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Official URL: <https://doi.org/10.1016/j.landusepol.2018.02.053>

DOI: <http://dx.doi.org/10.1016/j.landusepol.2018.02.053>

EPrint URI: <https://eprints.glos.ac.uk/id/eprint/5513>

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Understanding farmers' motivations for providing unsubsidised environmental benefits

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1. Introduction

Agriculture in Europe has been affected by multiple drivers of change since the Second World War, including a post-war political drive for agricultural intensification to ensure food security, demographic changes through urbanisation and rural-urban migration, improvements in technology and economic processes resulting in a cost-price squeeze on agricultural production (van Vliet *et al.*, 2015). This process has led to a broadly similar aggregate response to agricultural production across Europe; intensification of the most productive land and extensification (and in some cases abandonment) of the least productive land (van Vliet *et al.*, 2015). These changes in agricultural management practices have created agricultural systems that are successfully leading to increased productivity, with farms that are larger, more specialised in production and working with a reduced labour force, but often at the expense of the environment (Plieninger *et al.*, 2016). As is well documented, some of these modern agricultural practices have resulted in considerable environmental and health costs (Pretty *et al.*, 2000).

The policy response to this impact of agriculture on the environment has been to increase beneficial environmental management through three distinct mechanisms. One mechanism is regulation, which has been used to enhance environmental behaviour to protect the environment. A second mechanism is agri-environment schemes (AES), whereby farmers are paid for voluntarily undertaking specified environmental actions. This activity is referred to later in the paper as subsidised environmental activity. A third mechanism is the use of social approaches, whereby farmers are encouraged to undertake environmental management activities without financial reward or coercion, referred to in this paper as unsubsidised environmental activity.

Interest in promoting unsubsidised environmental activity has ebbed and flowed in recent decades. Agricultural producer groups have promoted industry-led agri-environment initiatives in an attempt to dissuade the Government from implementing environmental regulation in the face of growing public pressure over environmentally damaging agriculture practices (Cox *et al.*, 1985; Cox *et al.*, 1986; Clark and Jones, 1998). This approach also resonates with the neo-liberal interest in shifting responsibility away from government with a greater emphasis on civic responsibility, giving rise to 'social approaches' (Burton and Paragahawewa, 2011; Potter and Tilzey, 2005). Furthermore, there has been increasing Government support for industry-led partnerships in England, such as the Campaign for the Farmed Environment (CFE). The

CFE is a partnership of agricultural industry and environmental organisations that aims to maintain and improve the environmental condition of agricultural habitats and landscapes by working with farmers and advisers to embed environmental management as a core principle of all farm businesses for which they receive no financial reward (Clothier and Pike, 2013). The CFE was also promoted as a means of combatting the threat of further regulation of management practices on arable land through the introduction of compulsory set-a-side (Tasker, 2009). However, to date, there is a paucity of research on the use of non-monetary voluntary approaches to achieve nature conservation benefits (Santangeli and Laaksonen, 2015). Little is currently known about the amount of unsubsidised environmental activity occurring across the farming community and we present some empirical evidence identifying the extent of this activity amongst English farmers and compare some of its characteristics with subsidised environmental activity

There is a distinct body of research that has explored farmers' motivations for undertaking various environmental activities, by which we mean the reasons or driving force behind a particular behaviour.

This work has looked at farmers' motivations for complying with regulations (Winter and May, 2001) and the extrinsic and intrinsic motivations for undertaking subsidised activities through AES (Home *et al.*, 2014; Van Herzele *et al.*, 2013). Recent work has also found that intrinsic motivations related to the concepts of self-identity and personal norms were important in influencing the intention to undertake unsubsidised conservation activities (Lokhorst *et al.*, 2011; van Dijk *et al.*, 2016). However, little else is known about the motivations for unsubsidised agri-environmental behaviour and particularly with respect to specific environmental management practices. As environmental practices that are undertaken voluntarily, without coercion or incentives, have a greater potential for sustained and durable benefits (Mills *et al.*, 2016), we believe that this type of activity, in particular, requires more attention.

Given the limited understanding of unsubsidised environmental activity on farms, the aim of this paper is three-fold. Firstly, to consider the extent to which subsidised and unsubsidised environmental activity is undertaken, focusing particularly on arable land. Secondly, to describe and compare farmers' motivations for undertaking subsidised and unsubsidised environmental activity; and thirdly to understand the interaction between

these types of activity at the farm scale. The proposition is that by having a better understanding of these motivations it may be possible to achieve greater engagement in environmental activity amongst the farming community and to design advice, information and message framing that responds to and supports farmers' main drivers for undertaking unsubsidised environmental management activity.

In the next section we discuss different policy approaches to influencing environmental behaviour change and how an understanding of motivations can help with message framing to encourage voluntary environmental behaviour. In section 3 we describe our methodology and in section 4 we present new empirical findings on the pattern of uptake of subsidised and unsubsidised environmental activity in England and provide insights into the motivations that lead to voluntary environmental behaviours in farmers. In section 5 we discuss the implications of our findings for message framing and engagement strategies.

