

# Are English farmers ready for the changes in UK agricultural and environmental policy?

# Final Report



Iona Y. Huang, Karl Behrendt, Eleanor Parker and Nigel Hill at Harper Adams University

in collaboration with

Amandeep Kaur Purewal, David Swales and Sarah Baker at AHDB

April 2022

Food, Land & Agribusiness Management Department, Harper Adams University, Newport Shropshire TF10 8NB England

Corresponding author. Email: ihuang@harper-adams.ac.uk

# Table of Contents

Ex	ecutive Summary	5
1.	Introduction	7
2.	Background to Sustainable Farming Incentive	7
	2.1 Farmer reliance on BPS	8
	2.2 ELMS and the Sustainable Farming Incentive	8
3.	Literature Review	10
	3.1 Factors affecting farmers' environmental management behaviour	10
	3.2 Factors affecting farmers' participation in Agricultural Environment schemes (AES)	13
	3.3 Summary of literature review	14
4.	Method	16
	4.1 Data collection	16
	4.2 Data analysis	16
	4.3 Sample	17
5.	Findings	21
	5.1 Current situation and existing actions	21
	5.2 Farmers' understanding of agricultural policy, awareness of the ELM schemes and their views about the ELM and in particular SFI	24
	5.3 Farmers' sources of information, farming goals and approaches	27
	5.4 Farmer responses to the change of agricultural policy in England	28
	5.5 Factors influencing farmers' actions and responses to the changes	34
6.	Conclusions	39
	6.1 Key factors perceived by farmers which will affect their businesses	39
	6.2 Whether or not farmers have taken any measures informed by the proposed changes to plan for the future	39
	6.3 The impact of participation in Environmental Land Management (ELM) test and trials have on farm business finances, including the costs and benefits	40
	6.4 How farmers expect the Sustainable Farming Incentive (SFI) will impact on their farm business	
	finances, what are the expected costs and benefits of SFI, and how SFI could be improved	40
	6.5 Similarities and differences in attitudes of different types of farmers/growers	41
7.	References	42

# List of Figures

Figure 1: Change in distribution of Average Farm Business Income (FBI) over 2014/15 to 2016/17 inclusive and exclusive of Direct payments
Figure 2: Average FBI and the proportion of FBI equivalent to Direct Payments for different farm types across 2014/15 to 2016/17
Figure 3: Participating farms in SFI pilot: a) Proportion and number of farm types; b) Distribution of farm sizes9
Figure 4: Causal links between demographic characteristics of farmers and environmental behaviour12
Figure 5: Summative framework of factors influencing farmers environmental management decisions15
Figure 6: Summary of sampled farming businesses: location of the whole sample farms and SFI pilot sample farm18
Figure 7: Distribution of agricultural land tenancy across sampled farms by primary sector
Figure 8: Level of BPS payments received by sampled farms in each primary sector20
Figure 9: Distribution of SFI Standard trialling by primary sector for the 13 sampled farms participating in the SFI pilot
Figure 10: Word cloud of BPS reliant farmer responses to the removal of BPS and the impact on their farming business
Figure 11: Reliance on direct payments by farm size and farming sector
Figure 12: Details of farm business diversification in hierarchical order23
Figure 13: Distribution of all sampled farmer views on the ELMs and specifically SFI24
Figure 14: Distribution of responsive actions by farm size and farming sector
Figure 15: Distribution of SFI pilot participation in Intermediate and Advanced standards, including those that were unclear about their standard level
Figure 16: Expected costs and payments for each SFI standard

# List of Tables

Table 1: Variables used in fsQCA and their measures	17
Table 2: Descriptive profile of all sampled farmers and SFI Pilot participants	18
Table 3: Sample distribution on ELM Test & Trials and SFI Pilot participants	19
Table 4: Current and prior participation in agri-environmental schemes, reliance on BPS and diversific sampled farms.	ation for all
Table 5: Frequencies of participation and type of participation in Countryside Stewardship and En         Stewardship schemes	vironmental 21
Table 6: Types and reasons for diversification in farming businesses	23
Table 7: Level of understanding of agricultural policy and awareness of ELM in sampled farms	24
Table 8: Information sources regarding agricultural policy for all sampled farms	27
Table 9: Farmers responses to agricultural policy changes in England	28
Table 10: Farmer participation in ELM Test and Trials	30
Table 11: Distribution of reasons for participating in the SFI pilot	31
Table 12: Exemplar quotes from SFI pilot participating farmers on other benefits from participation	
Table 13: Exemplary quotes from non-participating SFI pilot farmers on reasons for not participating	34
Table 14: Examples of combinations of conditions in terms of necessity and sufficiency	35
Table 15: Key variables used in fsQCA and the results of tests for necessity and sufficiency	36

#### EXECUTIVE SUMMARY

Under the new English agricultural policy, direct payments will be phased out from 2021 until 2027 with no direct payments from 2028 onwards. A significant proportion of English farmers are reliant on Direct Payments through BPS to produce a positive Farm Business Income. During the transition period the amount of direct support will decline and the new Environmental Land Management Scheme (ELMS) will be phased in from 2021. The Sustainable Farming Incentive (SFI), which is one of the core components of ELM, will aim to reward farmers for meeting objectives that benefit the environment and the first pilot of this scheme is due to begin in 2021. The SFI has been developed following a set of 'tests and trials' which started in 2018. The SFI pilot provides a unique opportunity to investigate the response from farmers involved in the 'tests and trials' to understand the likely uptake of ELMs and SFI, and its potential impact on farm business performance, preparedness and future strategic planning in response to transitioning away from BPS.

This document reports on a project undertaken in collaboration with the Agriculture and Horticulture Development Board (AHDB) to examine what action farmers are taking with regard to new agricultural policies. The aim of this project is to assess farmers' awareness of the key factors relating to the proposed changes in farm policy, and to assess the extent to which English farmers are adapting their businesses to the changes in UK agricultural and environmental policy.

Primary data for this project was collected through qualitative in-depth semi-structured interviews conducted with 34 farmers. Five of the interviewed farmers also provided written confirmation about the costs and payments received from SFI. Data analysis was conducted in two phases: thematic content analysis in NVivo and fuzzy set qualitative comparative analysis (fsQCA). During phase one three broad themes were used to categorise the codes: 1) farmers' understanding and knowledge about agricultural policy and the ELMs; 2) farmers' plans and actions in response to the proposed changes of agricultural policy in England; 3) farmers' views and attitudes about the ELMs in general and SFI and perceived costs and benefits of participating in SFI pilot. Attributional information about farmers and their farming business were also captured. The results of this qualitative analysis were then fed into phase-two fsQCA to explore the similarities and differences in factors which might help to explain farmers' responses to ELMs and the SFI pilot.

The sample is largely representative of the production sectors (i.e. beef, sheep, dairy, arable, pork) across a range of farm sizes, geographical locations and land types. The 34 interviewed farmers' ages ranged from 30 to 80 with a mean age of 54, with seven respondents being female and 27 were male. They were located across most of England with some concentration in Yorkshire and Norfolk. Most sampled farms were lowland farms with a mixture of tenanted and owned land. Over 1/3 of the farmers (n=13) interviewed were due to take part in the SFI pilot. Of the 21 who are not participating in the SFI pilot, five were not eligible, two applied but then withdrew, two may apply in the next round, one was unclear and one intended to apply. In total there were 35 individual standards being implemented across the 13 farms participating in the SFI pilot. The remaining non-participating 10 farmers expressed no interest in applying for SFI. In regards to the ELMS tests and trials, 13 farmers participated, 8 of those subsequently applied for the SFI pilot.

Whether or not farmers have taken any measures informed by the proposed changes to plan for the future, shockingly, about one third of respondents have no idea about the amount of reduction of direct payments until 2027. A further third of farmers had begun to plan for reduced BPS income, and over a fifth of sampled farmers have undertaken no planning at all, although many respondents expressed a need and wish to do things differently. Those that have initiated actions had considered entering into new or other existing schemes, scaling up or scaling down, improving efficiency, or constraining investment. On-farm diversification was the most favoured strategy to cope with the change in agricultural policy and reduced BPS income. The main diversification strategies revolved around making better use of farm resources, and included farm premises conversion, providing farm related services, spreading costs of machinery by providing agricultural contracting, direct selling through farm shop or online channels or local butchers, entering into new energy sector or developing farm specialisation.

The impact of ELM tests and trials participation on farm business finances was mainly the costs of time spent, which overall were generally covered by payments. An identified key benefit of participating were social benefits such as networking with other farmers and like-minded people. Another benefit included the ability to exert some influence on the policy development although some were not convinced that their feedback will make any difference.

In regards to how farmers expect the SFI will impact on their farm business finances, including the expected costs and benefits, the most important incentive was the £5,000 payment for taking part in learning activities and providing feedback in the first year. Other benefits perceived include general environmental benefit, improving soil health, improving biodiversity and wildlife, public engagement and networking opportunities. For half the participants the payments offered exceeded or met the costs of SFI participation. Other costs of participation included using agents to make applications and claims, labour costs on management, opportunity costs of taking productive land out of production, soil testing, tree surveying and time spent on making applications, making claims and giving feedback. For the majority, farmers chose to meet SFI standards that they were already doing, and as such required no major changes in their current farming systems. For non-SFI participating farmers the standards did not fit with their current systems, the process was too burdensome or there was just too much uncertainty to consider the SFI in its current form.

In regards to improving the SFI process, it was identified that it could be improved by simplifying the online application platform, issuing hardcopy guidance or by providing a step-by-step manual and having a more accurate mapping of farm structure linked to the application systems, improving the clarity and details of each standard, help cover agency or consultancy costs, and embed more flexibility to cater for different farming systems, types and sizes.

The fsQCA identified that farmers who have worked out reduction of BPS payments and farmers who will participate in SFI pilot share two necessary characteristics: 1) they are more likely to have participated in countryside or environment stewardship schemes, and 2) they have moderate or good ELM awareness. Additionally, the results indicated that farmers who will participate in the SFI pilot have already planned or taken actions in response to policy changes, and do not have very large farms. Conversely, farmers who do not have good understanding of agricultural policy (including ELM), and do not have Bachelor's degree or the farming goal not being to maximise financial returns are more likely to be those who have not applied for the SFI, taken any action, diversification or planning in preparation for policy changes. Finally, very large farms tend to be not reliant on direct payments and have not planned for payment changes, often take calculated risks, are opinion leaders, and are more likely to have already diversified. In short, having participated in existing schemes and good awareness of ELM are necessary conditions for taking actions and participating in SFI pilot and having diversified is a distractor for SFI pilot participation whilst not having a good understanding of agricultural policy is an inhibitor for taking actions.

The key factors perceived by farmers which will affect their decision making included: 1) a desire to continue farming and maintain farming lifestyle; 2) uncertainties created by the loss of direct payments before the formal introduction of new schemes; 3) the high opportunity costs of taking out productive land for the new scheme; 4) potential of increased pressure from international trade, seen by most farmers as contradictory to sustainable farming messages from the government (i.e. importing food with lower standards and higher negative environmental impact); 5) insufficient reward in the new payment schemes of the natural capital created through sustainable farming; and 6) erosion of trust in government's motivation to introduce the new policy.

Overall, the uptake of the lumpsum scheme to encourage exit farming completely is likely to be very low. Many farmers will prefer more intensive farming to make up for the loss of BPS. Many farmers will not engage with the schemes to avoid possible restrictions or punishments. To achieve transformational changes for future farming in the UK, it is essential that the new policy will align farmers' economic sustainability with the expectations about environmental and social sustainability. Sustainable farming and food system in the UK should be seen as a shared responsibility in the society and the farmers should be rewarded for the eco-environmental services they provide not just on an income foregone approach, but on the basis of full recognition of the natural and social capital created through sustainable farming.

# 1. INTRODUCTION

The Agriculture and Horticulture Development Board (AHDB) is a levy funded, independent organisation which plays a pivotal role in improving farm business efficiency and competitiveness. Under the new English agricultural policy, direct payments will be phased out from 2021 until 2027 with no direct payments from 2028 onwards. The Sustainable Farming Incentive (SFI) will aim to reward farmers for meeting objectives that benefit the environment and the first pilot of this scheme began in November 2021. The SFI has been developed following a set of 'tests and trials' which started in 2018.

AHDB has a responsibility to get farmers and growers ready for the impending policy change and help them not only survive but thrive. This document reports on a project undertaken in collaboration with AHDB to examine what action farmers and growers are taking with regard to new agricultural policies. Specifically, we assessed farmer perceptions of the SFI pilot scheme in England and the removal of Direct Payments over the agricultural transition period. Key questions answered by this research included: How are farmers preparing for the changes and challenges ahead? Are they engaging in tests and trials? Are they participating in the SFI? and are they planning to expand, diversify or to leave the industry?

