

CEP key finding 12 suggests a mixed picture in terms of environmental outcomes delivered, with key positives in relation to 'soils' and 'biodiversity' and a mixed picture for other outcomes. The CEP report (p29) states that environmental benefits from land management practice changes can be anticipated, but are too soon to properly observe. FFS focused on enabling and empowering participants to implement changes they may hesitate to implement without the knowledge exchange programme, and thus longer term impacts of the theory of change are beyond the timeframe to be observed by the programme evaluation.

A high proportion of survey respondents changed their land management practices in relation to soil and grassland management (CEP key finding 9). These are evidence-based practices that will benefit biodiversity including reducing/minimising the use of chemical pesticides and fertilisers, using green manures, and increasing soil organic matter.

Our December 2018 survey revealed that 45% of participating farmers had put more than half of their holding under new sustainable land management practices, and 21% had implemented new management practice/s across their entire business holding. This equates to over 830 square miles of farmland across Scotland being managed using evidence-based practices which support SRDP objectives for low carbon, climate resilience and biodiversity.

In recognition of its environmental work with farmers, FFS won the 'Food and Farming' category of the prestigious RSPB 'Nature of Scotland Awards 2016' which celebrate the people, projects and organisations working to protect Scotland's wildlife and natural environment.

Economic

The CEP report (p30-31) did not find empirical evidence to support financial or productivity benefits. Like environmental, economic benefits may be too soon to observe. We believe FFS will improve economic performance, especially in the longer term. FFS promoted the reduced use of externally purchased inputs (including synthetic fertilisers, feed concentrates, etc.) by increasing recycling, re-use and efficient management of existing on-farm resources. In addition, woodland and agroforestry events demonstrated to participants new market opportunities and the economic benefits of trees on farms.

Farms which adopt these practices should be able to demonstrate a range of tangible economic benefits including immediate financial savings as well as longer-term positive business impacts. This is highlighted by anecdotal evidence through case studies, which demonstrate how farmers participating in FFS have managed to reduce their costs (see Annex 7 for case study). Refining future event content and associated materials which makes more explicit the links between reduced reliance on inputs and farm profitability is a key CEP recommendation.

8. COMMUNICATIONS AND ENGAGEMENT

The project was marketed and advertised to the target audience using a wide range of sources. Monitoring and evaluation of the marketing methods used to attract and engage farmers helped us to ensure using the best and most cost-effective methods.

Table 3: sources of promotion and reach for FFS events

Source of promotion	Reach/readership	Events promoted
Soil Association Scotland Twitter	8,000+	All events
Soil Association Scotland Facebook	780+	All events
Soil Association Scotland website farming page	1,800+	All events
Soil Association Scotland emails contact list comprising individuals, industry bodies, park authorities, land management organisations, NGOs etc (list is GDPR compliant)	Estimate: 2,000+	Selected events according to topic and locality
Rural Matters (Twitter account for the Scottish Government's Agriculture and Rural Economy Directorate)	7,000+	All events
Farm Advisory Service website & twitter	Twitter: 3,000+	All events
The Scottish Farmer: journal & website	Journal: 16,000+ per edition; website: 3,000+	Selected events depending on topic
Scottish Rural Network	Twitter: 3,000+	All events
NFU Scotland local text alerts & weekly bulletin	Alerts: 50-150 depending on location	Events being held in locality of farmers receiving alerts/bulletins
Adverts in local and regional newspapers	Please see Annex 8	Events being held in locality of paper
Adverts/flyers to various farmers' marts, vets, agricultural suppliers and machinery rings	Estimate: 10 -100	Events being held in locality of businesses and groups
Community newsletters	Estimate: <1,000	Events being held in locality of newsletter

'Word of mouth' recommendation was also a popular method for participants learning about upcoming events. The number of those participating in the events and the demographics and locations of the participants, demonstrate that the marketing methods used reached and engaged a wide audience of farmers across Scotland.

A key part of the programme's communications strategy was to provide follow-up support to FFS participants and disseminate findings arising from FFS. This was provided using a range of channels including:

- Bespoke resource packs provided to all individuals participating in FFS events, and contacts and links to further advice and guidance contained in-email to those wishing to receive further information (around 90% uptake since introduction of GDPR).
- Suite of technical resources covering on Soil Association Scotland website.[3]
- Soil Association Scotland Twitter[4] and Facebook[5] broadcasting news and highlights with relevant links.

[3] https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/resources/
[4] https://twitter.com/SoilAssocScot?ref_src=twsrc%5Egoogle%7Ctwcamp%5Eserp%7Ctwgr%5Eauthor
[5] https://en-gb.facebook.com/soilassociationscotland/

- News page on Soil Association Scotland website.[6]
- Impact report "Farming for the Future – Our work in Scotland' which features many of the inspiring stories as told by farmers who have participated in the KTIF-funded Future Farming Scotland programme. A copy[7] is on Soil Association Scotland website. Around 1,000 hard copies have been widely distributed to stakeholders and other interested parties.
- Editorial in industry journals and websites including The Scottish Farmer and Scottish Association of Young Farmers.
- A short film[8] about mob (conservation) grazing which features on our website.

Summary of outputs for outcome 1 Increased number of farmers, crofters and growers accessing knowledge and skills development activities for low-input and sustainable farming by 31 October 2018		
KPI	**TARGET**	**ACTUAL OUTPUTS ACHIEVED**
Number of resource packs distributed	1,500 plus packs distributed	1,600 plus resource packs distributed
Number of visits to on-line resources	1,500 visits	2,383 online visits made
Number of individuals signposted to advisory services/additional support	1,000 individuals	Over 1,000 individuals

[6] https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/scotland-farming-news/
[7] https://www.soilassociation.org/media/17814/farming-and-land-use-report-web.pdf
[8] https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/field-labs/mob-grazing-scotland/

9. KEY FINDINGS AND RECOMMENDATIONS

The following are the key findings made by the independent CEP evaluation.

Key outputs delivered by Future Farming Scotland (FFS):

- Key finding 1; the programme covered a wide variety of topics in a variety of locations (including upland/ Less Favoured Area, island, lowland) and land capability for agriculture contexts.

- Key finding 2; the programme is on track to hit target audience. The programme has engaged with a reasonably diverse / balanced mix of participants, particularly in terms of age and gender.

What participants thought about FFS:

- Key finding 3; FFS is valued by its participants as providing high quality knowledge transfer events across various farming / land management topics (notably 'soil' and 'grassland' but all topics received good ratings on the whole). Crucially, both models of FFS event delivery (one-off events and field labs) are rated similarly in terms of quality (i.e. no statistically significant difference in quality of rating).

- Key finding 4; overall the data suggest that all factors contributed positively to participant experience at FFS events. In particular, the quality / expertise of the facilitator and specialist were two aspects of the programme that were highly rated. Other aspects include the speakers, the agenda, and both the participative and practical nature of the events.

Key outcomes and impacts delivered by FFS:

- Key finding 5; survey results indicate marked increases across knowledge, ability/skills and confidence (particularly knowledge). Interviews reveal FFS is more about knowledge sharing and incremental change, rather than larger scale changes of management.

- Key finding 6; participants who attend more FFS events may achieve better outcomes across all the cognition indicators (knowledge, ability/skills, confidence), as the achievement of these outcomes was found to be significantly lower amongst survey respondents who had attended one FFS event only.

- Key finding 7; the evaluation results overall highlight a reasonable picture in terms of motivation and intention to adopt sustainable practices, although there are key successes around 'soil' and 'grassland', perhaps because these topics are the most receptive to change.

- Key finding 8; the evaluation results overall suggest a reasonable positive picture in terms of change in attitudes towards sustainable practices, especially in relation to certain topics (e.g. biodiversity and climate change). There may be an issue in that farmers/ land managers don't themselves recognise these changes. It is assumed one impact of this could be a reasonably positive shift towards individual identities of farmers / land managers that are more aligned with a sustainable ethos.

- Key finding 9; a high proportion of survey respondents changed their land management practices in relation to 'soil' and 'grassland', and a reasonably large portion did so for large amounts of land. Changes were less pronounced for other topics

- Key finding 10; although some respondents did reduce their on-farm inputs, especially in terms of artificial fertilisers, more respondents did not, especially for herbicides.