The aim of this project is to assess the awareness of farmers of the key factors relating to the proposed changes in farm policy, and to assess the extent to which farmers and growers are adapting their businesses to the changes in UK agricultural and environmental policy.

The project objectives were to:

- To explore the key factors perceived by farmers which will affect their businesses
- To assess whether or not farmers have taken any measures informed by the proposed changes to plan for the future
- To identify the impact of participation in Environmental Land Management (ELM) test and trials have on farm business finances, including the costs and benefits
- To identify how farmers expect the Sustainable Farming Incentive (SFI) will impact on their farm business finances, what are the expected costs and benefits of SFI, and how SFI could be improved
- To explore similarities and differences in attitudes of different types of farmers/growers

# 2. BACKGROUND TO SUSTAINABLE FARMING INCENTIVE

The UK having left the EU, has set its own agricultural and environmental policies (The Agriculture Act 2020) to transition to a legislative framework that, in England<sup>1</sup>, intends to pay farmers and land managers for public goods such as environmental or animal welfare improvements (including reducing carbon emissions). Recently, farmers in the UK received the majority (>80%) of the £3.5 billion spent by the UK government on agricultural support under the EU's Common Agricultural Policy (CAP), as direct payments based on land ownership. During the transition period the amount of direct support will decline subject to farm scale and the new Environmental Land Management Scheme (ELMS) will be phased in from January 2021 (DEFRA, 2020). The transition period and beyond represents a significant disruption and external threat or opportunity to the operation of farming businesses in the UK.

<sup>&</sup>lt;sup>1</sup> Devolved nations are responsible for their own Agricultural and Environmental Policy. At the time of writing Scotland had launched its public consultation (see: https://www.gov.scot/news/stability-certainty-and-simplicity-in-rural-support/); Wales is transitioning to their Sustainable Farming Scheme (https://gov.wales/written-statementagriculture-wales-white-paper-summary-responses-and-welsh-government-policy ); and Northern Ireland has recently announced their Future Agricultural Policy Framework Portfolio and is embarking on an extensive consultation process to develop a policy framework (<u>https://www.daera-ni.gov.uk/news/poots-publishes-vision-future-farming-policy-ni</u>).

#### 2.1 Farmer reliance on BPS

A significant proportion of English farmers are reliant on Direct Payments through BPS to produce a positive Farm Business Income (FBI) (Figure 1). The proportion of farms expected to produce a loss increases from 16% to 42% with the removal of Direct Payments. However, this assumes that BPS induced distortions in asset values and resource allocation within the agricultural sector remain constant with the removal of Direct payments, which may not be the case due to structural adjustment and changes in market values for resources occurs with the removal of BPS.



*Figure 1: Change in distribution of Average Farm Business Income (FBI) over 2014/15 to 2016/17 inclusive and exclusive of Direct payments.* 

Source: DEFRA (2018)

The impacts of Direct Payment removal on different farm types is not homogenous, and farm types such as LFA and Lowland grazing Livestock, Mixed farms and tenanted farmers (Direct payments equivalent to 83% of FBI) in England are likely to be most impacted by the transitioning away from the BPS (Figure 2).



*Figure 2: Average FBI and the proportion of FBI equivalent to Direct Payments for different farm types across 2014/15* to 2016/17.

Source: DEFRA (2018)

#### 2.2 ELMS and the Sustainable Farming Incentive

ELMS is set to further enhance existing agri-environmental schemes under the overarching Environmental Stewardship (ES) land management scheme. The current ES scheme includes three sub-schemes, Entry Level Stewardship (ELS), Organic Entry Level Stewardship (OELS) scheme, and the Higher Level Stewardship (HLS) scheme. These schemes, as well as the Countryside Stewardship (CS) scheme, which is focused on supporting farmers and land managers to implement a range of environmental improvement actions, will be phased out in 2023 and become part of ELMS. There is evidence that previous schemes have not achieved adequate public value for money

and have been environmentally ineffective, both in the UK and within the EU (Brown et al., 2021). The core component of ELMS relevant to English farmers is the Sustainable Farming Incentive (SFI) scheme which is expected to expand overtime to promote the adoption of sustainable farming actions. In addition, the Local Nature Recovery and Landscape Recovery schemes will focus on local (community) environmental priorities and support long-term land use change projects.

The SFI<sup>2</sup> is currently designed to provide a simple and straightforward approach to paying farmers for the provision of public goods, such as cleaner water and air, and carbon reduction. The SFI is designed with 'action-based payments' for farmers adopting environmentally friendly practices that go beyond regulatory requirements. The SFI pilot actions are grouped into packages set out initially as eight standards covering arable & horticulture land, arable & horticulture soils, improved grassland, improved grassland soils, low and no input grassland, hedgerow, on farm woodland, and water body buffering standard. It is envisaged that the number of standards available will increase overtime and payment rates based on an 'income foregone' approach for actions contained within each standard will be modified based on farmer feedback. More than one standard can be applied to the same area of land, as long as the standards are not in conflict. For details of the rules, please refer to DEFRA's website<sup>3</sup>.

A significant emphasis of the Agricultural Transition Plan (DEFRA, 2020) is the focus on co-design and stakeholder engagement in the development of the ELMS approach to agri-environmental schemes. A core component to the co-design process is the use of pilots and tests over 2021-2024. This co-learning process is aimed at identifying the best way to deliver the SFI, and by 10 Oct 2021 938 farmers from across England have applied to be part of the SFI pilot<sup>4</sup>. Figure 3 indicates the proportion and number of farm types and sizes that have applied to the SFI pilot, of which 22% are fully tenanted farmers (rent all of their land) with 39% of participating farmers having farms over 150 ha in size<sup>3</sup>. The SFI pilot agreements will last for three years and payments to participating farmers will be quarterly in arrears. Early feedback from farmers indicates that the current version has issues with 'goodness of fit' (i.e., fitting inflexible standards into existing farms), payment levels being insufficient to meet standards, and some technical difficulties with the application process.

This component of developing ELMS provides a unique opportunity to investigate the response from farmers involved in the 'tests and trials' to understand the likely uptake of ELMS and SFI, and its potential impact on farm business performance, preparedness and future strategic planning in response to transitioning away from BPS.

b)

Farm sizes

#### a) Farm types



Figure 3: Participating farms in SFI pilot: a) Proportion and number of farm types; b) Distribution of farm sizes.

Source: DEFRA (2021<sup>3</sup>)

<sup>3</sup> <u>https://www.gov.uk/guidance/sustainable-farming-incentive-pilot</u>

<sup>&</sup>lt;sup>2</sup> <u>https://www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme</u>

<sup>&</sup>lt;sup>4</sup> https://defrafarming.blog.gov.uk/2021/10/15/update-on-the-sustainable-farming-incentive-pilot/

#### 3. LITERATURE REVIEW

#### 3.1 Factors affecting farmers' environmental management behaviour

Cusworth and Dodsworth (2021), using Bourdieu's social theory<sup>5</sup> and the good farmer concept explored how UK farmers are experiencing the transition from BPS to ELMS. They interviewed 40 farmers (25 of them twice, and all previously involved with ELS) and show that there is general acceptance for the transition towards a public good model of subsidisation, if remuneration allows them to maintain a financially viable farm. They suggest the approach of farmers to ELM is being influenced by their historical productivist identify (focused on optimisation and efficiency), and the perception of a 'good farmer' is being recast into one that is associated with the delivery of public goods (such that the identities of being a public goods provider and productivist co-exist). The role of social learning, which is related to Bourdieu's social theory and the building of cultural and social capital within farming communities, has been found to be a significant influence in designing 'culturally sustainable' and better pro-environmental and voluntary AES policy interventions (Burton and Paragahawewa, 2011; Burton et al., 2008; Noguera-Méndez et al., 2016). A study in Ireland looking at voluntary AES participation found that farmer self-identity (i.e. forward looking and innovative self-identify) and the viewpoints of peer-farmers had a significant positive influence on AES participation and attitudes towards the scheme (Cullen et al., 2020). Extending the concept of the 'good farmer' into a study of new entrants into crofting in Scotland, Sutherland and Calo (2020) found that there was a tendency for new farmers to adopt new marketing and management practices, suggesting structural change in agricultural sectors may lead to increased environmentally-orientated behaviour given developing social norms, social expectations and changes to legislation.

In a study of Scottish farmers in LFA's, Willock et al. (1999b) found that there were high correlations between 'sustainability' and 'quality of life' objectives influencing farmers' attitudes towards decision making, with further moderate correlations with the objectives of 'status' (being a farmer) and 'success in farming'. Production-orientated behaviour was found to be significantly correlated with Quality of Life objectives, whereas environmentally friendly behaviour was only moderately positively correlated with sustainability and off-farm work objectives, and was associated with extraversion and openness farming attitudes in the personality domain (Willock et al., 1999b). Willock et al. (1999a) used structural equation modelling and found similar outcomes. In that multiple attitudes influenced behaviours, with some influencing behaviour directly, whereas others are mediated by objectives, and some are related to farm structure. The results were consistent with the analysis undertaken in Willock et al. (1999b). Le Coent et al. (2021) suggested that when farmers voluntarily provide environmental public goods they may be driven by counteracting effects between both descriptive norms akin to conformity (i.e., follow peer behaviour) and injunctive norms (i.e., conform with societal expectations – moral pressure) which works to increase AES participation (but which is constrained when there is low farmer engagement in the AES).

Sullivan et al. (1996) study of organic v conventional arable farmers in the USA indicates that organic farmers exhibit more environmentally-orientated behaviour. Both groups, however, indicated that autonomy and independence as their main benefit from farming, and a lack of financial reward as the main negative. Overall conventional farmers self-reported more stress with a weaker perception of community. Further work by McCann et al. (1997) suggested that the organic farmers expressed significantly greater concern for long-term sustainability and environmental problems, and traded-off short-term risks for perceived long-term benefits of adopting alternative conservation practices, although both organic and conventional farmers had similar adoption rates of conservation farming practices. Organic farmers attitudes towards what defines successful farming was more orientated towards improving soil quality, personal satisfaction and community participation. This is consistent with the work of Han et al. (2021)

<sup>&</sup>lt;sup>5</sup> Bourdieu's social theory suggests that decision makers are influenced by 'social evaluation' as an important motivational factor so as to ensure they have favourable social standing through the reproduction of symbolic capital, which is comprised of economic, social and cultural capital (Bourdieu, 1986, cited by Cusworth and Dodsworth, 2021). The social code that determines the reproduction of these forms of capital are viewed as the 'rules of the game'.

looking at the motivations of farmers in Iowa (US) to adopt organic farming. They found that farm profitability, personal safety, environmental stewardship, consumer perceptions and self-identify and tradition were all key motivators of the adoption of more environmentally-orientated behaviour. However, using a TPB<sup>6</sup> approach, Poppenborg and Koellner (2013) found no difference in attitude between South Korean organic and conventional farmers, but did suggest that farmers with a positive attitude towards providing ecosystem services and environmentally-orientated behaviour had higher incomes and the financial means to support it.

A review by Burton (2014) of 53 papers focused on environmental behaviours in farming, which included engagement with agri-environmental or conservation programs, using environmentally-orientated farming practices, or practices that improve farm biodiversity. From the review a series of complex causality relationships were identified to explain the connection between demographic characteristics and environmental behaviour (Figure 4). The complexity in causality, which are often found to be inconsistent, is argued to result from a failure to understand causality and its often contradictory nature, and the need to understand the features of the AES.

The generally accepted concept of path dependency in farm management decision-making suggests that farm managers tend to maintain a steady course and only make minor incremental changes to farming operations (e.g., inclusion of buffer strips in arable farming, leaving hedges untrimmed), until a major event or opportunity occurs (Sutherland et al., 2012). A major change in farming activity, or 'transition' to a new path, occurs when there is a significant re-orientation of farm resources or activities (e.g., a shift from conventional to organic farming) (Sutherland et al., 2012). The removal of BPS, a subsidy scheme, was found by Sutherland et al. (2012) to be a major trigger event<sup>7</sup>, and would expect to encourage farmers to transition towards a new pathway (e.g., contracting out their land, off-farm or contracting employment, diversification, transition from commercial to care farming). But it remains to be seen if the options provided through ELMS/SFI (and standards) are significant enough to encourage the transition of production-orientated farmers towards environmentally-orientated behaviour.

Waldman et al. (2021) in a comparison of socio-economic threats and environmental threats, arable and dairy farmers in the mid-west of the USA considered immediate socio-economic threats (trade impacts, long-run price decline, industry consolidation) much more important than environmental threats, which also influenced farmer stress and related exit decisions, especially in the dairy sector. The arable sector would predominantly look to change farming practices in response to both environmental and socio-economic threats. The lack of detail and uncertainty around the ELMS and SFI, as well as what may predominantly be perceived as minor incremental changes to farming practice and require minimal engagement of farm managers, may well lead to low levels of farm transitioning towards more environmentally-orientated behaviour and AES participation (Sutherland et al., 2012), and a greater focus by farmers on transitioning towards other pathways to deal with reduced BPS income, especially if they are resourced constrained.

<sup>&</sup>lt;sup>6</sup> Theory of Planned Behaviour (TPB).

<sup>&</sup>lt;sup>7</sup> Major trigger events identified by UK farmers were either related to intergenerational succession (e.g., succession, retirement, labour availability); or farm business related (e.g. labour availability, commodity price fluctuations, regulations, subsidy schemes, disease outbreak (e.g., BSE)) (Sutherland et al., 2012).



(Burton, 2014)

### 3.2 Factors affecting farmers' participation in Agricultural Environment schemes (AES)

A Rapid Evidence Assessment of literature by Brown et al. (2021) on the effectiveness of uptake of AES across seven EU countries identified key factors that influenced farmer decision making. The study of 241 papers indicated that economic factors being critical to driving farming uptake of AES, with higher payments being central to increasing uptake. Additionally, farmer beliefs and values in regard to either a productivist or environmentalist motivation, and the complexity of AES policy were critical to farmer uptake of AES. With few exceptions, these findings are consistent with that of Burton (2014) and Dessart et al. (2019).

Lastra-Bravo et al. (2015) conducted a qualitative meta-analysis of 10 peer-reviewed journal papers published between 2000 and 2013 on factors influencing EU farmers participation in AES. They suggested that increased participation in AES was driven by factors such as being offered a fair payment level, lower household dependency on agricultural income, younger age and higher education levels, the absence of a successor, and ability to make incremental changes to the business (goodness of fit with minimal disruption of agricultural activities). Ingram et al. (2013) suggested that the participation of Welsh farmers in the Tir Gofal whole-farm AES program may not be seen as a distinct development pathway, but rather just one of many integrated non-static development pathways. This work challenges how factors driving AES participation are viewed, as farmer decision making is dynamic and values may change over life-times, and AES needs to be integrated into existing farming systems.

In a study across the EU (including the UK) of area-based compensation payments offered to farmers for carrying out agri-environmental actions that go beyond good farming practice, Zimmermann and Britz (2016) found that participation by farmers in AES is more likely to occur among farmers with less intensive production systems (e.g. grassland based systems), where agri-environmental payments are lower and AES may fit better with their resources and strategies. Additionally, larger scale farms in less-favoured areas are more likely to participate in AES, although there was found to be a tendency for older farmers not to participate with AES (Zimmermann and Britz, 2016). Similar results were found by Murphy et al. (2014) studying the voluntary participation in the Rural Environment Protection Scheme (REPS) operating in Ireland over the period of 1995 to 2010. They found farmers that were most likely to participate in this AES had poorer soils, extensive farming systems (beef and sheep), were of younger age, had lower incomes and spent the majority of their labour working on-farm in comparison to non-participants. This suggests that participation in this particular AES may have been more of a reflection of a group of farmers in need of income support (Murphy et al., 2014) than farmers exhibiting environmentally-orientated behaviour.

However, Burton and Paragahawewa (2011) argue that contemporary AES, which simply compensate for economic capital lost, are not 'culturally sustainable' as they do not embed environmentally-orientated behaviour into farming cultures as part of 'good farming' practice, as this restricts the ability of such schemes to generate cultural and social capital. This is supported by Blackstock et al. (2010) who stress the importance of effective knowledge exchange and trusted advice in influencing farmer behaviour towards mitigating agricultural pollution of water environments, and Baumgart-Getz et al. (2012) who find from a study of 25 years of Best Management Practice (BMP) adoption in US arable systems that social networks, extension, environmental awareness and attitudes are positive influences on BMP adoption.

Wilson and Hart (2001) studied the possible change in attitudes/conservation-thinking induced by AES – as an indicator of success, and measures of uptake does not illustrate the quality of environmental benefits to farmers or society. They studied the Countryside Stewardship scheme and explored whether the CS scheme has shifted attitudes among less-conservationist farmers towards conservation-orientated attitudes & practices. Through interviewing both participants and non-participants, they found that the predominating reasons for participation were that the CS scheme fitted with existing farm plans (74%), the farmers wished to promote conservation (66%), and for financial reasons (65%). Reasons for non-participation included the lack of goodness of fit (53%) and a lack of clear value or benefit to the farm from participants identified the objectives of the scheme as primarily environmental with few

believing it had financial objectives (Wilson and Hart, 2001). This may suggest that farmers were generally quite aware that such a scheme is not about providing direct financial support.

In a study of a Payment by Results (PBR) approach to AES in the Yorkshire & The Humber region, Schroeder et al. (2013) interviewed 32 farmers to ascertain their perspectives and acceptance of such an approach. The work indicated that farmers generally accepted such an approach, which was significantly influenced by farmer age (younger more willing), prior experience with AES (also supported by Lastra-Bravo et al. (2015)), larger farm size and abundance of pre-existing environmental features. In a similar study by Russi et al. (2016) in Germany, they found most farmers were motivated to participate due to both monetary incentives and ethical reasons. Niskanen et al. (2021) used a choice experiment method to reveal Finnish farmers trade-offs between attributes describing an AES under a PBR policy (i.e. biodiversity, landscape, climate change mitigation, water quality and agri-environmental payment). The farmers were grouped using a Latent Class model, which found that the majority of farmers (~73%), which tended to be arable farmers and not pro-extensification, required higher levels of compensation to participate.

Adoption of environmental policies is suggested as not being driven by the same factors that influence production and financial decision making in farming (Lastra-Bravo et al., 2015; Willock et al., 1999b). Farmers that are most likely to exhibit environmentally orientated behaviour are already actively committed to environmental conservation (Willock et al., 1999b). This is supported by a study by Riley (2016) monitoring farmers over 10-12 years, that indicated that participation with low and high level AES increased awareness and understanding of farmers of environmental issues (enhancing social capital), although farmer engagement with AES was originally opportunistic. Pannell et al. (2006) suggests that the unsubsidised adoption of innovative conservation practices is a dynamic learning process, and is driven by the achievement of personal goals.

A study of farmer participation in voluntary EU agri-environment measures (AEM) found that monetary gain was a more important driver of participation in complex AEM (e.g. specific management of a habitat or species), whereas the importance of monetary gains is variable depending on the farmers' reasoning for relatively simple AEM's and the importance of other considerations such as environmental effects, production potentials, and goodness of fit in their farming system (Van Herzele et al., 2013). In a study of an afforestation AES in Germany, Lienhoop and Brouwer (2015) using choice experiments and qualitative interviews found that contract duration and scale of AES provided strong disutility to farmers. Farmers were found to at least require subsidy payments to be equivalent to existing land-uses (Lastra-Bravo et al., 2015; Lienhoop and Brouwer, 2015). The work by Lienhoop and Brouwer (2015) indicated that farmers would also be willing to receive lower subsidy payments if they were provided with technical management advice and had the opportunity to return to farming based land uses after contracts ended. This indicates that both flexibility (or a reluctance to make irreversible long-term commitments), goodness of fit, and risk influences the uptake of some AES.

Using a Theory of Planned Behaviour model to investigate factors that are associated with farmers intention to perform unsubsidised agri-environmental measures (i.e. farmers exhibiting positive environmental management behaviour, but not participating in subsidised AES scheme), van Dijk et al. (2016) found that self-identity was the dominant predictor of farmers' intentions. Other significant factors included attitude towards the usefulness of unsubsidised agri-environmental management, perceived social norms and perceived personal ability to implement unsubsidised agri-environmental management. This would be reflective of those within the UK that have already adopted SFI practices and standards without subsidy. Pannell et al. (2006) suggests that conservation practices that do not provide a clear relative advantage (particularly in economic terms) or are difficult to trial by landholders will either experience non-adoption or low adoption.

#### 3.3 Summary of literature review

A big range of studies have been undertaken to understand factors influencing farmers decision making in environmental related issues such as participating in or withdrawal from agri-environment schemes (Lastra-Bravo et al., 2015; Brown et al., 2021), adopting best practices in environmental management (Baumgart-Getz et al. 2012;

Prokopy et al., 2019) and land use changes (Poppenborg and Koellner, 2013; Arnott et al., 2021). Broad themes of influences include internal and external factors. External factors comprise policy design, external enabling factors and market factors. Internal factors most commonly found in the literature are related to capacity of farm and farmer, farm management approaches and farmers psychological factors. Figure 5 provides a summary of the two sets of factors influencing farmers environmental management decisions found in extant literature.



Figure 5: Summative framework of factors influencing farmers environmental management decisions

Based on the identified factors and characteristics that influence either environmentally or productivist-orientated behaviour with either non-AES participation or AES participation, there are proposedly four combinations of different farmers and actions, which are:

- Those that exhibit environmentally-orientated behaviour and do not participate in an AES, as they already have or will voluntarily adopt agri-environmental practices without subsidy.
- Those that exhibit environmentally-orientated behaviour and participate in AES, as they adopt more-complex agrienvironmental practices when receiving lower levels of subsidises.
- Those that are productivist-orientated and do not participate in AES and are non-adopters of agri-environmental practices and remained focused on traditional/conventional farming systems.
- Those that are productivist-orientated and participate in AES, as they only adopt minor incremental agrienvironmental practices when subsidised, and would require high levels of subsidisation to adopt more complex agri-environmental practices.

#### 4. METHOD

# 4.1 Data collection

Qualitative in-depth semi-structured interviews were conducted with 34 farmers. Potential participants were normally initially contacted by email, and then followed up with phone calls. Most of the farmers were initially contacted during August and September, a busy harvest season for arable farmers. In total, 347 farmers were contacted in successions which gives a response rate of nearly 10%. Efforts to recruit respondents were also made via the Farming Forum and social media such as Twitter and LinkedIn.

All interviews were conducted either on Zoom, TEAMS or via phone. All interviews were recorded and fully transcribed. Five of the interviewed farmers also provided written confirmation about the costs and payments received from SFI.

#### 4.2 Data analysis

Data analysis was conducted in two phases: thematic content analysis in NVivo and fuzzy set qualitative comparative analysis (fsQCA). Phase one involved thematic content analysis of the interviews in NVivo. This involved open coding of descriptive themes, axial coding (categorising and recoding) and selective coding (refining on axial coding and identification of relationship) (Bazeley and Jackson, 2013). Three broad themes were used to categorise the codes: 1) farmers' understanding and knowledge about agricultural policy and the ELM, 2) farmers' plans and actions in response to the proposed changes of agricultural policy in England, 3) farmers' views and attitudes about the ELM in general and SFI and perceived costs and benefits of participating in SFI pilot. Attributional information about farmers and their farming business were also captured.

The results of this qualitative analysis were fed into phase-two fsQCA to explore the similarities and differences in factors which might help to explain farmers' responses to ELMS and the SFI pilot. FsQCA is a configurational approach underpinned by the assumption that conditions for the presence of a particular action may be different from those for the absence of the action. This is different from conventional linear analysis based on correlational additive effects. It also assumes that one outcome may have multiple conditions and multiple combinations of conditions (pathways). To conduct fsQCA, calibration of the scales was essential. Details of the variables used and how each variable was measured and calibrated can be found in Table 1.

One important feature of the QCA is the identification of necessary and sufficient causes or conditions. A test of necessary and sufficient conditions against each of the four outcome variables was conducted. Ragin (2008), the developer of the software fsQCA, explained the meaning of necessary conditions and sufficient conditions clearly as quoted below:

"A cause is defined as necessary if it must be present for an outcome to occur. A cause is defined as sufficient if by itself it can produce a certain outcome. This distinction is meaningful only in the context of theoretical perspectives. No cause is necessary, for example, independent of a theory that specifies it as a relevant cause. Neither necessity nor sufficiency exists independently of theories that propose causes. Necessity and sufficiency are usually considered jointly because all combinations of the two are meaningful. A cause is both necessary and sufficient if it is the only cause that produces an outcome and it is singular (that is, not a combination of causes). A cause is sufficient but not necessary if it is capable of producing the outcome but is not the only cause with this capability. A cause is necessary but not sufficient if it is capable of producing an outcome in combination with other causes and appears in all such combinations. Finally, a cause is neither necessary nor sufficient if it appears only in a subset of the combinations of conditions that produce an outcome. In all, there are four categories of causes (formed from the cross-tabulation of the presence/absence of sufficiency against the presence/absence of necessity" (Ragin, 2006, P. 42-43).