- Key finding 11; the evaluation results suggest a reasonably successful picture as social capital (bonding, bridging and link capital) has been enhanced at least 'somewhat' across all types of capital. Improvements are likely to be most pronounced in relation to 'bonding capital', which suggests that any alteration of social norms may be more pronounced in communities of place.

- Key finding 12; the evaluation results suggest a mixed picture in terms of environmental outcomes delivered, with key positives in relation to 'soils' and 'biodiversity' but a mixed picture for other outcomes.

Recommendations

The CEP evaluation (p46-48) made a range of recommendations, which link to the supporting evidence from the evaluation and anticipated effect (based on theory of change) on outputs and impacts. These recommendations will help to inform the future design and delivery of our programme work.

- Soil Association Scotland could market under-represented enterprise types in the next iteration of their knowledge exchange programme (p17).

- The scope and focus of the programme could be reflected on, in terms of who is precisely the target audience. For example, those who require a bigger uplift in knowledge, ability/skills and confidence could be targeted, as it is where gains may be less marginal (p24).

- Topics of common interest (p25), topics where attitudes may be more stubborn to change (p25), and topics that have seen less pronounced on-the-ground adoption (p26), could be targeted in the programme's next iteration. In particular, specific sessions could be developed on sustainable management of on-farm water resources and pollution (p30).

- Soil Association Scotland could further its work targeting reducing on-farm inputs, and make more explicit to participants the links between reduced inputs and profitability (p31). This relates to the degree to which Soil Association Scotland approach farmers / land managers as 'citizens' or 'business people', and which argument resonates best with individuals.

- Soil Association Scotland could consider how to further involve government, agencies, and other wider stakeholders in the programme's next iteration (p27).

- Soil Association Scotland may wish to encourage repeat attendance at events, in order to promote greater levels of cognitive outcomes from future iterations of the programme (p37).

- Soil Association Scotland may wish to develop indicators and monitoring protocols to track changes in land management over longer time periods (i.e. multiple iterations of the FFS programme) and data on land manager rationale, drivers, choice factors etc. that govern land management change (p37).

10. CONCLUSION

The independent CEP evaluation revealed strong evidence that participants had increased their knowledge, ability/skills and confidence of sustainable land management practices to support Aim 1: build a strong knowledge and skills base for productive, profitable and sustainable agriculture and land use amongst Scotland's rural communities.

The CEP evaluation found less data to support Aim 2: increase the economic and environmental performance of Scottish agriculture. The evaluation highlights that while some change in social norms can be theorised through the empirically evidenced programme outcomes, environmental and economic benefits from land management practice changes can be anticipated, but are too soon to observe.

FFS focused on enabling and empowering participants to implement changes they may hesitate to implement without the knowledge exchange programme, and thus longer term impacts of the theory of change are beyond the timeframe to be observed by the programme evaluation. As a result, the CEP evaluation recommends:

It may be useful to update and/or clarify the scope of the FFS logic model/ theory of change to better reflect the likely levels of management change (i.e. incremental change rather than large scale changes) following participation in FFS events (i.e. whereby the focus is on knowledge transfer, sharing, networking, collaboration etc.).

As part of future monitoring and evaluation efforts, Soil association Scotland may wish to develop indicators and monitoring protocols to track changes in land management over longer term periods (i.e. multiple iterations of the FFS programme) and data on land manager rationale, drivers, choice factors etc that govern land management change. Future monitoring and evaluation tools (e.g. surveys) should distinguish between different models of FFS delivery.

The delivery and evaluation of Future Farming Scotland is helping us to develop our farming and land use work. We are currently looking at range of ideas beyond the current SRDP 2014-2020 which also reflect the likely future direction of Scottish Government policies, with a focus on integrating knowledge and skills with measures to facilitate practical action on the ground. These include:

- Providing more opportunities (smaller groups of farmers meeting on a regular basis) which encourage greater participation with longer-term engagement. We believe that this is important where significant change and investment in land management practices (e.g. woodland creation) is required. This is highlighted by the CEP evaluation.
- Promoting an outcome-based approach which gives farmers the responsibility and flexibility to implement sustainable management practices which deliver environmental and business benefits.
- Encouraging citizen science – more farmers involved in environmental monitoring and recording which is a key part of an outcome-based approach to farming.
- Facilitating a landscape scale approach using the Ecological Coherence Protocol – a targeted approach which enables farmers and land managers to collaborate to deliver impactful environmental benefits across a wider area.
- Continuing to develop and provide support for farmer-led innovation.

Providing evidence that our programme work is effective and delivers positive impact is one of our key strategic objectives. Having a dedicated Evaluation Officer (who works across different Soil Association Scotland projects) has significantly improved the robustness and quality of the information which we gather. In addition, this capacity has enabled us to better identify what worked well across FFS, and where improvements in current and future programmes of work can be made.

Key improvements we are seeking to make to our monitoring and evaluation framework include: increasing the rate of evaluation responses from those participating in our programmes; and increasing our understanding of barriers to the uptake of certain land management practices (e.g. reducing use of pesticides) and informing measures to help address barriers.

SOIL: Knowing what you've got and making it work for you
Campbeltown, Argyll & Bute - 26 November 2015; Glenluce, Dumfries & Galloway - 20 January 2016; Thankerton, South Lanarkshire - 21 January 2016; Galashiels, Scottish Borders - 22 January 2016; Tain, Highland - 16 February 2016; Aboyne, Aberdeenshire - 17 February 2016; Dunkeld, Perth & Kinross - 18 February 2016; Westray, Orkney - 2 June 2016

These were practical workshops led by soil expert James Bretherton of Agscope, which were held at locations across Scotland. The workshops looked at the importance of soil, how to assess soil health, how to spot signs that soil that needs attention and how to take appropriate remedial action.

The workshops also featured a 'bring your own' soil sample and interactive soil analysis for attendees. Overall, these events were highly rated, especially the speaker and interactive soil sample and analysis sessions. ***Comments by event attendees:***

- *Highly educational and interesting – good mix of theory and practical*
- *Great event. Well organised, enthusiastic speaker, informal atmosphere. I think I learnt more in the few hours today than I have in the last 5 years! Much better than trawling through the books. Thank you*
- *Soil Sample analysis was a highlight. Also, putting across the idea of the soil as a living organism. Arable farmers are livestock farmers'! Interested in events covering managing old/unimproved pastures – productivity/soil status/conservation benefits. As a result of the event will vary grazing patterns on grass fields*
- *Most grateful to you for adroitly organising a truly most informative, and thought provoking, event yesterday*
- *Absolutely loved talk at Glenluce. I would love it if there were more talks in this area. Definitely understand more about what is going on in the soil; but still got a long way to go*
- *Excellent event; brilliant speaker*
- *Fantastic! A really great use of time today*
- *Good mix of listening and learning with discussion and practical hands-on action*
- *Speakers very on point and informative – inspiring almost. Will try alternative planting regimes as a result of attending this event*
- *I found the whole day to be very interesting.*
- *Will dig more soil to see structure of top soil. Found examining the soil on the table useful.*
- *Practical – very useful*
- *Learning about soil structure etc most useful*
- *Very interesting day. Most useful: pH balance; Calcium-Mag ration*

Soil, MucK and Money: targeting resources for maximum return
Oban, Argyll & Bute - 26 October 2017; Isle of Bute, Argyll & Bute - 27 October 2017; Balloch, West Dunbartonshire - 21 November 2017; Falkland, Fife - 22 November 2017

These events were practical days looking at soil management and how to best utilise inputs for increased profitability, to produce optimum yields and return on investment. Attendees were invited to bring their own soil for analysis at a hands-on session. Speakers: Charlie Morgan, GrassMaster and Liz Stockdale, NIAB.