The follow-on fsQCA is unnecessary for necessary conditions with consistency greater than 0.8 (the threshold level recommended by Ragin (2008)). As the main outcome for this study is for O1 where only necessary conditions were

identified, it was decided a table to show the necessary and sufficient conditions for four key outcomes (presence and absence) would be appropriate and easier for the key stakeholders to understand.

Code	Variable	Role of variable	Measure
01	Applied to participate in SFI pilot (5 not	Outcome	Binary (1- Yes, 0 -No)
	eligible were excluded)		
O2	Action planned or taken in preparation for	Outcome,	Binary (1- Yes, 0 -No)
	the change of policy in England	Condition for O1	
03	Worked out the amount of reduction of direct	Outcome,	Binary (1- Yes, 0 -No)
	payment until 2027	Condition for O1 and O2	
O4	Diversification undertaken	Outcome,	Binary (1- Yes, 0 -No)
		Condition for O1, O2 & O3	
C1	Participated in ELM Tests & Trials	Condition	Binary (1- Yes, 0 -No)
C2	Participated in existing agri-environmental	Condition	Binary (1- Yes, 0 -No)
	schemes (CS, ELS and/or HLS)		
C3	Moderate or good understanding of policy	Condition	Binary (1- Yes, 0 -No)
C4	Good understanding of policy	Condition	Binary (1- Yes, 0 -No)
C5	Moderate or good ELM awareness	Condition	Binary (1- Yes, 0 -No)
C6	Good ELM awareness	Condition	Binary (1- Yes, 0 -No)
C7	Reliance on direct payment of BPS	Condition	Binary (1- Yes, 0 -No)
C8	Direct payment as a major source of income	Condition	Binary (1- Yes, 0 -No)
C9	Very large farm*	Condition	Binary (1- Yes, 0 -No)
C10	To maximise financial returns as a farming	Condition	Binary (1- Yes, 0 -No)
	goal		
C11	Education – Bachelor's Degree or above	Condition	Binary (1- Yes, 0 -No)
C12	Risk taking approach (4 data points)	Condition	0.05 rarely take risk
			0.27 sometimes take risk
			0.73 take calculated risk
			0.95 often take calculated risk

Table 1: Variables used in fsQCA and their measures

\*Note about "Very large farm" - Farm size was calibrated based on the average farm size of the sector of the primary farm business given by the respondent. The sector average was taken from DEFRA's June survey report. Calibration was conducted as below: double the sector average as 0.95, average as 0.5 and half the average as 0.05. This generated 15 data points ranging from 0.05 to 1. Twelve were converted as "1". Overall, this sample is biased to more than sector average farms (81.2%). It was decided to create a new variable named "Very large farm" with 1 being "1" in the calibrated data and all others being 0, meaning not very large.

# 4.3 Sample

The sample is largely representative of the production sectors (i.e. beef, sheep, dairy, arable, pork) across a range of farm sizes, geographical locations and land types (Figure 6). Whilst the primary farming business represents mainly arable, beef, dairy and sheep, the pork sector was represented by one farm with free range pigs as their secondary farming business, and another farmer recently transitioned out of pig production and focused on beef and sheep only.



Figure 6: Summary of sampled farming businesses: location of the whole sample farms and SFI pilot sample farm

The farmers' age ranged from 30 to 80 with a mean age of 54, with seven respondents being female and 27 were male. Fourteen farmers had achieved a level of education to Bachelor's degree or above, nine HNDs, four A levels, six GCSE or equivalent, and one had no qualification (Table 2).



Table 2: Descriptive profile of all sampled farmers and SFI Pilot participants

Over 1/3 of the farmers (n=13) interviewed will take part in the SFI pilot. Of the 21 who are not participating in the SFI pilot, five were not eligible, two applied but then withdrew, two may apply in the next round, one unclear and one intended to apply. The remaining non-participating 10 farmers expressed no interest in applying for SFI. In regards to the ELMS test and trials, 10 farmers participated and 22 didn't as shown in Table 3. Of the 13 ELMS test and trials participants, eight subsequently applied to take part in the SFI pilot.



Table 3: Sample distribution on ELM Test & Trials and SFI Pilot participants

Most sampled farms are lowland farms with a mixture of tenanted and owned land. Types of ownership are very much distributed among the different primary sectors with tenanted only farms within the interviewed sheep and arable farms (Figure 7).



Figure 7: Distribution of agricultural land tenancy across sampled farms by primary sector.

The level of BPS payments for farms within each sector are somewhat reflective of the scale of the farming operations, with more arable farms receiving higher levels of BPS payments in comparison to all other sectors (Figure 2). Farmers interviewed from the sheep sector received the lowest levels of BPS payments, which also had the highest proportion of farms that were below average in scale.



Figure 8: Level of BPS payments received by sampled farms in each primary sector.

The SFI standards being trialled by farmers participating in the SFI pilot was quite mixed across the different sectors (Figure 9). In total there were 35 individual standards being implemented across the 13 farms participating in the SFI pilot. The exceptions were the arable and horticultural soils standard and the arable land standard, both of which were only being trialled by arable farms, and the water body buffering standard that was only being trialled by a beef farm. Farms from most of the other sectors were found to be trialling the remaining standards. This is somewhat reflective of the mixed farming systems (multiple enterprises) being operated by many of the interviewed farmers and the non-enterprise specific nature of some standards that require land use change (i.e., hedgerows and farm woodland).



Figure 9: Distribution of SFI Standard trialling by primary sector for the 13 sampled farms participating in the SFI pilot.

In summary, the sample is largely representative of the famer profile and the split between SFI pilot participants and non-participants is considered to be reasonable although there was a concentration of respondents located in Yorkshire.

# 5. FINDINGS

This section provides results on the following five themes:

- 1. Current situation and existing actions
- 2. Farmers' knowledge and understanding of agricultural policy and the ELM schemes and their sources of information and advice
- 3. Farmers' environmental interests, farming goals and farming management approaches
- 4. Farmer responses to the change of agricultural policy in England
- 5. Factors influencing farmers' actions and responses to the changes

# 5.1 Current situation and existing actions

This section presents the current situation of the respondents in terms of whether they have taken part in any agrienvironmental schemes, how reliant and in what way they are reliant on direct payments, and what diversification activities have been undertaken so far. Table 4 provides a summary of the responses.

Table 4: Current and prior participation in agri-environmental schemes, reliance on BPS and diversification for all sampled farms

Have you taken part in any existing agri-environmental schemes?	Frequency	%
No	10	29.4%
Yes	24	70.6%
How much do you rely on direct payment from BPS?		0.0%
Reliant	15	44.1%
Somewhat reliant	5	14.7%
Not reliant	14	41.2%
How has direct payment supported your farm business?		0.0%
A major souce of income to achieve profitability	15	44.1%
A minor souce of income	15	44.1%
Buffer for price volatility and other uncertainties	7	20.6%
Working capital for fertiliser, labour and rental	5	14.7%
Investment to improve farm infrastructure	3	8.8%
Low food price	2	5.9%
Have you undertaken any diversification activity previously?	-	0.0%
No	10	29.4%
Yes	24	70.6%

Firstly, more than 70% (25 respondents) have taken part in government-funded **environmental schemes** (Table 5), 18 of those were in Countryside Stewardship and 14 were in Environmental Stewardship. Many signed up for multiple schemes. Mid-tier Countryside Stewardship (n=12) and Entry level of Environmental Stewardship (ELS) (n=12) were the most commonly taken options.

 Table 5: Frequencies of participation and type of participation in Countryside Stewardship and Environmental

 Stewardship schemes

Countryside Stewardship		су	%
Countryside Stewardship higher-tier		1	2.9%
Countryside Stewardship mid-tier	-	12	35.3%
Countryside Stewardship standalone capital grants		9	26.5%
Water quality		7	20.6%
Boundaries, trees and orchards		4	11.8%
Environmental Stewardship			
ELS		12	35.3%
HLS		6	17.6%

Nine of the farmers who have participated in existing agri-environmental schemes applied to participate in SFI pilot with three being in both countryside stewardship and environmental stewardship (with one in HLS), three only in countryside stewardship and another three only in environmental stewardship scheme.

Regarding **reliance on direct payments**, just over 40% (14 respondents) of sampled farms indicated that they were not reliant on direct payments. Those who relied on direct payments saw this as a major source of income to achieve profitability. When asked about the impact of the reduction of the BPS on their farming business, the responses provided as shown in the word cloud below (Figure 10) demonstrates how reliant those farmers are on direct payments.

do rely on the payment i'd struggle a big reduction cannot replace the loss heavily reliant on it devastating necessary affect us greatly massive loss long-term how long i can survive it will have a big impact

# Figure 10: Word cloud of BPS reliant farmer responses to the removal of BPS and the impact on their farming business

For those who believed that they might not be affected as much, direct payments were not seen as a major source of income, but to have provided some buffer for uncertainties such as bad weather, diseases and price volatility of inputs and outputs. Most of those used the direct payments to cover their running costs, such as rental and input materials, or to invest in farm infrastructure such as upgrading machinery. Most acknowledged that they will have to do things differently.

Fourteen farmers were clear that they were not reliant on the BPS and the payments were seen as "icing on the cake". Some respondents were very much resentful of the word "subsidy" as they believe the payments were used to subsidise consumers rather than subsidising farming. Some were very clear that farmers were producing food as a public good and the ecosystem-services provided by farmers should be paid for by the public.

The interviewed farms were grouped into three categories using relative farm size calculated against the average size of each farming sector (in area for 'arable' or in number of animals for other sectors) as reported in DEFRA June survey report 2020. Farms which were less than the sector average were grouped as small farms. Farms with size from average to double average of the sector were grouped as medium and those which were more than double average of the respective sector were classified as large farms. As shown in Figure 11, large farms were less reliant on direct payments with 83% of small farms (n=5) being reliant whilst only 22% of large farms (n=4) were reliant.



# Figure 11: Reliance on direct payments by farm size and farming sector

When comparing across the farming sectors, the most significant difference was between sheep farmers and dairy farmers. Sheep and beef farmers were the first and second most reliant on BPS with only 25% (n=2) of sheep farmers

and 28.6% (n=2) beef farmers reported being 'not reliant' on BPS. Dairy farmers were the least reliant with 5 out 7 being 'not reliant' (71.4%) and 41.7% of arable farmers (n=5) were not reliant on BPS.

**Turning to diversification activities reported** by the interviewed farmers, 24 reported to have considered or previously undertaken diversification activities either on-farm or off-farm (Table 6). Financial drivers were the most reported reason for diversification due to the need for an extra source of income and making use of surplus capacity on farm.

a. Type of diversification	Freq	luency	b. Reasons for diversification	Frequer	ıcy
Farm premises		16	Extra source of income needed	16	
Agricultural contracting		6	Extra capacity	6	
Clean energy		6	Proactive planning	6	
Farm shop or equivalent		4	Influenced by social referents	4	
On-farm recreational activities		4	Had innovative ideas	2	
Farm specialisation		3	Personal aspirations	2	
Off-farm employment		3	Spreading machinery costs	1	
			For environmental reasons	1	
			Government incentive for turbine	1	

Table 6: Types and reasons for diversification in farming businesses

Making use of farm premises for accommodation, industrial/commercial purposes or storage were the most popular options. Other activities included agricultural contract work, entering into clean energy sector, opening farm shops, running recreational activities or conducting more specialised farming activities. Figure 12 shows more details under each type of activities.





Funding sources for diversification included bank loans, private businesses, developers, government grants, inheritance and personal savings.

Nine respondents reported no diversification activities at all. Reasons given for not diversifying included:

- Restricted by land renting agreement and planning permissions
- Not wishing to cover good productive land with solar panels
- Wanting to focus on what one is good at, which is farming (sticking to the core business)
- Restricted by farm size, location, capacity and capability
- Financial barriers and risk of failure
- Near retirement age

5.2 Farmers' understanding of agricultural policy, awareness of the ELMS and their views about ELMS and in particular the SFI

#### 5.2.1 Understanding of agricultural policy

More than half the respondents (19 in all) regarded their **understanding of government policy** as either "reasonably good" or "good". Nine believed that they had a "low level" of understanding the policy and six claimed a "moderate" level of understanding (Table 7).

Table 7: Level of understanding of agricultural policy and awareness of ELM in sampled farms



As for the **awareness of the ELM**, five respondents considered their level of understanding about ELMS to be "limited or very low". Half the respondents considered they had "moderate awareness of ELMS", and about one-third considered their level of awareness to be "good".

#### 5.2.1 Views about ELMs and SFI pilot

Respondents were asked about their views on ELMS in general and the SFI pilot in particular. There were more negative views than positive views for both as shown in Figure 13 below.



Nine respondents expressed **positive views** about ELMS. In terms of the scheme design, two believed that it was good in principle and the aims for the countryside were good and hoped that everyone can apply for the lower level of the SFI. Three believed that the payment will still support farming but in different ways. Some believed that it was also good that the government is consulting farmers as commented by Respondent 3: "*The point of the pilot is to find out what does work before it becomes mandatory*".

Ten respondents said that they could not comment because they did not know enough about it.

Regarding views on the SFI, overall, the themes are very similar to those about ELMS. Positive views included:

- Going in the right direction
- Convinced that it's a good theory
- There is a need to change intensive farming
- Easy to get into lower SFI standard levels particularly

Commenting on the potential impact of SFI on the farm business, six respondents indicated that it will be straight forward and there should be no major challenges. Those farmers were either already doing it or had carefully selected standards to suit their farm structure. One respondent mentioned that this will be a good opportunity for them to take less profitable areas out of production.

Eight respondents commented on concerns about the **cost implications of SFI standards** if they have to do something new. This included soil testing and the challenges on the establishment of insects and pollinator mixes. One was worried about whether they will be able to make mid-way changes or reclaim the land after the end of the scheme. Four commented on their worry about compliance and potential repercussions.

**Negative views** about ELMS were provided by 24 respondents in the following four areas:

- Communication and clarity and related uncertainties
- Scheme design
- Lack of trust in government's motivation
- Payment rate not attractive enough

Eight respondents commented about the need for better **communication and clarity** of directions. Some were concerned that it was too complicated for some people as explained by Respondent 07:

"I have worked in a professional capacity and managed a large department. I had to read documents and apply for grants, et cetera. ... I've got someone helping me to fill this in. The two of us together are thinking this is crazy."

There was also some confusion about the definition of sustainability and public goods. Some farmers asked whether food is a public good. Some commented on whether maturing shrubs should be allowed to mature or whether they will have to cut down to fit the rules for payment.

Closely related to the community and clarity is the sense of uncertainties caused by the potential changes. Many farmers commented on the unfairness that the reduction of the direct payments has already been implemented whilst the new schemes are still in trials and piloting.

Regarding the **scheme design**, 17 respondents commented on this. Five of those commented on the need to distinguish between different types and sizes of farms. There is a need to assess what is already on farm rather than focusing on new actions. There was a feeling that the new schemes will harm small farms and benefit large farms and land owners. Some believed that the government want to give up food production completely as commented by Respondent 22: "I think they're going to let agriculture go to the wall in this country. The ELM scheme is their token gesture." This does

not fit into many farmers' values who believed that farmers' role is to feed people. One farmer commented that "*you can't eat trees*". Some believed that this is the same as Countryside Stewardship and Environment Stewardship. Why should we reinvent the wheels? Whilst some others would like to see more radical changes and more options and felt disappointed that it is a waste of an opportunity.

There was a considerable **lack of trust in the government's motivation**, some believing **it's all about cutting costs** and diverting money to other areas. One farmer commented that 75% of the budget for all agricultural support is not spent on supporting farmers directly due to perceived costs of monitoring, enforcement and other support activities provided by DEFRA and relevant advisory bodies. Some commented about the consultation process and suggested that it was done too late. It should have "*started three years ago but they are still making it up*". Some believed that the consultation was **delivering a pre-written conclusion**. Some farmers were concerned about the constant changes and updates. They felt that they can't make plans when not knowing what is going to happen. The lack of trust in government is also reflected in the perceived **incoherence of policies between sustainable farming and international trade**. Many farmers felt that the new trade deals will mean importing food with lower standards and higher negative environmental impact which is contradictory to sustainable farming messages for UK agriculture. Farmers expressed the importance of the government supporting local food production as shown in the quotes below.

"If you want farmers to stand on their own two feet, you can't let in cheap food from Australia produced at lower standards. The trade policy is absolutely key. In fact, you can probably save loads of public money and do more good by very careful trade policy than anything else. **All the good work of ELMS and things like that could be eclipsed in one final swoop by signing a trade deal with Brazil or the Australian**." (*R6*)

"I think for the environment, we are going to have to cut back on imports." (R8)

"I question which way the government needs to drive the industry of the country. Stop worrying about importing things, let's drive people to produce them at home." (R17)

More than half of the respondents (N=14) felt that the **payment rate is too low or not attractive enough**. One raised doubt that there was proper costing research done on the schemes. There was a need to not only properly consider the opportunity costs of taking land out of production, but also to **pay farmers to provide the environmental services** for the general public as expressed by these two farmers: *"We should be paid to be the custodians of the countryside." (R17) and "I expect they trim their garden hedges nicely and keep their lawns cut." (R14).* 

# 5.2.3 Recommendations made by farmers

Recommendations and general comments made by some respondents include: 1) more individual farm support or payment to cover consultation costs, 2) farmers' economic sustainability should be prioritised, and 3) more flexibility and more localised assessment about the eligibility of farm for SFI standards and 4) SFI application process.

A number of farmers commented the need for more **individual farm support** directly from DEFRA or RPA. Otherwise, the scheme should include **costs for using a consultant** for making applications and claims. This is particularly needed for small farms or those who are not that computer literate as commented by Respondent 07:

"How many farmers who are small like this are necessarily going to be able to afford to have someone to help them to do it? ... There's no payment for getting your application in. In my opinion, it's a wasted opportunity. There could have been a system brought in which allowed for the Rural Payments Agency to look at individual farms more closely and tailor broad schemes to individual farms, but that isn't really what this is about."

Another recurring theme was about the need to balance "carrots and sticks" and the need to recognise that farming is a risk-taking business due to external uncertainties and **economic sustainability of farmers should be prioritised**. R32 commented that "*if carrots are going, farmers may take more risk to break regulations*" and money which could have been spent on supporting farmers will have to be diverted to monitoring and enforcement.

Regarding the SFI pilot, many commented about the need for DEFRA advisors or local delivery groups to work with farmers more closely and not taking a one size fits all model. Five respondents suggested that there should be more **flexibility to allow tailored plans and more appreciation for what the farm already has**, and what one can do relatively easily to improve as shown in the quote below from Respondent 24:

"it's not even better than nothing because it's giving you money for tying your hands behind your back basically. I think yet again, it's one-size-fits-all. There's no flexibility, there's no sense of valuing what you might already have on your own really."

Respondent 23 also commented that

"for a North Yorkshire moorland, upland farmer, or a Cumbrian upland farmer, it's not going to work. They need completely different approaches. From that point of view, I think, although it's complicated for DEFRA to manage, I think they could have achieved so much more by just creating local delivery groups and allowing the farms to look at the public goods that were being sought and come up with their own proposals to deliver them with a good degree of flexibility and agreed custom farm plans for each farm."

Regarding the guidance and support provided and the **application process**, some commented about the application platform not being user-friendly and one person mentioned that they had to go back four steps to find out instructions. Some suggested a hardcopy manual would be useful.

# 5.3 Farmers' sources of information, farming goals and approaches

Regarding the **sources of information** about agricultural policy and the ELM schemes, the most mentioned was farming press/media, with two farmers claiming that farming press was their predominant sources (Table 8). Farming press mentioned included Farmers Guardian, Farmers Weekly, and Farming Today on Radio 4. Consultants and agents were the second most used sources. Most of those farmers tended to use consultants or agents to help with claims and grant applications. The costs of using consultants for such matters ranged from under £500 to over £5,000 per year. Informal networks included farmers discussion groups, neighbours or other farmers, the Farming Network, the Farming forum, Agricultural shows and auctions.

Information sources	Frequ	iency	%
Farming press		19	55.9%
Consultants and agents		14	41.2%
Informal network		14	41.2%
Government sources		13	38.2%
Other organisations		13	38.2%
Websites in general		9	26.5%
Social media		7	20.6%
Family members		6	17.6%

Table 8: Information sources regarding agricultural policy for all sampled farms

Eleven respondents reported government sources including DEFRA (including their blogs), Rural Payment Agency, and Natural England. Some respondents were very positive about DEFRA sources, suggesting that they are very "*accessible and up to date*". The quotes below compared different sources of information and how DEFRA has increasingly become the primary source of information about policy issues.

"Historically it would probably have been Farmers Weekly and possibly online articles and possibly or probably quite heavy reliance on the NFU and them distributing information. I've now started or signed up to, I don't know whether I've got them all, but some of the DEFRA blog posts that are written. I found those quite useful. They tend to be quite accessible now. They're quite well written. They're quite up-to-date obviously with the information that comes out. They come straight to my email, so I'm able to read them in the evenings or whatever. I wouldn't say they're necessarily the primary source of information, but they've become very significant in terms of my understanding of the wider schemes and options available.

I get quite a lot of information off the internet in various forms. I try not to get drawn too much into the slanging matches that tend to go on. I would much rather know that something is happening and then go and look for the information myself. I'm quite happy going and finding the information if I know that something exists. Then the primary source of information generally is DEFRA, to get it straight from the heart of where it should be coming from." (Respondent 32)

Other organisations such as NFU, AHDB, CLA, NSA and internet searches in general were used by some respondents. Social media such as Twitter and Snapchat were mainly used by younger farmers.

Respondents were finally asked about their **farming goals.** Most respondents (n=22) aimed to be able to pass on a "healthy sustainable business" to the next generations. One respondent was actively considering leaving farming. Nine aimed to maximise financial returns with another nine seeing diversification as a way to reduce reliance on farm income. Two indicated to carry on with little change to preserve their way to life. Answers to this question were not exclusive as some chose a combination of two.

About adopting **new methods and practices**, of all the sampled farms, four considered to be pioneers who like to be the first to adopt and seven early adopters. Majority (n=20) claimed to be late adopters. Two would like to wait and see what happens on other farms, and one preferred not making changes at all.

As for **risk-taking approach**, nine respondents claimed that they rarely took risks and eight sometimes took risks. Eleven chose to take calculated risk and six often took calculated risks.

# 5.4 Farmer responses to the change of agricultural policy in England

This section explores farmers behaviour in response to the proposed policy changes. Four questions were asked about their responses as shown in Table 9.

	Frequency	%
Have you worked out how much reduction you will receive from BPS until 2027?		
Not worked out how much reduction	11	32.4%
Some knowledge but not worked out the exact amount of reduction each year	9	26.5%
Have worked out the exact amount of reduction each year	14	41.2%
What actions have been taken or planned to prepare for the proposed changes?		
No action and no plan	7	20.6%
Planning only	3	8.8%
Planned	6	17.6%
Action taken and planned	12	35.3%
Action Taken	6	17.6%
Will you participate in the SFI pilot?		
Yes	13	38.2%
No	15	44.1%
Not eligible	5	14.7%
Unclear	1	2.9%
Have you participated in ELM test and trials?		
Yes	13	38.2%
No	21	61.8%

#### Table 9: Farmers responses to agricultural policy changes in England

For the questions "**Have you worked out how much reduction you will receive from BPS until 2027**?", only 41.2% (n=14) have calculated the exact amount of income reduction in each year. Of the 14 farmers, two had relied on a consultant, one used an NFU chart and two used the AHDB calculator. The others all indicated that they have worked out the reductions themselves. Nine said they had some knowledge of the reduction on a sliding scale but had not worked out the exact amount. Two of those indicated that they were not worried about it because it was not a big part of their income. Eleven respondents had no idea about how the changes will impact their income. Five of those farmers indicated that they were not aware of any direct payment calculators. Reasons for having not worked out reductions at all included:

- one currently selling the farm and will move to Scotland
- one mentioning exiting farming if the farm was no longer profitable
- two were not worried because BPS was not a major component of their farm income, as one farmer said *"I've never really had a need"* (Respondent 29).

When comparing by farming sector, it is evidence that more beef (71.4%) and arable farmers (50%) have worked out reduction of BPS than dairy (14.3%) and sheep farmers (n=25%).

In response to "What actions have been taken or planned to prepare for the proposed changes", more than half of respondents (52.9%) have planned their responses to the proposed changes, and about one-fifth (20.6%, n=7) have no plans.

Of those seven farmers who have made no plans at all, reasons given include:

- Not worried because BPS was not a big part of their income
- One believed that their farming system might suit the new scheme, hence, no actions need to be taken at this moment.
- One farm has naturally evolved into being less and less reliant on direct payment.
- Three mentioned that they were just uncertain about what is going to happen and therefore cannot make any plans ahead as mentioned by Respondent 14: "*No, because I don't know what the challenges are going to be. I'm carrying on as normal till I find out what's happening*".