Attendees were extremely positive about the speakers and presentations. Following these events attendees were planning to make better use of soil analysis; trying additional lime to correct pH; using farm manure more efficiently; grass species selection; reseeding fields after analysis; planting hedgerows; cow tracks to reduce soil compaction; more detailed grazing management; changing approach to P and K management; grass harrowing; introducing new glasses and clover. They found the practical sessions looking at soil particularly useful. ***Comments by event attendees:***

- *Very informative. Brought to life through economic reality and clear examples*
- *I liked to see how the healthy soil could outperform the poor soil on the tables*
- *There is nothing that wasn't useful and it was a very good range of topics for the time available*
- *Will consider timing and application method of slurry in spring*
- *Possibly change how farm manure is applied, after event. Useful to hear drawbacks to some aeration techniques. It was all very useful to me being more educated in these types of grass measurements/managements*
- *Will re-evaluate my investment in soil analysis. Difficult to pick out any one presentation – all equally valuable*
- *Charlies' comments/practical real application was fantastic*
- *Format and content were excellent*
- *Thoroughly enjoyed the day - very worthwhile and good to come away with some more helpful hints and things to follow up on*

Soil Health: how to revolutionise your farm's profitability
Aviemore, Highland – 28 September 2016; Inverurie, Aberdeenshire - 29 September 2016; Dumfries, Dumfries & Galloway - 18 January 2017; South Queensferry, Edinburgh - 19 January 2017

These were practical, informative meetings focusing on why soil health is crucial for optimum production of crops and livestock, how farmers can influence soil health to provide higher yields and healthier stock, looking at and beyond the chemical and the physical and providing answers to attendees' soil related questions.

Speakers included: Jo Scamell, Ground Level Nutrition; and James Bretherton of AgScope. The response to the events was very positive, with most of the attendees planning to make changes following the events, including carrying out soil analysis and physical soil assessment, taking remedial action to achieve correct pH, P, K, aerating soil and trying different crops to help soil life. The feedback on the speaker was excellent, delivering a good level of relevant and useful information as well as practical tips. ***Comments by event attendees:***

- *Will take more care of soil and try to improve it*
- *Very interesting. Lots of information. Delivered in an understandable way*
- *Will try herbal leys as a result of event. Most useful was soil aeration talk*

- *Info on future challenges very useful. Excellent event*
- *A very interesting day*
- *Will follow up on the literature afterwards – lots of information to absorb*
- *Will try composting FYM*
- *Will try wider soil analysis*
- *I am going to attend further events and have already planned to go to the leatherjackets workshop in Dumfries*
- *Very good delivery of practical information relating to actual improves on land. Very good event*
- *Very useful to check that we are doing the right thing*
- *Most useful on interaction of elements in soil re nutrient take up. Cal v Mag*
- *Will do more research as a result of event. Now have more of an understanding of how the bacteria and fungi affect soil performance*
- *Very interesting breaking down soils and what needs applied, more than just NPK*

Horticulture: for crofters and other small producers
Glendale, Isle of Skye - 11 May 2016



This event was also held on the Isle of Skye and was specifically designed for crofters and small scale producers. This was a practical event looking at soils, fertilisers and rotations for horticultural crops. The day included outdoor practical sessions including soil physical assessment, crop rotations for polytunnels and placement of windbreaks and shelters. Speakers included: Audrey Litterick, independent consultant; and Donald Murdie, Glendale Croft Produce. Attendees rated the event very informative and useful. ***Comments by event attendees:***

- *Very knowledgeable and informative speakers. Really fabulous*
- *Very useful information and presentations. Great handouts – a lot to take away and read and digest. As a result of the event we will do a more in depth study of our soil*
- *Had a fantastic interesting day. What a knowledge Audrey has – she is amazing*
- *As a complete beginner, I found all information very valuable. Thanks for a great day*

Soils, Fertilisers and Rotations for Horticultural Crops
Inverness, Highland - 15 August 2017

This was a practical one-day event looking at soils, fertilisers and rotations for horticultural crops. The day included outdoor practical sessions including soil physical assessment, crop choice and rotations for polytunnels, and soil fertility. Speakers included Audrey Litterick (co-author of Horticulture: A Handbook for Crofters) and Maggie Sutherland of the Natural Veg Company.

Attendees were very enthusiastic about the event saying that as a result of attending they would try more succession of salad crops; more variety of early polytunnel crops; different irrigation techniques, leaving soil bare. Most useful was the importance of assessing and feeding NPK on an individual basis; liming/pH and simple applicable and compost sources. ***Comments by event attendees:***

- *Enjoyed every aspect of the day. Thank you for an excellent day*
- *Farm visit most useful: great to see it in action*
- *Having attended the event will make a seed propagator. Create time for more hands-on soil/structure/texture work*
- *Always good to see horticulture and soil working in practice. Very helpful farm tour*

Market Gardening Essentials
Comrie, Perth & Kinross – 15 May 2018

This event was aimed at those interested in starting up a small-scale market business, as well as those who already had smallholding or croft. There was a mixture of theoretical and practical sessions. The event covered the key principles of sustainable crop production in a Scottish climate, including crop planning, rotations, organic pest control, soil health and fertility. Tomnah'a also shared their expertise in no-dig cultivation methods, growing and selling flowers, setting up a CSA box scheme, and getting the most from your space with bio-intensive plantings.

Horticultural expert Audrey Litterick introduced some of the key principles of sustainable crop production in a Scottish climate, including crop planning, rotations, organic pest control, soil health and fertility. Attendees said that, following the event, they would be introducing new systems for compost, pest control and weed management, introducing no dig and working to improve soil structure. ***Comments by event attendees:***

- *Great to have a tour round Tomnah'a excellent and inspirational garden. Whole event was great, thank you*
- *The tour was inspiring. Great to have hands-on time in the workshops*
- *Logistics for picking and packaging and marketing were most useful*
- *Really fantastic overview - would love to have a similar event at other start-ups/market gardens*
- *Great event – all questions were answered*

Annex 2: grassland and nutrient management events

Grassland: managing soils and weeds
Portree, Isle of Skye - 10 May 2016

This event was designed for crofters on the Isle Syke and looked at practical soil management and sustainable weed control. The day included a visit to Lon Dubh croft followed by a BYO soils workshop and Q&A session. Speakers included: Ian Cairns, independent consultant; Janette Sutherland, SAC Consulting; and Shelagh Parlane, RSPB Scotland. ***Comments by event attendees:***

- *All aspects very interesting and useful*
- *Perfectly pitched. The croft visit was talking about real issues. Ian Cairns' presentation was excellent and credible! No sales talk. David and Janette [speakers] were well informed and friendly. Very useful day*
- *High points: Q&As; out in the field; making connections; speakers excellent/knowledgeable and very good at managing the Q&As to the benefit of all*
- *Excellent as usual*

Grass Matters Conferences
Dingwall, Highland - 2 December 2016; Dumfries, Dumfries & Galloway - 30 November 2017

These were practical one-day conferences focussing on helping farmers to get more from their grass. Delegates were invited to bring along a sod/divot and get an expert anaylsis of the grass on their farm. Expert speakers: Charlie Morgan the 'GrassMaster'; Chris Duller, a soil and grassland management specialist; and farmer Duncan McEwen of Arnprior Farm, Stirlingshire. ***Comments by event attendees:***

- *I just wanted to thank you for suggesting I came to Grass Matters. A very worthwhile conference, especially helpful looking at different grasses/soils with Charlie Morgan. From the advice he gave me looking at the grass sample from the underperforming field I have spoken to the sheep owners and they are going to divide the field into 4 and mob graze it. We are also taking soil samples. Will dig more soil pits and seek advice. Excellent – thank you, lots to follow up on*
- *Just a wee thank you! I found the day very interesting and really got the grey matter working about the possibilities to make every ones systems work so much better for them! It was the first time I have attended one of your meetings but really can't praise it highly enough*
- *Might try rotational grazing as a result of event. All the speakers were good and presentation was excellent*
- *Superb! Really useful information, much appreciated*
- *This course has given me further ideas around rotational grazing and the eureka moment of just leaving the young dock! The whole course was very useful and interesting with a great lunch*
- *All very rewarding with the bonus of receiving further info from the speakers via Lyn*
- *Excellent course*
- *I am experimenting and these events help to allow me to make more informed decisions on how I proceed to improve my grazing. Thank you for a very useful day*
- *That was a really excellent event and loads of really useful stuff to consider*

Paddock Grazing for Profit
Forgandenny, Perthshire - 11 July 2017

This was a practical day discussing paddock grazing and the benefits it can bring, optimising animal performance from pasture. The importance of functional genetic traits was also discussed. Speakers included: Murray Rohloff, an internationally renowned sheep/grazing consultant and Robyn Hulme, Easyrams. The day also included a visit to Montalt Farm courtesy of the Ritchie family.