Of those who have actions planned or already taken **actions**, seven farmers mentioned either getting ready for the new scheme or entering into some other existing schemes. Two farmers mentioned scaling up to make up for the income loss. Other options included: improving efficiency by cutting costs, cutting spending, slowing down progress (constraining investment) and scaling down.

**On-farm diversification** was by far the most mentioned action/plan (n=13), including using extra farm premises (n=6), building for clean energy (n=4), setting up a farm shop or direct selling, such as fresh boxes (n=4), specialising in breeding, doing more farm contracting work, or attracting private sector payments through carbon capture. Three farmers also mentioned some off-farm diversification, including getting an extra job and developing properties outside the farm.

Chi-square tests of two groups on actions taken or not against key farm attributes farm size and primary farming sector indicated no statistically significant differences across different groups. Figure 14 shows the cross-tabulated distribution of the responses in percentages.



Figure 14: Distribution of responsive actions by farm size and farming sector

**Regarding the participation in ELM Test and Trials**, twelve respondents had participated in five types of test and trials (TT) as shown in Table 10 below. Some took part in more than one test and trial activity. Overall, as most TT involved paper-based exercises or online meetings, the costs were mainly time spent, which overall were covered by payments.

ELM Test & Trials activities	Frequency
Catchment sensitive farming	1
Collaboration models and incentives	1
Development of land management plans	3
Evaluation of advice and guidance	5
Innovative delivery solutions	2
Testing payment rates and methods	3
unclear	3

Table 10: Farmer participation in ELM Test and Trials

One reason for taking part in the ELM Test and Trials worth highlighting is the social benefits seven farmers cited. This included developing their own understanding, giving feedback to the policy makers and engaging with other farmers. One farmer commented that "one of the hidden benefits is actually getting together with a group of likeminded farmers and comparing notes and there's always that little bit of peer pressure to do better than someone else" (Respondent 16). R11 also commented that "it's good to meet with your neighbours and discuss these things and see how other people are and meet the same challenges economically". They also felt good about being able to give "a little bit of influence on how policy is going to be shaped in the future" (Respondent 16).

However, there was also mistrust in the government. Some farmers were not convinced about the consultation process saying that "*what became of it all and to what extent the feedback was included in anything, I don't know*" (Respondent 7) or "*they were delivering a pre-written conclusion*" (Respondent 23).

Finally, regarding participation in the SFI pilot, five interviewees were not eligible to participate in the SFI pilot due to being in Countryside Stewardship or Environmental Stewardship. Of those who are eligible, 13 have applied and waiting to sign the agreement, 16 will not participate including two who applied but then decided to withdraw (see reasons in Table 8), and one was unclear whether the scheme they applied for was SFI or not. How the 13 potential participating farms spread across the schemes and farming sector is presented earlier in Figure 9. Figure 15 shows the level of standards in which the farmers will participate. Some farmers were still unclear about which level of standards they are going to sign for.



*Figure 15: Distribution of SFI pilot participation in Intermediate and Advanced standards, including those that were unclear about their standard level.* 

Table 2 and Figure 6 in Section 4.3 showed the SFI pilot farms' location, land tenure and land terrain, participants' education and age in comparison with the all sampled farms. The data indicates that the profiles of SFI pilot participating farmers is similar to all sampled farms, with the exception of the location.

Reasons for participating in the SFI pilot are shown in Table 11 below. 'Financial incentives' is unsurprisingly cited by most respondents. Many signed up to make up for the reduction of BPS. This included explicitly the £5,000 incentive for providing feedback in the first year of the pilot. One respondent mentioned that they would not have signed up without the £5,000: "*The only reason that I'm doing it really is because we're going to get this extra payment for doing the consultation side of it. Honestly, the money that we get for having our hands tied behind our backs is just not worth it.*" (R24)

The second most cited reason was to influence the policy to ensure the new schemes would work for them. Others were influenced by family members, farm managers or friends. Concerns for the environment was mentioned by three farmers. Those who wanted to test and see if the SFI works for them also mentioned that the fact that this is a pilot means they can withdraw more easily if it doesn't work for them. They also believed that it may not be as harsh as some set-in-stone schemes. Most of those were unsure if they will continue with the SFI after the end of the SFI pilot, as they wanted to test and see.



Table 11: Distribution of reasons for participating in the SFI pilot

In terms of **expected financial costs and benefits of the SFI**, five farmers were able to provide specific payments expected over three years for each standard and four farmers provided an estimate of total payment for all standards. One did not provide any specific number but indicated that the payment is enough. One was unsure. Based on the

information provided, five categories were coded regarding whether the payment is enough to cover costs. Figure 16 below shows the distribution of the responses by SFI standards.



Figure 16: Expected costs and payments for each SFI standard

Of the 13 respondents, seven indicated that the payment will be enough or much higher than the cost, and one said it will just about cover costs. The "much higher than costs" was used when specific figures were provided and indicated so. For example, two respondents showed that the costs will be 50% of the payment received, and another one showed that there may be no extra costs required net of payment to meet the standard level they have signed up to. The "Enough" category was created for those who could not provide specific figures for payment, or cost or neither, but indicated that it should be enough. Three indicated that the payment is "not enough" as one will have to pay for soil testing, which can cost much more than the payment being received. Another that was labelled as "not enough" was based on the fact that the respondent indicated having to spend 15 hours per month to manage the two standards (Hedgerows and Improved grassland) but the payment expected was only £991 and £118 respectively. Three were "unsure" because one didn't provide any specific figure and the other indicated that they were unsure about the cost implications.

However, it is worth pointing out that majority of the respondents were unsure about the costs. Key cost incurring activities include:

- Costs of using agents One respondent mentioned that in order to save cost, they will have to attend a course for tree surveying themselves. The costs of the course fee and time spent may not have been taken into consideration by DEFRA. One farmer commented that small farms are more likely to rely on using an agent or consultant, the cost of which may not be considered by DEFRA either.
- Labour costs on management.
- Opportunity costs of having to take productive land out of production.
- Seed costs may be expensive and some wildflower seeds do not grow well in fertile soil as commented by one farmer "where we're going to struggle more and we're definitely going to incur costs is in the establishment of the insects and pollinator mixes and things like that because that's obviously going to take land out of production that hasn't been out of production before".
- Soil testing which can be much higher than the payments to be received.
- Time spent on making application and claims and giving feedback

Some indicated that there may be cost savings on labour and materials due to low input. Some indicated that it is hard to quantify whether and where cost savings may be achieved as shown by the following quote:

"I'm finding it a little bit hard to quantify because things like the hedge cutting we're going to go for every other year hedge cutting. We know that there will be a saving in the sense that the hedge cutter will only be on the farm doing half the hedges, but obviously, it's going to take him longer to do half the hedges. I'm not easily able to quantify where a saving might or might not occur there" (Respondent 32).

"Others chose standards which fitted into their current farming system. This meant no extra costs would be incurred from participation. As one mentioned: "I put it in something that isn't going to be that difficult. We are not intensive farm." (Respondent 34).

In terms of any changes to be made to meet the SFI standards, eight farmers indicated no major changes will be needed because they are already doing it and they chose the standards to suit their current system. Three farmers mentioned some changes needed to be made including doing soil testing, managing fields differently, and needing a mindset change as demonstrated by Respondent 11:

"The key changes we have to make: Our hedging, the hedges we cut and how we cut them. We'll have to obviously identify areas to take out of production. The rotation around the farm will need to change a little bit so that we can keep the ground cover that we have. It's something that shouldn't be underestimated. All these things worked well if you have a flat farm with the sheds in the middle and fields all the same size and you can rotate through perfectly. ... fields that we've got that are 45-degree slope. If we're changing to meet the requirements of SFI, we're going to have to manage those fields slightly differently. And so, it's going to be a conflict between the environmental policy and the structure of the farm." (Respondent 11)

In terms of other benefits of taking part in the SFI pilot, Table 12 shows the key aspect commented by the farmers and some exemplary quotes.

Other benefits	Exemplar quotes
Environmental benefit overall	the low input grassland one, which is the only one that I've really paid attention to so far. I suppose there will be potentially positive benefit for the natural environment (R28)
Soil health	We should get the benefits hopefully of having sown a nice cover crop which then should improve our soil structure and give us more worms and all that sort of thing (R21)
Wildlife	Hedgerows make a big difference. We've got one edge on the farm where we do that now where the margins aren't in stewardship because they're too wide. And I want to make the hedge bigger, and having a margin either side has allowed the hedge to be bigger (R11)
Social benefit – public engagement	it increased the relationship between the public and the farmer the majority of people do want to learn and they ask you questions (R09)
Social benefit – networking opportunity	I hope there'll be benefits in terms of networking and sharing information and so forth and actually feeding back and having some influence on the future (R07)

Table 12: Exemplar quotes from SFI pilot participating farmers on other benefits from participation

The majority of the sampled farms will not participate in the SFI pilot. Some believed that the **payment rate is too low** as expressed by Respondent 20: "*Personally, I think I can make more money out of intensifying*".

Some farmers believed that the participation will be very low: "*I've only known one person who's going into this environment scheme. Everybody else I've spoken to, it'll be no. They're all carrying on farming the same way.*" (*Respondent 27*).

Table 13 below indicates some of the specific reasons for non-SFI pilot participation with exemplary quotes.

Table 13: Exemplary quotes from non-participating SFI pilot farmers on reasons for not participating

Reasons	Exemplary quotes
Payment rate too low	The SFI doesn't pay enough to actually completely cover the costs of joining and any income lost by the change in land use. If in 5 or 10 years' time, you're going to find that you can't actually change the land use back into production, then you devalue the land as well. (R23)
Not suitable for tenanted land	we have no control over the short-term tenancies. Some of them we've had for 10 years now and you think I could have invested money to make it easier to manage those years ago, but because you didn't know how long you would have them for, it wasn't worth it at the time. (Respondent 29)
Not suitable for intensive farms	I would love to do more environmentally-wise field margins. That was my initial reason for joining it. To be honest, I actually loved. I'm in trial but I'm not applying. I registered, accepted, and then I decided to eventually pull out. We are quite an intensive farm. We housed livestock. Yes, I think it's extensive although high welfare and high standards now our soil quality is well maintained. I say for people like us, no, I don't think so, but for people who've got areas of poor ground in corners or fields or watercourses, then yes it could work. It didn't make sense then. Not financially. (Respondent 25)
Unsure about long- term directions	We've had a lot of trouble over the last few years, which I think is all linked to uncertainty in the payments and people are making shorter-term decisions more because they don't know what's going to happen longer-term. (Respondent 29)
Wait and see	I'm not sure whether it'll work for me or not. Like I said, there will be plenty of people who take it out, I guess. I'm not saying that I wouldn't in the future, but I probably need to look at it. We're not at that stage yet. (Respondent 20)
Not confident about making applications	I have paid someone to deal with my Countryside Stewardship. And I think I will need to pay her to help me fill in the forms for the Sustainable Farm Initiative. I don't think I can do it on my own. I don't think it'll be easy. (Respondent 08)
Simply not interested	I suppose it doesn't really interest me if I'm honest. (Respondent 12)

As mentioned earlier, two applied and subsequently withdrew. Apart from being "not eligible", reasons for not participating include suitability for integration into the existing farming system, restrictions to tenants, a sense of uncertainty about future policy, discontent about the need for a pilot, a lack of confidence in understanding the standards and making applications, or simply lack of interest.

# 5.5 Factors influencing farmers' actions and responses to the changes

This section addresses the objective of exploring the similarities and differences in attitudes of different types of farmers. In particular, it shows what type of farmers have applied to participate in the SFI pilot and what type of farmers have not, and what type of farmers have taken or planned to take actions in response to the agricultural policy changes and what type have not. As mentioned in the methods section, some variables were further calibrated and

preliminary tests were conducted on all the key variables. The variables which showed no consistency for necessary or sufficient conditions were excluded from further analysis. Table 15 shows the final set of variables with binary measures and one variable with fuzzy set computed 4 data points (risk-taking tendency). Outcome variables were indicated with prefix "O" and condition variables were indicated with prefix "C". Three outcome variables (O2, O3 and O4) were also used as condition variables for O1.

A test of necessary and sufficient conditions against the presence and absence of each of the four outcome variables was conducted. The meaning of necessary and sufficient conditions was explained in section 3.2 and further demonstrated in Table 14:

Types of condition	Example				
necessary but not sufficient	'Action planned or taken in preparation for the policy change in England' is a necessary but not sufficient condition for 'being an SFI pilot participant' because diversification (or many other activities) may also be seen as an action planned for the policy change in England.				
sufficient but not necessary	'Having dairy cows on farm' is sufficient but not necessary for the enterprise to be classified as an 'animal farm' (because an animal farm may only have other animals such as beef or sheep)				

Table 14: Examples of combinations of conditions in terms of necessity and sufficiency

QCA assumes that conditions for the presence of outcome may be different from conditions for the absence of outcome. Therefore, for each pair of outcome and condition, four tests were conducted (presence/presence, presence/absence, absence/absence). Table 15 shows the testing results of necessary and sufficient conditions for four types of farmers' actions. Only conditions with consistency level  $\geq 0.8$  (recommended threshold) are presented in the table. This means those conditions **more likely** (but not 100%) to appear for the particular outcome. If the presence of the condition is necessary, it is shown as "Necessary". If the presence of the condition is sufficient, it is shown as "Sufficient". If the absence of the condition is necessary, it is shown as "(~Necessary)", whilst the absence of a sufficient condition is indicated as "(~Sufficient)". In the note to Table 15, two examples are provided regarding how to read the table.

			Will participate in SFI Pilot		Action Taken/Planned		Worked out reduction		Diversification undertaken	
	Yes	No	O1 Yes	(~O1) No	O2 Yes	(~O2) No	O3 Yes	(~O3) No	O4 Yes	(~O4) No
	Ν	Ν	13	21	27	7	14	20	24	10
O2 Action planned or taken in preparation for the	27	7								
policy change in England			Necessary*	(~Sufficient)					Necessary	
O3 Worked out the amount of reduction of direct										
payment until 2027	14	20			Sufficient					
04 Diversification undertaken	24	10		Necessary	Sufficient					
C1 Participated in ELM Test & Trials	13	21		(~Sufficient)						
C2 Participated in existing agri-environmental										
schemes (CS, ELS and/or HLS)	25	9	Necessary		Sufficient		Necessary			
C3 Moderate or good understanding of policy	19	15			Sufficient				Sufficient	
C4 Good understanding of policy	9	25			Sufficient	(~Necessary)		(~Necessary)	Sufficient	(~Necessary)
C5 Moderate or good ELM awareness	29	5	Necessary*	(~Sufficient)*	Necessary		Necessary	(~Sufficient)		
C6 Good ELM awareness only	12	22			Sufficient					
C7 Reliance on direct payment of BPS	20	14			Sufficient				(~Sufficient)	
C8 Direct payment as a major source of income	15	19			Sufficient					
C9 Very large farm	13	21	(~Necessary)	Sufficient	(~Sufficient)	Necessary			Sufficient	
C10 To maximise financial returns - farming goal	9	25		(~Necessary)	Sufficient	(~Necessary)		(~Necessary)		
C11 Education - Bachelor's degree or above	14	20		(~Necessary)	Sufficient	(~Necessary)				
C12 Risk taking approach										
(4 data points .05, .27, .73, .95)	8, 8,	10, 6			Sufficient				Sufficient	

Table 15: Key variables used in fsQCA and the results of tests for necessity and sufficiency

Note: (~Necessary) - absence of the condition is necessary; (~Sufficient) - absence of the condition is sufficient.

Only conditions with consistency level >= 0.8 are indicated. \*The consistency level is 1.

Example of interpretation of this table using the first two results for the condition of O2 against the outcome of O1 (Yes) and ~O1 (No):

- (1) Necessary\* All SFI participants (O1) (n=11) have the condition of O2 (i.e. action planned or taken in preparation for the policy change in England).
- (2) (~Sufficient) At least 80% of those who have no actions planned or taken in preparation for the policy change in England (n=7) belong to those who will not participate in SFI pilot.

# a. SFI Pilot participation or not

For the 29 farmers who were eligible to apply for the SFI pilot, 13 applied and were likely to participate (O1) and 17 did not (including two who applied but withdrew) (~O1). Both were tested against the 14 conditions (O2 to C10). No consistent sufficient conditions were found.

Five conditions (O2, C2, C5, ~C9 and ~C13) were found to be necessary for the 13 potential SFI pilot participants. Firstly, it's self-evident that all SFI participants have the condition of O2 (i.e. action planned or taken in preparation for the policy change in England) because signing up to the SFI pilot is an action. But there many other actions which may not be "participating in SFI pilot". Therefore, O2 is a necessary but not sufficient condition for SFI pilot participation.

Other necessary positive conditions are: having participated in existing agri-environmental schemes (C2) (n = 11), having moderate to good levels of awareness of the ELM (C5) (n=13). Interestingly, SFI participants are less likely to be those who considered themselves to be opinion leaders and early adopters ( $\sim$ C13) (n=2), and not being a very large farm ( $\sim$ C9) (n=1).

However, conditions for those who are not going to participate in the SFI pilot are not just the opposite of conditions for participating. They are more complicated. As shown in the table, there are three necessary conditions (O4,  $\sim$ C10 and  $\sim$ C11) and four sufficient conditions ( $\sim$ O2,  $\sim$ C1,  $\sim$ C5 and C9). This means that more non-participants of SFI pilot:

- 1. have already undertaken and planned to undertake diversification activities (O4) (n=17/21);
- 2. do not see maximising financial returns as their farming goal (~C10) (n=17/21), and
- 3. have education just under Bachelor's degree level ( $\sim$ C11) (n=16/21)

Additionally, the four sufficient conditions mean that more farmers who have the following conditions are likely to belong to non-participants of SFI pilot (n=21):

- 1. having no plans or actions about the changes ( $\sim$ O2) (n=6/7;);
- 2. having not participated in the ELM test and trials ( $\sim$ C1) (n=16/20);
- 3. not having much knowledge about the ELM ( $\sim$ C5) (n=5/5), and
- 4. having very large farms (the 12 very large farms are all in this group) (C9) (n=12/12).

# b. Actions planned or not

Out of the total 32 farmers, seven farmers reported absolutely no plan or action in response to the policy changes. For those seven farmers, four necessary conditions exist which means that more farmers in this group do not have a good understanding of agricultural policy in general (~C4), do not see maximising financial returns as their farming goal (~C10), and have not obtained a Bachelor's degree (~C11). Six out of the seven farmers have very large farms. No sufficient conditions were identified.

On the other hand, those who have taken actions or have some plans or constantly planning and forward-looking, the vast majority (n=24/27) reported having moderate or good knowledge and understanding of the ELM. This is the only necessary condition. However, 13 sufficient conditions have been identified for this group of 27 farmers. They are:

- Worked out the amount of reduction of direct payment until 2027 (O3)
- Diversification undertaken (O4)
- Participated in existing agri-environmental schemes (CS, ELS and/or HLS) (C2)
- Having moderate or good understanding of policy (C3, C4)
- Having moderate or good ELM knowledge and understanding (C5, C6)
- Reliance on direct payment of BPS (C7)

- Direct payment as a major source of income to achieve profitability (C8)
- Not very large farms (~C9)
- Maximise financial returns as a farming goal (C10)
- Education level at Bachelor's degree or above (C11)
- High on risk taking (C12)
- Not being one of the first to adopt new methods and practices not an opinion leader (~C13)

The fact that these are sufficient conditions means that farmers in this group do not necessarily have to meet all of these conditions. A further analysis showed that no two farmers shared the same combination of the conditions. Therefore, no further typology analysis was conducted. However, the conditions which were reported by more than 15 farmers are highlighted in bold.

# c. Worked out how much reduction of direct payment will be for their farm until 2027 or not

Only a minority of farmers (n=14) have worked out the exact amount of income reduction. For those farmers, three necessary conditions have been identified. They are: having participated in existing agri-environmental schemes (C2) (n=12/14), having moderate or good ELMS knowledge (C5) (n=13/14) and majority do not see themselves as opinion leaders ( $\sim$ C13) (n=2/14 for 'no').

Of the 20 farmers who have not worked out the exact amount of reduction, two necessary conditions are a lack of good understanding of agricultural policy in general ( $\sim$ C4) (n=16/20) and maximising financial returns was not seen as their main farming goal ( $\sim$ C10) (n= 17/20). Having very limited knowledge of ELM ( $\sim$ C5) is a sufficient condition. Four out of five who reported limited ELMS knowledge have not worked out the exact amount of reduction.

# d. Diversification activities undertaken

Twenty-four farmers have undertaken some form(s) of diversification activities as described in an earlier section. No necessary but six sufficient conditions were identified. The six sufficient conditions are:

- 1. Having moderate or good understanding of agricultural policy (C3) (n=16/19),
- 2. Having good understanding of agricultural policy (C4) (n=8/9),
- 3. Not reliant on direct payment of BPS (~C7) (n = 12/14),
- 4. Very large farm (C9) (n=11/13),
- 5. High on risk taking (C12) (n = 15/17 who reported take or often take calculated risks), and
- 6. Being one of the first to adopt new methods and practices seen as an opinion leader (C13) (n=6/7)

Of the 10 farmers who have not undertaken any diversification activities, two necessary conditions are

- 1. Not having good understanding of agricultural policy (~C4) (9/10)
- 2. Not being one of the first to adopt new methods and practices seen as an opinion leader (~C13) (n=9/10)

This means that eight out nine who have not undertaken or planned to undertake diversification activities do not have good understanding of agricultural policy and do not see themselves as an opinion leader.

# 6. CONCLUSIONS

Conclusions are drawn based on the objectives set out in the introduction.

6.1 Key factors perceived by farmers which will affect their businesses

- 1) Loss of direct payments can affect about 60% of the farmers interviewed who will struggle to achieve profitability or will see a big reduction in profit. This means the farmers will lose buffer for price volatility and other uncertainties such as bad weather or disease outbreaks in particular. Even for those who do not rely on the direct payments will be affected in that they will make less investment in infrastructure. Some farms have to scale up to make up for the loss of income whilst other may scale down to reduce costs and reduce investment.
- 2) No respondents have expressed their design to take up lump sum and exit completely. This is because many believe the payment is not enough and many assumed that there will be a tax deduction and most would like to keep farming and pass the farm to the next generation. Not wishing to exit is particularly relevant to generation farmers whose lifestyle depends very much on farming and amenities.
- 3) The pace of policy changes and resulting lack of clear direction –The fact that Test and Trials and the SFI pilot are still ongoing and the reduction of payment has already been decided has caused major concern as this adds to the uncertainties for farmers and made it difficult for many farmers to plan ahead. This also caused considerable lack of trust in government.
- 4) Potential incoherence or contradictions between sustainable farming policies and international trade policy.
- 5) ELMS and the SFI, in particular, may mean that some farms may have to change their farm structure and farming methods. For some farmers, this was seen as a good opportunity to take loss-making unproductive land out of production to do something good for environment and biodiversity and get paid. Other farmers may also seize this opportunity to enhance soil health of their intensive farming land.
- 6) New schemes have also been seen as tying their hands behind their back. This sentiment has led to many farmers, particularly those who do not rely on direct payments, to consider not joining any new schemes in order to avoid restrictions or punishments.
- 7) Not assessing and rewarding what farms have got already in developing plans for new schemes has been raised as a wasted opportunity for genuinely enhancing sustainability in agriculture. Many respondents would like to see less of a one-size-fits-all approach and more individual farm-based scheme plans for delivering eco services.
- Tenant farmers, particularly those on short-term or annual rolling basis felt that their options are limited. Many commented that the new schemes will benefit big landowners.
- 9) The new scheme design may also affect small farms in that many of those farms may rely on using agents or consultants to make applications and claims. There was a strong recommendation for the new scheme design to include such costs in payment design.
- 10) ELM Test & Trials and the SFI pilot have been seen by some farmers as a good opportunity to help shape the direction of policy, to test water and learn from peer farmers. However, many felt that the consultations were delivering pre-written conclusions.

#### 6.2 Whether or not farmers have taken any measures informed by the proposed changes to plan for the future

- 11) Shockingly, about one third of respondents have no idea about the amount of reduction of direct payments until 2027.
- 12) About a third of farmers have begun to plan for reduced BPS income, and over a fifth of sampled farmers have undertaken no planning at all although some of those farmers indicated that it was because they were not reliant on direct payments whilst some others were just unclear about what implications are and just want to carry on as normal.

- 13) Many respondents expressed a need and wish to do things differently.
- 14) Of those who have actions planned or already taken actions, actions include getting ready for the new scheme or entering into some other existing schemes, scaling up or scaling down, improving efficiency, constraining investment were mentioned by quite a few respondents. Some farmers suggested that signing up for the Test & Trials or the SFI pilot was one of their actions.
- 15) On-farm diversification was the most favoured strategy to cope with the change in agricultural policy and reduced BPS income. Making better use of the farm resources and extra capacity on farm was the most commonly used practices. This include farm premises conversion, providing farm related services, spreading costs of machinery by providing agricultural contracting, direct selling through farm shop or online channels or local butchers, entering into new energy sector or developing farm specialisation.