The response to the meeting was very positive, with most of the attendees commenting on the excellent quality of the speakers and presentations. Following the event, attendees were planning to make changes including splitting large fields, worm count sampling in sheep, stripgrazing tups over winter instead of putting in shed, selling some lambs store and looking into clover. Attendees found the farm visit and the impact of pasture renovation most useful. ***Comments by event attendees:***

- *Excellent speakers! Very much enjoyed listening to Murray and Robyn and share their way of thinking*
- *Farm walk – very honest, practical and helpful. All brilliant – thank you*
- *Event was 'Awesome'*

Mob Grazing Gives You More: a practical introduction for livestock and arable farmers
Pittenweem, Fife - 26 June 2018



There has been great interest in Scotland in this fairly new method of farming livestock, which can be summed up as "short duration, high density grazing with a longer than usual grass recovery period". Tom Chapman, farmer and mob grazing specialist spoke about what mob grazing could do for your business: the practical benefits and performance on the ground as well as leading a question and answer session. The day also included a visit to Balcaskie Estate with an overview of management from Sam Parsons, the Estate Manager.

Most of the attendees, following the event, were planning to change current practices including setting up a grazing plan, looking at the infrastructure (e.g. troughs/fencing) required, looking at forage mixes/new leys and trying mob grazing. ***Comments by event attendees:***

- *Might try – Improving my grassland productivity*
- *Might Try – Different Seed Mixes to extend grazing*
- *Great organisation, well done*
- *This event gave us a lot of confidence that mob grazing is the way to go! Great to see Soil Association running this event and look forward to more like it*

Soil, MucK and Money: targeting resources for maximum return
Dounby, Orkney - 1 June 2016: Stromness, Orkney - 7 March 2018; Inverurie, Aberdeenshire - 6 March 2018



These were a series of practical events looking at soil and grassland management, and making best use of FYM and slurry for optimum production. These events included a 'bring your own' soil sample and interactive hands-on analysis. Speakers included: Charlie Morgan, GrassMaster; Liz Stockdale, NIAB; James Bretherton, AgScope; and Iain Eadie, Germinal UK Ltd. These events were well received, especially to hold them on Orkney ***Comments by event attendees:***

- *Thank you for coming back to Orkney*
- *Both the indoor talks and crop walks were good*
- *Stuff on slurry management from James was most useful*
- *Most useful: On the ground experience from Erlend (the host farmer), soil analysis basic techniques with a spade*
- *Most useful: understanding soil structure better*
- *Good practical demonstration showing producers skills they can use themselves to evaluate from soil structure/fertility*

Annex 3: woodland creation and management events

Agroforestry - managing and planting for improved livestock and arable production
Aberfeldy, Perth and Kinross - 26 May 2016; Newburgh, Fife - 27 May 2016

These two practical events looked at the benefits of agroforestry, how to manage existing woodland for livestock, planting for optimum arable production, sources of funding for forestry, and how Woodland Trust Scotland can support farmers. Speakers included: Ian Moss and Russ Jobson, Woodland Trust Scotland; Mike Strachan, Forestry Commission Scotland; and Stephen Briggs, farmer and agroforestry expert.

The Aberfeldy event (pictured above) included a visit to Bolfracks Estate to look at a long established silvopastoral grazing system. The Newburgh event included a visit to Parkhill Farm looking at the farmer's plans to plant apple trees in arable fields to increase production, and plant native trees to provide shelter for livestock. ***Comments by event attendees:***

- *Stephen Briggs and Farm Visit were both extremely useful*
- *Good opportunity to see density of tree planting*
- *As a result of event will do wider research on options and potential*
- *Farm talk by Stephen was very informative and useful*
- *As ever, a most informative and inspiring event. A much needed injection of enthusiasm in a challenging farming environment*

Woodland: making it work for you - management, planting and utilisation
Penicuik, Midlothian - 8 November 2016

This practical on-farm event held at Windy Gowl Farm looked at benefits of trees on farms and business opportunities. The event included discussion on woodland creation, riparian and shelter belt planting, how to manage existing woodland and opportunities for wood fuel production. Speakers included: Iain Moss, Woodland Trust Scotland; and Jeremy Thompson, Forest Direct.. ***Comments by event attendees:***

- *Planting around burns was not something we were thinking about but are going to consider now*
- *Will get in touch with Woodland Trust regarding funding help*
- *Event reaffirmed current knowledge of shelter belt plantations*

Woodland: making it work for you - management, creation and woodfuel
Mauchline, Ayrshire - 23 November 2016

This practical on-farm event held at Pant Farm looked at woodland creation, how to manage existing woodland, and opportunities for wood fuel production and biomass boilers. Speakers included: Simon MacGillivray, Chartered Forester; Joe Fergusson, Energy Agency; Richard Huston, Farm Business Services; and John MacBeth, Forestry Commission Scotland. Feedback revealed most attendees were either in the process of carrying out, or planning to implement, tree planting projects. ***Comments by event attendees:***

- *Many thanks for organising a very useful afternoon. I enjoyed meeting everyone and learned a lot*
- *Found the afternoon very informative and interesting*
- *The talk about new grant schemes was very useful*
- *The event was very useful; we have an area of woodland that needs a bit of management following about 10-15 years of neglect post planting by the previous owner. We were deliberating with how best to tackle it and what exactly we needed to do/whether to plant more. The afternoon spent at Barskimming helped answer a few of our queries and has helped guide us in a few decisions*
- *Farm walk and talk and different discussions about management were very useful – thanks! Many thanks for organising the event, and thanks also for including the Farming for a Better Climate information in the delegate packs*

Woodland: making it work for you - woodfuel, biomass boilers and getting on the list!
Aboyne, Aberdeenshire - 22 February 2017; Selkirk, Scottish Borders - 8 March 2017

These were practical afternoons looking at the benefits of woodland management and woodfuel supply. Speakers discussed legal, sustainability and reporting requirements for sourcing biomass raw materials for use in RHI boilers, and the requirements of the Biomass Suppliers List (BSL) for self-supply and selling to others. The Aboyne event was supported by Usewodfuel and Grampion Biomass Working Group. The event also provided an opportunity to find out about reporting on non-woody biomass raw materials and fuels with the new Sustainable Fuels Register (SFR), and a visit to Glen Tanar Estate to see a boiler system in action.

Speakers at Aboyne included: Ian Cowe, Forestry Commission Scotland; Amanda Calvert, independent woodfuel specialist; Jon Swain, Sustainable Fuels Register; Michael Bruce, Glen Tanar Estate. Speakers at Selkirk included: Peter Darling, Floors Forestry; Iain Laidlaw, Forestry Commission Scotland; Amanda Calvert, independent woodfuel specialist; and Kevin Lindegaard, Sustainable Fuels Register. Attendees found this event very informative and as a result planned to look into woodfuel production, managing woodland and planting trees, as well as becoming BSL and SFR registered. ***Comments by event attendees:***

- *As I am taking over from my mother, I am learning the ropes and found the whole afternoon very informative and showed me how much more I need to learn*
- *Following the event we will be putting a biomass boiler onto estate to fuel castle/caravan park*
- *Floors Forestry and Roxburghe Estate talks were most informative*
- *Forestry Commission talk regarding sustainability was most useful*
- *Overall day very useful and informative*
- *The day as a whole was indeed useful for technical update purposes*
- *The event helped with regard to completing the BSL application. Since the event I liaised with the Estate I work on about increasing woodfuel production*

Forestry - Adding Value
Banchory, Aberdeenshire - 24 May 2017

This event looked at the key components of FSC® and PEFC™ certification, forest management requirements and market demand. The event also looked at funding for woodland creation including the Woodland Carbon Code, as well as answering attendees' certification questions from every part of the supply chain. The day included a visit to a FSC® Certified Forest and to a local sawmill. Speakers included: Andrew Heald, Confor; Ewan Mackintosh, Tilhill; Vicky West and Ian Cowe, Forestry Commission Scotland; Andy Grundy, certification expert; and David Leslie and Stephen Craig, James Jones.