# 6.3 The impact of participation in Environmental Land Management (ELM) test and trials have on farm business finances, including the costs and benefits

- 16) Twelve respondents had participated in five types of test and trials (TT). Some took part in more than one test and trial activity. Overall, as most TT involved paper-based exercises or online meetings, the costs were mainly time spent, which overall were covered by payments.
- 17) Key benefits of participating in Test & Trials were social benefits noted by some farmers who enjoyed networking with other farmers and like-minded people.
- 18) Being able to exert some influence on the policy development was another feel-good factor although some were not convinced that their feedback might make any difference. This is particularly the case for those who did surveys with multiple choice type of questions.

# 6.4 How farmers expect the Sustainable Farming Incentive (SFI) will impact on their farm business finances, what are the expected costs and benefits of SFI, and how SFI could be improved

- 19) A very important incentive for sign up was the £5,000 for giving feedback in the first year.
- 20) For just over half of the participants in the SFI pilot, the payments offered exceeded or met the anticipated costs of Standard participation.
- 21) Several key cost areas were identified. They are costs of using agents, labour costs on management, opportunity costs of taking productive land out of production and not being able to convert them back after the end of the scheme, soil testing, tree surveying and time spent on making applications, making claims and giving feedback
- 22) For the majority, farmers chose to meet SFI Standards that they were already doing, and as such required no major changes in their current farming systems.
- 23) For those sampled farmers not participating in the SFI pilot (62% of all sampled farms) the majority did not see the standards fitting with their current systems, the process was too burdensome or there was just too much uncertainty to consider the SFI in its current form.
- 24) Other benefits perceived include general environmental benefit, improving soil health, improving biodiversity and wildlife, public engagement and networking opportunities.
- 25) The process of application can be improved by simplifying online application platform, issuing hardcopy guidance or step-by-step manual an having more accurate mapping of farm structure linked to the application systems.
- 26) Another area for improvement is about the clarity and details of each standard so that farmers can easily understand how their farms can match the levels and standards. This goes alongside the need to cover agency or consultancy cost if no central services can be provided.
- 27) Finally, many farmers commented one the need for flexibility to cater for different farm types and sizes and recognise what is already in the farm and farm type and farm size.

#### 6.5 Similarities and differences in attitudes of different types of farmers/growers

- 28) Farmers who have worked out reduction of BPS payments and farmers who will participate in SFI pilot share three necessary characteristics - They are more likely to have participated in countryside or environment stewardship schemes, having moderate or good ELMS awareness but they do not see themselves as opinion leaders.
- 29) Additionally, farmers who will participate in the SFI pilot have planned or taken actions in response to policy changes, and do not have very large farms.
- 30) Those who have undertaken diversification, have no Bachelor's degree or above, and whose farming goal is not to maximise financial return are more likely to have not applied for the SFI pilot.
- 31) Most of those not having even moderate level of ELMS awareness tend to be those who have not applied for the SFI pilot and who have not worked out the exact amount of reduction of direct payments.
- 32) Farmers who do not have good understanding of agricultural policy are more likely to be those who have not taken action or planned in preparation for policy changes and have not undertaken any diversifications.
- 33) Those who do not have Bachelor's degree and do not have farming goal of maximising financial returns are more likely to have taken no action or planned in preparation for policy changes
- 34) Very large farms are more likely to have not planned for changes (possibly due to no reliance on the direct payment)
- 35) Very large farms, those what are not reliant on direct payment, those who consider themselves as often taking calculated risks and opinion leaders are more likely to have diversified.

In a nutshell, the key factors perceived by farmers which will affect their decision making included: 1) a desire to continue farming and maintain farming lifestyle; 2) uncertainties created by the loss of direct payments before the formal introduction of new schemes; 3) the high opportunity costs of taking out productive land for the new scheme; 4) potential of increased pressure from international trade, seen by most farmers as contradictory to sustainable farming messages from the government (i.e. importing food with lower standards and higher negative environmental impact); 5) insufficient reward in the new payment schemes of the natural capital created through sustainable farming; and 6) erosion of trust in government's motivation to introduce the new policy.

Overall, the uptake of the lump sum scheme to encourage exiting farming completely is likely to be very low. Many farmers will prefer more intensive farming to make up for the loss of BPS. Many farmers will not engage with the schemes to avoid possible restrictions or punishments. To achieve transformational changes for future farming in the UK, it is essential that the new policy will align farmers' economic sustainability with the expectations about environmental and social sustainability. Sustainable farming and food system in the UK should be seen as a shared responsibility in the society and the farmers should be rewarded for the eco-environmental services they provide not just on an income foregone approach, but on the basis of full recognition of the natural and social capital created through sustainable farming.

# 7. References

Baumgart-Getz, A., Prokopy, L.S., Floress, K., 2012. Why farmers adopt best management practice in the United States: A meta-analysis of the adoption literature. Journal of Environmental Management 96, 17-25.

Bazeley, P. and Jackson, K. (2013), Qualitative data analysis with NVivo, Sage Publications Limited.

Blackstock, K.L., Ingram, J., Burton, R., Brown, K.M., Slee, B., 2010. Understanding and influencing behaviour change by farmers to improve water quality. Sci Total Environ 408, 5631-5638.

Brown, C., Kovács, E., Herzon, I., Villamayor-Tomas, S., Albizua, A., Galanaki, A., Grammatikopoulou, I., McCracken, D., Olsson, J.A., Zinngrebe, Y., 2021. Simplistic understandings of farmer motivations could undermine the environmental potential of the common agricultural policy. Land Use Policy 101.

Burton, R.J., 2014. The influence of farmer demographic characteristics on environmental behaviour: a review. J Environ Manage 135, 19-26.

Burton, R.J., Paragahawewa, U.H., 2011. Creating culturally sustainable agri-environmental schemes. Journal of Rural Studies 27, 95-104.

Burton, R.J.F., Kuczera, C., Schwarz, G., 2008. Exploring Farmers' Cultural Resistance to Voluntary Agrienvironmental Schemes. Sociologia Ruralis 48, 16-37.

Cullen, P., Ryan, M., O'Donoghue, C., Hynes, S., hUallacháin, D.Ó., Sheridan, H., 2020. Impact of farmer selfidentity and attitudes on participation in agri-environment schemes. Land Use Policy 95.

Cusworth, G., Dodsworth, J., 2021. Using the 'good farmer' concept to explore agricultural attitudes to the provision of public goods. A case study of participants in an English agri-environment scheme. Agriculture and Human Values, 1-13.

DEFRA, 2018. Agriculture Bill: Analysis and Economic Rationales for Government Intervention. Department for Environment Food & Rural Affairs, London, UK, p. 64.

DEFRA, 2020. The Path to Sustainable Farming: An Agricultural Transition Plan 2021 to 2024. Department for Environment Food & Rural Affairs, London, UK, p. 66.

Dessart, F.J., Barreiro-Hurlé, J., van Bavel, R., 2019. Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. European Review of Agricultural Economics 46, 417-471.

Han, G., Arbuckle, J.G., Grudens-Schuck, N., 2021. Motivations, goals, and benefits associated with organic grain farming by producers in Iowa, U.S. Agricultural Systems 191.

Ingram, J., Gaskell, P., Mills, J., Short, C., 2013. Incorporating agri-environment schemes into farm development pathways: A temporal analysis of farmer motivations. Land Use Policy 31, 267-279.

Lastra-Bravo, X.B., Hubbard, C., Garrod, G., Tolón-Becerra, A., 2015. What drives farmers' participation in EU agrienvironmental schemes?: Results from a qualitative meta-analysis. Environmental Science & Policy 54, 1-9.

Le Coent, P., Préget, R., Thoyer, S., 2021. Farmers follow the herd: a theoretical model on social norms and payments for environmental services. Environmental and Resource Economics 78, 287-306.

Lienhoop, N., Brouwer, R., 2015. Agri-environmental policy valuation: Farmers' contract design preferences for afforestation schemes. Land Use Policy 42, 568-577.

McCann, E., De Young, R., Erickson, D., Sullivan, S., 1997. Environmental awareness, economic orientation, and farming practices: a comparison of organic and conventional farmers. Environmental Management 21, 747-758.

Murphy, G., Hynes, S., Murphy, E., O'Donoghue, C., 2014. An investigation into the type of farmer who chose to participate in Rural Environment Protection Scheme (REPS) and the role of institutional change in influencing scheme effectiveness. Land Use Policy 39, 199-210.

Niskanen, O., Tienhaara, A., Haltia, E., Pouta, E., 2021. Farmers' heterogeneous preferences towards results-based environmental policies. Land Use Policy 102.

Noguera-Méndez, P., Molera, L., Semitiel-García, M., 2016. The role of social learning in fostering farmers' proenvironmental values and intentions. Journal of Rural Studies 46, 81-92.

Pannell, D.J., Marshall, G.R., Barr, N., Curtis, A., Vanclay, F., Wilkinson, R., 2006. Understanding and promoting adoption of conservation practices by rural landholders. Australian Journal of Experimental Agriculture 46, 1407-1424.

Poppenborg, P., Koellner, T., 2013. Do attitudes toward ecosystem services determine agricultural land use practices? An analysis of farmers' decision-making in a South Korean watershed. Land Use Policy 31, 422-429.

Ragin, C.C., 2008. User's guide to Fazzy-set / Qualitative Comparative Analysis, University of Arizona

Tucson, AZ.

Riley, M., 2016. How does longer term participation in agri-environment schemes [re]shape farmers' environmental dispositions and identities? Land Use Policy 52, 62-75.

Russi, D., Margue, H., Oppermann, R., Keenleyside, C., 2016. Result-based agri-environment measures: Marketbased instruments, incentives or rewards? The case of Baden-Württemberg. Land Use Policy 54, 69-77.

Schroeder, L.A., Isselstein, J., Chaplin, S., Peel, S., 2013. Agri-environment schemes: Farmers' acceptance and perception of potential 'Payment by Results' in grassland—A case study in England. Land Use Policy 32, 134-144.

Sullivan, S., McCann, E., De Young, R., Erickson, D., 1996. Farmers' attitudes about farming and the environment: A survey of conventional and organic farmers. Journal of Agricultural and Environmental Ethics 9, 123-143.

Sutherland, L.-A., Calo, A., 2020. Assemblage and the 'good farmer': New entrants to crofting in scotland. Journal of Rural Studies 80, 532-542.

Sutherland, L.A., Burton, R.J., Ingram, J., Blackstock, K., Slee, B., Gotts, N., 2012. Triggering change: towards a conceptualisation of major change processes in farm decision-making. J Environ Manage 104, 142-151.

van Dijk, W.F.A., Lokhorst, A.M., Berendse, F., de Snoo, G.R., 2016. Factors underlying farmers' intentions to perform unsubsidised agri-environmental measures. Land Use Policy 59, 207-216.

Van Herzele, A., Gobin, A., Van Gossum, P., Acosta, L., Waas, T., Dendoncker, N., Henry de Frahan, B., 2013. Effort for money? Farmers' rationale for participation in agri-environment measures with different implementation complexity. J Environ Manage 131, 110-120.

Waldman, K.B., Giroux, S.A., Farmer, J.R., Heaberlin, B.M., Blekking, J.P., Todd, P.M., 2021. Socioeconomic threats are more salient to farmers than environmental threats. Journal of Rural Studies 86, 508-517.

Willock, J., Deary, I.J., Edwards-Jones, G., Gibson, G.J., McGregor, M.J., Sutherland, A., Dent, J.B., Morgan, O.,

Grieve, R., 1999a. The role of attitudes and objectives in farmer decision making: Business and environmentallyoriented behaviour in Scotland. Journal of Agricultural Economics 50, 286-303.

Willock, J., Deary, I.J., McGregor, M.M., Sutherland, A., Edwards-Jones, G., Morgan, O., Dent, B., Grieve, R., Gibson, G., Austin, E., 1999b. Farmers' attitudes, objectives, behaviors, and personality traits: The Edinburgh study of decision making on farms. Journal of Vocational Behavior 54, 5-36.

Wilson, G.A., Hart, K., 2001. Farmer Participation in Agri-Environmental Schemes: Towards Conservation-Oriented Thinking? Sociologia Ruralis 41, 254-274.

Zimmermann, A., Britz, W., 2016. European farms' participation in agri-environmental measures. Land Use Policy 50, 214-228.