Feedback was excellent with attendees commenting on how well managed and organised the event was, that they found the woodland carbon code and certification information useful and really appreciated the opportunity for networking and discussion. ***Comments by event attendees:***

- *Event had a broad range of topics, thoroughly enjoy the event! Will be reading all the materials from today*
- *Thank you so much for these events – I learn so much. Much appreciated*
- *Really appreciated additional info about the woodland carbon code – will explore this further.*
- *Great idea to link up what is happening in the forest with implications of certification and the visit to the sawmill*
- *Greatly increased my knowledge of how forestry works in Scotland, the future prospects for forestry and the consequent influence on my biomass business.*
- *I am taking advice from Treeline Forestry on the felling and re-planting of some of my woodland*

Growing Trees on Farm – the beneficial impact
Dumfries, Dumfries & Galloway – 1 June 2017

This event gave a practical perspective of growing trees on farm from initial design to planting, pruning, managing and processing. The benefits, the options, lessons learned, funding and future plans were all highlighted, with an emphasis on what trees can do for your business. The event included a visit to a mixed farm (Barfil) to show the outcomes that can be achieved for the whole farm, 25 years on from planting a mixed conifer and broadleaved woodland. Speakers included: David Atkinson, Snr Forestry Advisor, Edwin Thompson; Louise Payne, Forestry Commission Scotland; and Iain Moss, Woodland Trust Scotland.

The event was described by attendees as interesting, informative and well organised with excellent delivery of information and networking opportunities. The majority of the attendees at this event said that following the event they would consider looking into planting trees, managing woodlands and funding options. ***Comments by event attendees:***

- *Lots of info from this event. Really worthwhile*
- *Thank you for an excellent day*
- *Good to see an unusual example for farm woodlands. Good insight into commercial forestry and the future*
- *A very important topic and brilliant to see a farm/woodland example 25 years in*
- *I found the event really useful in all sorts of unexpected ways. Since then I have become involved with a community woodland buyout 324ha coniferous plantation with a view to*

replanting, woodfuel, agroforestry etc and of course funding. Without this course I would have been in a much poorer position to contribute

Woodland - making it work for you
Boat of Garten, Cairngorms National Park - 3 October 2017

This was a practical afternoon looking at benefits of woodland management, creation and funding opportunities. The event was hosted by Lymbreck Croft. Speakers included: Keir Smith, Forestry Commission Scotland; Russ Jobson, Woodland Trust Scotland; Jim Simmons, Ruthven Farm; Will Anderson, Seafield Estate; and Will Boyd Wallis, Cairngorms National Park Authority.

The response to the event was very positive, with attendees saying it was particularly useful hearing from other farmers how beneficial woodland creation and hedges were to their business and how quickly they could see benefits. As a result of attending the event, attendees were planning to make changes including integrating woodland and livestock aspects; trying wader scrapes; small scale schemes available from the Woodland Trust; planting hedges; wetland creation; carbon funding; exploring more grant options; modification for integrated land use/habitat management. ***Comments by event attendees:***

- *It was a well organised event with a good variety of speakers*
- *All v useful, good to hear different perspectives and experiences rather than just theory*
- *Today has been very useful*
- *Preparing business plan to rehabilitate a neglected (small) farm. Looking to integrate woodland and livestock (Galloway) aspects. Today has been very useful. Lots of questions*

Woodland - making it work for you
Lanark, South Lanarkshire - 16 May 2018



This was a practical event (run in partnership with Central Scotland Green Network Trust) looking at benefits of woodland on farms and funding opportunities. The event held at included discussion on woodland creation, management of existing woodland and available support. Speakers included: Simon Amor, Forestry Commission Scotland; Iain Moss, Woodland Trust Scotland; David Robertson, Scottish Woodlands; and Iain MacDonald of Ardoch and Threepland Farms. Following the event, most attendees intended to plant trees and/or manage woodland. ***Comments by event attendees:***

- *Interested on silvopastures in conjunction with woodland creation*
- *Anyone of the speakers could have held the floor for 3 hrs!*
- *Considering hedging along some fence lines as shelter*

Woodland: making it work for you – exploring forestry opportunities on farm
Kirkcaldy, Fife – 14 June 2018

This was a practical afternoon at Kilrie Farm (run in partnership with Central Scotland Green Network Trust) event looking at the benefits of woodland creation, managing established woodlands and funding and finance. The event included a tour of new and established woodland sites and a woodland management machinery demonstration.

Speakers included: Forestry Commission Scotland; Virginia Harden Scott; Central Scotland Green Network Trust; Malcolm Young, SAC Consulting; Barbara Watson, SAC Veterinary Services; and James Heaton, Clydesdale Bank. Attendees were encouraged to come along to hear and discuss what trees can do for farming business. Following the event, attendees intended to carry out detailed planning for shelter belts, to ensure good outcomes, as well as applying for the forestry grant scheme, look at woodland carbon code. ***Comments by event attendees:***

- *Very good event, not easy to improve, many thanks*
- *Most informative, thanks*
- *Excellent insight to woodland creation and management*

Woodland: making it work for you - creation, management and funding
Fort William, Highland - 21 July 2018

This was a practical walk and talk event which explored the benefits of woodland creation, management and funding opportunities. There was discussion on riparian and shelter belt planting, agroforestry and how to manage existing woodland. Speakers included Iona Hyde of Woodland Trust Scotland, Ian Collier from Forestry Commission Scotland and Michael Foxley of Achaphubuil Croft.



Making Woodland Work for You: Creation, management and funding
Kishorn, Highland – 4 August 2018

This was a practical walk and talk afternoon event, which explored the benefits of woodland creation, management and funding opportunities for crofters. The event was held at Achintraid Township Common Grazing. It included discussion on planting on marginal hill land, shelter belt planting, and how to manage existing woodland.

Speakers: Donnie Chisholm, Woodland Trust Scotland; and Murray Stark, Grazing Clerk of the Achintraid Township Common Grazing. The event was considered by attendees to be was very well balanced, with something for everyone at all levels from expert to novice. ***Comments by event attendees:***

- *Contact the Woodland Trust regarding hedging*
- *Speak to crofters regarding common grazing and woodland possibilities and benefits it will bring*
- *Investigate the possibility of felling prior to adopting a planting programme*
- *Scarify to encourage natural reseeding*
- *Try and manage the trees I cut. Be more choosy about what I cut. Try and plant trees on common grazing*

Future Farming Conference - Common problems, new solutions
Dundee - 12 July 2018

Farming is full of challenges and opportunities. Some are age old, such as how to optimise productivity and get maximum profit from your land and livestock. Others seem to be getting worse, like the weather and its knock-on effects. Our December conference was a practical day hearing and discussing how farmers are making changes to their business to meet these challenges.

Guest speakers/farmers included: Graeme Bethune, Ballachly Farm, Caithness, on rush control; Rory Christie, Dourie Farming, Newton Stewart, on harnessing dairy genetics; Jim Simmons, Ruthven Farm, Glenlivet on woodland creation and Duncan McEwen, Arnprior Farm, Stirling, on grassland management. In the afternoon attendees had the option to visit one of two farms: the Kearneys of Lundie Farming, to see their extensive grass-based, block calving dairy farm, accompanied by James Bretherton of Agscope, or James Hutton Institute's Balruddery Farm, to discover the latest developments in research including field margins, green manures and crop trials.

The attendees found the conference interesting and informative and stated that they would like more events like this. The feedback on the farm visits was also good with people appreciating the balance of 'inside and out', i.e. the choice of farm visits after the presentations. After the event, attendees said they would consider implementing the following practices: create a wildflower field margin; start milking cows; try Gascon Cattle as a breed; soil testing and changes in cultivating techniques.



Annex 4: field labs

1. Managing Rushes without Chemicals

Invasive soft rush can rapidly take over grassland for grazing, and crowds out breeding birds. This Scotland-wide field lab delivered across four trial sites, explored a range of methods for controlling soft rush (*Juncus effusus*) without chemicals. Chemical herbicides will not prevent rush ingress, and their use requires the removal of stock after application, as well as incurring additional cost. This field lab set out to test and learn about strategies for the sustainable control of invasive rush, and at the same time retain some rush as habitat for breeding waders.

The lab found that successful and sustainable rush management is achievable if the same essentials as those of good grassland management are addressed; drainage, soil structure, soil pH, and the soil nutrients phosphate and potash. (Learning from this lab has informed a series of highly popular knowledge transfer events delivered through Soil Association Scotland's KTIF-funded Farming with Nature project.

2. Controlling Leatherjackets

Leatherjackets (the larvae of crane-flies) eat the roots and shoots of cereal plants such as barley, oats and wheat, as well as grass. This can have a devastating effect on these crops. The crane-fly lays its eggs in tussocky grass in late summer, so cereal crops sown after grass are very susceptible to leatherjacket attack. Dursban (which contains organo-phosphate chemical called chlorpyrifos) was the only chemical non-organic farmers could use to control leatherjackets, and it was banned in March 2016. There is very little known about alternative ways to control leatherjackets.

This field lab focused on looking at management and biological options including encouraging natural predation by birds and managing availability of grass at key times in the leatherjacket lifecycle.

3. Good Green Manures

Green manures should be good for crops and good for soil. There are a lot of different green manure seed mixtures that can be sown, but which ones work best? This field lab looked at four different green manure seed mixtures and compared how well they established, grew, improved the soil, and what effect they had on crop yield. Trials were held at three farms using the mixes in different growing conditions.

A report has been produced which provides a useful summary for each of the green manure mixes of what was looked at in the early spring; soil structure, earthworm counts, full forage analysis, mineral content, available and total nitrogen content, and cost of establishment. No single seed mix emerged as a clear winner in all categories of the assessment, emphasising the need to tailor green manures to specific farm goals.



4. Grassland Seed Mixes

This field lab explored potential solutions to the challenges faced by farmers growing grass in Scotland, by looking at tailoring grass seed mixtures to better suit Scottish climate and soil conditions. The lab trialled grass seed mixes that might respond well to longer periods of wet weather with the aim of producing grass that performs well, persists, provides adequate nutrition, and competes with weeds, particularly rushes.

We held three meetings on a farm in south-west Scotland with input from James Bretherton from AgScope and Andrew Best from Watson Seeds. Results suggested that fields sown with herbal ley have better soil structure and seemed slightly healthier. Lab attendees found the event extremely helpful with interesting points on soil and worm activity and noted that they intended to do better soil analysis, dig regular soil pits, check pH and introduce more lime.



5. Cultivating Soil Health

This field lab investigated if reduced tillage methods can improve soil health, reduce production costs and improve the farm's carbon footprint. Ploughing is a very useful method to help prepare seedbeds and control weeds. Unfortunately it is also associated with a decline in soil health, particularly in terms of earthworm numbers. This lab was held at Durie Farm (Perthshire) which is part organic arable and livestock enterprise, where the farmer has been using reduced tillage for over 17 years.

Findings from this lab showed that best practice management practices including minimising soil disturbance, never having bare soil, maintaining living roots in the soil, integrating livestock (where possible) and diversifying and rotating crops can yield benefits for soil health, production and cost.

6. Less Toil, Better Soil

This field lab looked at ways to increase crop yields, improve soil health and reduce the need for weeding in small scale vegetable production at Locavore. The lab involved experimenting with seven trial beds of kale and a range of different cultivation methods including planting through black plastic, under-sowing with green manures, and inter-cropping with lettuce and radishes. The beds mulched in black plastic appeared to be more successful in terms of weed suppression.

The response to this event was very positive with attendees saying they would consider implementing a ventilated polytunnel system, using seedling compost, compost inputs (amounts), building new compost bins, changing compost supplier and changing compost storage practices. Several attendees also said they were planning to share the information from the event with others, and has set up its own facebook group.



7. All Over Clover

The purpose of this lab was to look at whether it is possible to get a more diverse herbal pasture in the West of Scotland without a full reseed. Attendees were invited to join this field lab with dairy farmer Bryce Cunningham of Mossgiel Farm (Ayrshire) to see how a trial of oversowing of a herbal grass seed mix was progressing. He also spoke about his new mob grazing system. This lab has since evolved in to a new lab Mob Grazing, which is being delivered through the KTIF funded Farming for the Future programme (KTIF-011-2016).

Further information including findings made by these seven field labs can be found here[9].

[9] https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/field-labs/

Annex 5: Illustrative evaluation case studies

A specific theory of change model was prepared for each of the case study topics. The models were designed to show the strength of the empirical evidence (obtained through the evaluation project) behind the achievement of specific FFS outcomes and impacts, in relation to the topic at hand. As the original theory of change model for FFS is, by definition, theoretical, this is an important development by highlighting where, how, and to what extent the theoretical model is backed-up by empirical evidence.

Case study 1: Soil management events (CEP evaluation p39)

Although interviewees attended many programme topics and rated all highly, there is evidence from across the empirical data that the soil events may have led to the most and best outcomes. The topic specific theory of change model for soil in Figure 3 attempts to map this empirical evidence to the model to indicate where outcomes and impacts have occurred.

Evaluation of outputs and activities
The FFS Programme's principle topic for one-off events is soil management, with 20 events held in relation to soil health and productivity from 2015 to mid-2018 (57% of all one-off events). There were six field lab events on the topic of soil, comprising 33% of total field lab events. Similarly to all topics covered by FFS, soil events were rated consistently highly by participants:

- As a topic, the range of average event ratings was 4.5-5/5 from event feedback forms, speakers were rated 4.5-4.9/5 and usefulness of information 4.5-5/5 (secondary data); and
- Soil events were the topic that received the highest number of survey respondents ticking 'topic covered particularly well' (88%) in the online survey.

Evaluation of outcomes (short-term)
Soil was mentioned by three interviewees as the topic where their knowledge has increased the most following participation in FFS events. It is also of interest as a topic for consideration in future events – specifically soil quality and drainage.

- *Definitely highlighted how important the soil is, and how it's what's under the soil which is important (interview participant)*
- *We probably knew quite a lot of stuff already, but yes our knowledge and skills has improved Especially the soil analysis and stuff about that (interview participant*)

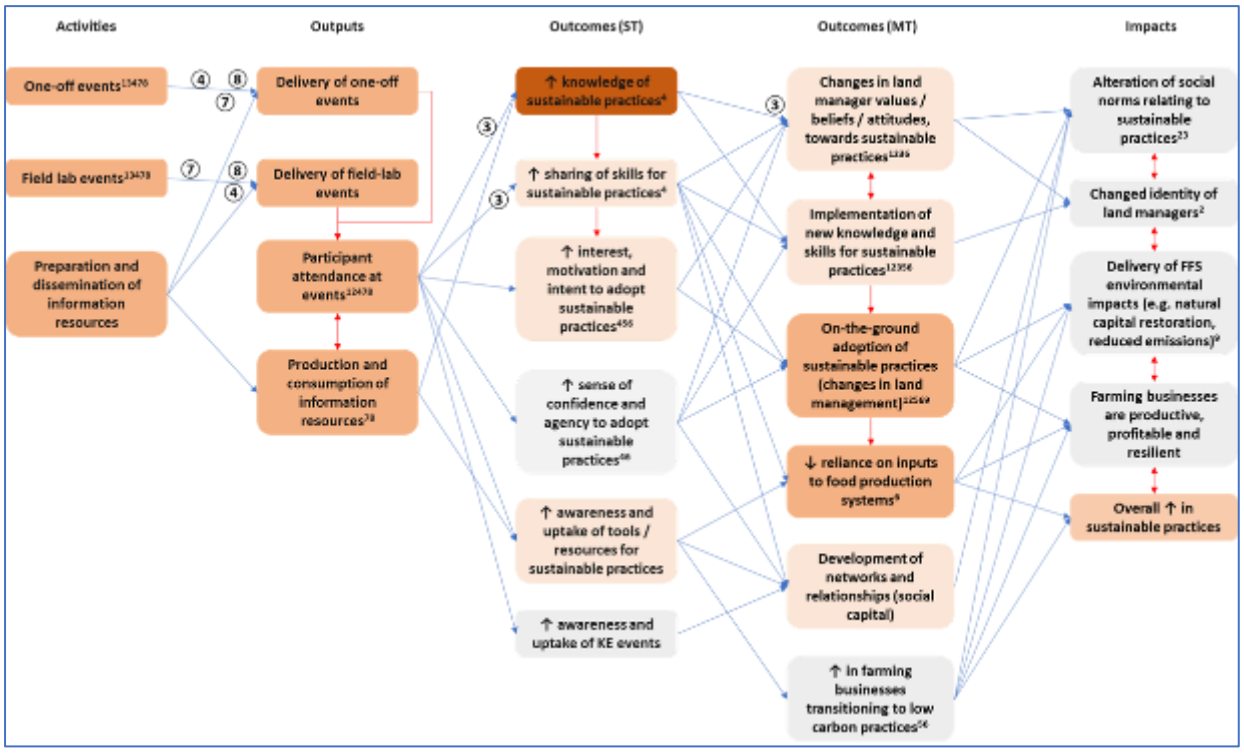
Evaluation of outcomes (medium-term)
For soil, more than half the interviewees had implemented land management changes:

- *So we've really put time effort and thought into this, chopped soil, improved sub soil" (interview participant)*
- *Analysing soil, reducing our impact on the soil through our application of waste materials in an environmentally benign way so that it is not damaging to soil and wildlife (interview participant)*
- *Soil analysis, keeping an eye on sulphur and our soils. I've applied these practices to all of my holding (interview participant)*

This was also confirmed in the analysis of secondary data, where implementation rates following FFS event participation were 80-100% in terms of soil management changes, for those who responded to the follow up questionnaire.

Interactive Future Farming Scotland soil workshop in Galashiels

Figure 3: CEP theory of change model for FFS soil management events accounting for empirical evidence from the evaluation. **Note: Darker orange cells = strong empirical evidence / evidence across multiple strands / sources of evidence; lighter orange cells = weak empirical evidence; and grey cells = no empirical evidence.**



Case study 2: nutrient and grassland management/ animal productivity and health events (CEP evaluation p39)

"The events are like an open University of agricultural ideas" (Interview participant, paddock grazing event)

The programme has run seven one-off events on the topic of nutrient and grassland management / animal productivity and health, from 2015 to mid-2018. This constitutes 17.5% of all one-off events. Of the 18 field lab events run during this period, the majority (12, or 66.7%) were run on this topic.

Evaluation of activities and outputs
Grassland events were the second most popular event for survey participants (with 70% attending), and 82% of survey participants felt that nutrient and grassland event topics were covered particularly well. In addition events solely dedicated to livestock were attended by a quarter of survey participants. Interviewees were very positive overall about the event, including on the usefulness of the topic and the speakers. Information packs were also rated highly by one interviewee.

Participant interviewees who had attended many FFS events commonly spoke about those on the topic of grassland and nutrient management, indicating their profile. Moreover in response to interest in paddock and mob grazing, Soil Association Scotland have designed a new field lab on these topics.

- *The Field Lab run by David Michie about leatherjackets is exactly useful information for me about how to control leatherjackets without chemicals (interview participant)*

Evaluation of outcomes (short term)
52% of survey respondents ticked that attending grassland events had greatly motivated them to adopt more sustainable grassland management practices. The figure was 23% for uniquely livestock events. This corresponds with findings from interviews with facilitators that grassland management is one of the easiest topic to change rather than direct changes to livestock:

- *It's a much simpler thing to change how you grow vegetables and try something different (market gardening – a lot of buzz and discussion)…livestock just as much interest to learn but difficult to implement (interview participant)*

Interviews indicate that participants have increased knowledge on the topic, including on animal welfare. Several interviewees were interested in mob and paddock grazing as a future event, and interviews reveal there is a strong interest in how management practices work on the ground:

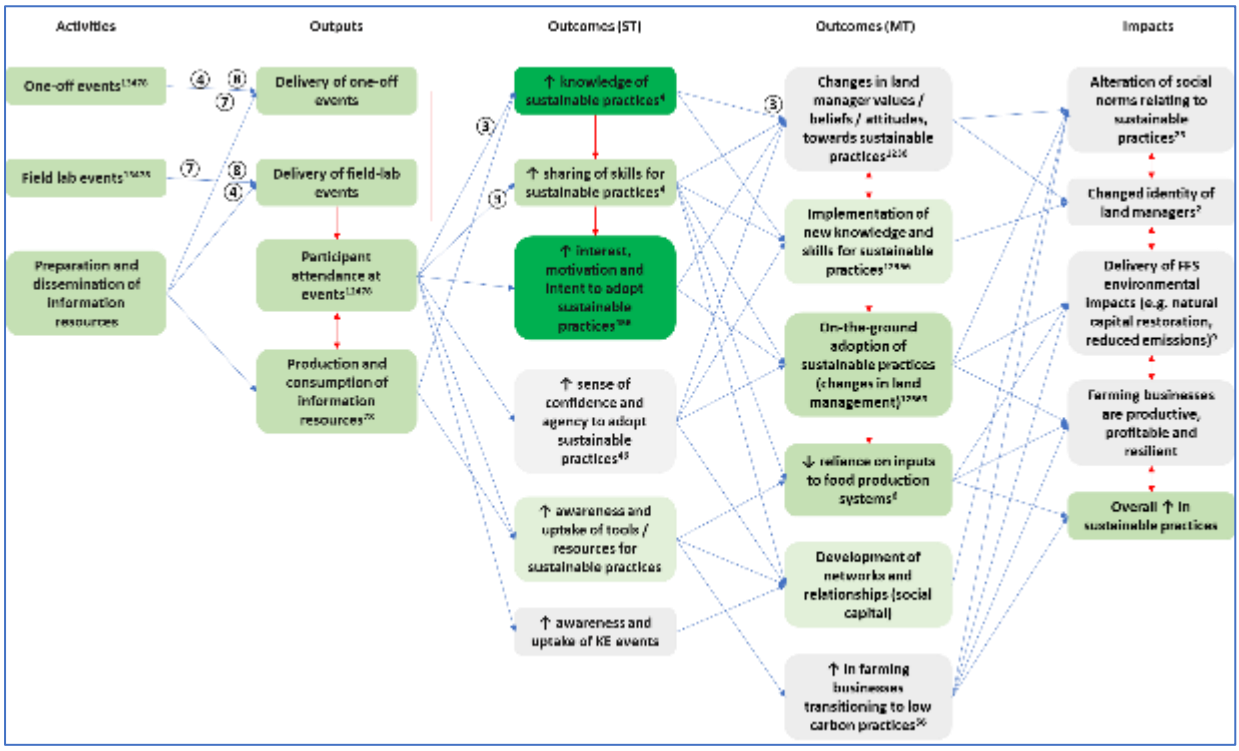
- *There was a lot of technical questions from people there 'in my situations it's like this, how do you do that? (Interview participant, grassland diversification and mob grazing event, Mossgiel) (interview participant)*
- *The events are useful to pick up information. I've been in farming for 40 years and there is still a lot of things that farmer's do that need a rethink (interview participant)*

However, a few interviewees discussed how they could not follow SAS practice suggestion on rushes, because of the context specific nature of their farm.

- *I did try practices to kill rushes – such as leaving carpets on the ground for two months to kill undergrowth underneath, but from my experience it just didn't work (interview participant)*

- *Some suggested tips from the Soil Association, such as only fertilising twice a year; we found we couldn't keep the grassland alive (interview participant)*

Figure 4: CEP theory of change model for FFS nutrient and grassland management / animal productivity and health. Note: Darker green cells = strong empirical evidence / evidence across multiple strands / sources of evidence; lighter green cells = weak empirical evidence; and grey cells = no empirical evidence



Evaluation of outcomes (medium term)

Interviews revealed that several sustainable practices in relation to grassland and nutrient management, and animal productivity and health have been adopted. These are on increased clover content, diversity of grass mixes, rotating livestock, checking heights of grass, increasing grassland, paddock grazing, and reducing fertiliser inputs.

- *I've put increased the clover content of the grass, and tried different grass mixes, and we've looked at reducing field sizes (Interview participant)*
- *Using different varieties of grass…Paddock grazing, grazing grass down to the ground" (interview participant)*

This was also confirmed in secondary data, where implementation rates were 75-100% on nutrient and grassland management changes, for those who responded to the follow up questionnaire.

Graeme Bethune of Ballachly Farm, Caithness, farms 150 breeding ewes - 8 hectares in the bye and 36 hectares on the hill.

"Before, I was more 'burn and turn', but ten years ago a bailing contractor came in with big machine and broke half the pipe clay drains in the productive haylage field. The volume of grass dropped like a rock. I got a Crofting Agricultural Scheme Grant (CAGS) grant to put in a substantial modern drainage system, then I ploughed and reseeded it."

"The first year the grass didn't come quickly and I got docks, creeping thistle and rushes. The next year I selectively over-sprayed the field, which didn't kill the rushes but killed all the clover. That's when I started going to the Soil Association events."

"From the events I learned to dig test pits all over the fields instead and I realised I had a plough pan – a sealed layer that was preventing the water draining properly. Then between the wet, my tractor and the contractor's baling I had surface compaction, which I had also learned to recognise. It all clicked in my brain."

"Now I make all my decisions under the idea that what I spend must bring me the greatest return. Burn and turn is expensive and doesn't bring me a good return. Now I'm adapting a system that suits me, my animals, my machinery. It's incremental not instant."

He also values the chance to meet up with like-minded farmers and chew the fat. "There's an emotional isolation in farming," he says. "If something fails you take it personally. You need somebody to laugh with you and say, you think this is failure, try this!

"I think the flexible and the nimble of mind, who are willing to change their practices, will be ok. Just because your grandfather or father did things a certain way doesn't mean it's right for now. We're in period of change, you need to be willing to adapt."

Annex 7: case study of a win for business

One farmer's story of how sorting out his soil was a win for his business

Philip Bews of Gorn Farm – 255 hectares, mixed livestock – on Westary, Orkney

Philip said the results of changes he made after attending the same event two years ago were "stunning."

I took along a soil sample to a Soil Association event in June 2016. When the expert broke it up it split horizontally – I didn't know that was a classic sign of compaction, and I didn't know about the need for aeration.

"On their advice I bought a flat lifter and the results were stunning for grassland and barley, amazing. You could see the line between where I'd used it and where I hadn't by the grass."

"Since then the increased grass has meant we can reduce our use of fertiliser – we bought 20% less last summer. That's a win-win – we've saved money on that and the freight costs, which are high here on Orkney. Although we're not an organic farm we try to apply organic principles where we can, because it's better for the environment and the soil.

If the soil's not right, the livestock aren't right," he adds, and indeed his improved grass has meant he can keep more cattle. "Because of the increased grass growth, of the calves born last Spring I've kept 20 more than I otherwise would have."

He also learned how to look at soil life – such as the worm count – to judge soil health. "Now I know how many worms to expect in a clod [around 25 per cubic foot] I'll dig up some soil, count them and look at root structure.

Annex 8: adverts placed in press (and reach) to promote events and field labs

Event date	One-off events	Newspaper title
26/11/2015	Soil management: Campbeltown	The Scottish Farmer
		Campbeltown Courier
		Stranraer & Wigtown Free Press
20/01/2016	Soil management: Glenluce	The Scottish Farmer
21/01/2016	Soil management: Thankerton	Carluke and Lanark Gazette
22/01/2016	Soil management: Galashiels	Berwickshire News
		The Southern reporter
		The Scottish Farmer
16/02/2016	Soil management: Tain	The Scottish Farmer
17/02/2016	Soil management: Aboyne	The Inverness Courier
18/02/2016	Soil management: Dunkeld	The Courier
		Press and Journal
11/05/2016	Soil management: Skye	The West Highland Free Press
26/05/2016	Woodland creation & management: Aberfeldy	The Scottish Farmer
27/05/2016	Woodland creation & management: Newburgh	Press and Journal
		The Courier
02/06/2016	Soil management: Stromness	The Orcadian
28/09/2016	Soil management: Aviemore	The Scottish Farmer
29/09/2016	Soil management: Inverurie	Press and Journal
		The Courier
08/11/2016	Woodland creation & management: Penicuik	The Scottish Farmer
		Berwickshire News
		The Scottish Farmer
23/11/2016	Woodland management: Mauchline	The Scottish Farmer
02/12/2016	Grassland management (conference): Dingwall	The Scottish Farmer
		Press and Journal
		John O'Groat Journal
18/01/2017	Soil management: Dumfries	Dumfries and Galloway Standard
19/01/2017	Soil management: South Queensferry	The Scottish Farmer
22/02/2017	Woodland management: Aboyne	Press and Journal
08/03/2017	Woodland creation & management: Selkirk	The Scottish Farmer
		Berwickshire News
		Dumfries & Galloway Standard
24/05/2017	Woodland creation & management: Banchory	The Scottish Farmer
		Press and Journal
01/06/2017	Woodland creation & management: Dumfries	Dumfries and Galloway Standard
		The Scottish Farmer
11/07/2017	Grassland & nutrient management: Perthshire	The Courier
		Press and Journal
		The Courier
15/08/2017	Soil management: Inverness	Press and Journal
		Inverness Courier
26/10/2017	Soil management: Oban	The Scottish Farmer
		The Oban Times
27/10/2017	Soil management: Isle of Bute	The Buteman

21/11/2017	Soil management: Balloch	Farmers Journal Scotland
22/11/2017	Soil management: Falkland	Farmers Journal Scotland
		Dumfries and Galloway Standard
		Press and Journal
30/11/2017	Grassland management (conference): Dumfries	Farmers Journal Scotland
		The Scottish Farmer
		Dumfries and Galloway Standard
		Farmers Journal Scotland
06/03/2018	Grassland & nutrient management: Inverurie	Farmers Journal Scotland
07/03/2018	Grassland & nutrient management: Orkney	The Orcadian
		The Orcadian
		Press and Journal
		Press and Journal
16/05/2018	Woodland creation & management: Banchory	Buchan Observer
14/06/2018	Woodland creation & management: Kilrie	The Courier
		Press and Journal
		The Scottish Farmer
26/06/2018	Grassland & nutrient management: Pitenweem	Press and Journal
12/07/2018	Future Farming Conference: Dundee	The Courier
		Press and Journal
		The Courier
		Farmers Journal Scotland
		Press and Journal
		The Scottish Farmer
21/07/2018	Woodland creation & management: Fort William	Oban Times
04/08/2018	Woodland creation & management: Kishorn	Gairloch & District Times
		Press and Journal
		Ullapool News
Meeting date	**Field lab**	**Newspaper title**
06/11/2015	Managing rushes without chemicals: Caithness	Press and Journal
		The Inverness Courier
03/03/2016	Managing rushes without chemicals: Caithness	John O'Groat Journal
		Press and Journal
28/10/2016	Managing rushes without chemicals: Aviemore	The Scottish Farmer
12/07/2016	Cultivating soil health: Newmiln	The Scottish Farmer
24/11/2016	Cultivating soil health: Newmiln	The Scottish Farmer
02/03/2017	Good green manures: Thankerton	Carluke & Lanark Gazette
18/05/2017	Controlling leatherjackets: Whithorn	The Scottish Farmer
05/09/2017	Grassland seed mixes: Selkirk	Carluke & Lanark Gazette
12/06/2018	All over clover: Mauchline	The Scottish Farmer
11/07/2018	Grassland seed mixes: Langholm	Berwickshire News
30/07/2018	Good green manures: Banff	The Courier
		Farmers Journal Scotland
07/11/2017	Controlling Leatherjackets: Fife	The Courier
11/10/2018	Grassland seed mixes: Langholm	Dumfries and Galloway Standard

Press title	Circulation per issue (by most recent date available)
Press and Journal	41,600
The Courier	31,500
Oban Times	17,500
The Southern Reporter	12,500
Dumfries and Galloway Standard	7,700
The Inverness Courier	7,300
The West Highland Free Press	5,100
Stranraer & Wigtown Free Press	4,900
Campbeltown Courier	4,800
Gairloch & District Times	1,200
The Buteman	730
Carluke & Lanark Gazette	unknown
Berwickshire News	unknown
John O'Groat Journal	unknown
Ullapool News	unknown
Buchan Observer	unknown
The Orcadian	unknown