2. Policy approaches to environmental behaviour change

As previously mentioned, there are a number of policy approaches that can be used to change environmental behaviour on agricultural land, including regulations, economic incentives and social/voluntary approaches (OECD, 2001), although in practice, many policies use levers that fall into more than one of these categories.

Regulations aim to change behaviour by requiring certain management practices or placing particular legal obligations upon managers of rural land. For example, the establishment of Nitrate Vulnerable Zones (NVZs) under the European Union (EU) Nitrates Directive areas in which farmers' nitrogen fertiliser practices are restricted. It has been argued that regulation – i.e. prohibiting actions that are deemed unacceptable – should form a 'baseline' level of behaviour or a 'reference level' which it is assumed that society wishes all land managers to observe in carrying out their activities (Fuentes, 2004; OECD, 2001). Regulatory approaches seem to work best in situations where the target group is already, or can relatively quickly be, persuaded that the regulated actions clearly fall below an acceptable 'reference level' of responsible farming practice (OECD, 2001). It is hoped that through regulatory approaches an enforced change in behaviour will ultimately lead to a change in attitude towards environmental practices (Davies and Hodge, 2006), although evidence of such positive behavioural change is limited unless combined with other approaches (Barnes *et al.*, 2013). For example, Riley (2016) identified that only when closer environmental regulations were combined with longer-

term AES participation were AES activities considered by the farming community as 'good farming' practices. In fact, there is increasing recognition that command and control regulatory approaches are often overly bureaucratic and expensive (in terms of monitoring and enforcing compliance). Also it has been argued that formal legal approaches to environmental management de-motivates the individuals concerned, discouraging them to take an active approach to environmental stewardship and deliver sustainable, long-term benefits (Koontz, 2003; Spash and Biel, 2002).

The rationale of applying and implementing economic compensation in agri-environment policy and schemes is based on market failure to deliver the socially desirable level of environmental quality (Pearce and Turner, 1990). The evidence suggests that these economic incentives are an important factor to increase farmers' explicit participation in environmental management, in particular if payments and schemes are tailored to local natural and agronomic conditions (Bräuer *et al.*, 2006). However, whilst some evidence suggests that AES can deliver durable changes in farmers' attitudes and behaviour (Crabtree *et al.*, 1999; Darragh and Emery, 2017; Fish *et al.*, 2003), others argue that AES have not resulted in a broad pro-environmental behavioural change amongst European farmers (Burton *et al.*, 2008; Van Herzele *et al.*, 2013). Some would argue further that AES have created complacency with farmers only adopting agri-environmental options that require no or minimal effort (Hodge and Reader, 2010; Schmitzberger *et al.*, 2005; Wilson and Hart, 2000) and viewing environmental management as a public good for which they should be paid to deliver (Hodge and Reader, 2010). Several observers also suggest that the payment of subsidies for agri-environmental contracts might discourage innovation and long-term commitment, as farmers are not rewarded for doing any more than the minimum required to receive payments (Burton *et al.*, 2008; Deuffic and Candau, 2006; Kaljonen, 2006).

Therefore, in the UK, there is increasing interest in the use of social/voluntary approaches to encourage behavioural change. It is suggested that shifting farmers' extrinsic motivations for undertaking environmental management activities to more intrinsic ones is necessary to ensure sustained and widespread environmental improvements (de Snoo *et al.*, 2013; Matzdorf and Lorenz, 2010; Van Herzele *et al.*, 2013; Wilson and Hart, 2001). Furthermore, it is argued that if behaviour change leads to voluntary action then it tends to persist over time as it is more likely to become embedded in social norms (Ayer, 1997).

2.1 Farmer motivations and message framing for environmental activities

There has been recognition of the importance of motivation, and especially the source of motivation, in attempting to explain farmers' voluntary behaviour, such as their inclination to adopt conservation practices and participate in environmental schemes and practices (Black and Reeve, 1993; Home *et al.*, 2014; Potter and Gasson, 1988; Smithers and Furman, 2003; Wilson and Hart, 2000; Wilson and Hart, 2001).

The theoretical base for much of the work on individual motivation is derived from the field of psychology, education and employment research which distinguishes between different types of motivation based on the underlying attitudes and goals that give rise to an action and their intensity (Deci and Ryan, 1985; Gagné and Deci, 2005; Ryan and Deci, 2000). According to Ryan and Deci (2000 p.55) 'The most basic distinction is between intrinsic motivation, which refers to doing something because it is inherently interesting or enjoyable, and extrinsic motivation, which refers to doing something because it leads to a separable outcome'. An intrinsically motivated action is not reliant upon any outcome separable from the behaviour itself. For example, a farmer may undertake an environmental activity, such as planting trees, for no other reason than because it is innately satisfying. Conversely, extrinsic motivation is instrumental in nature and so is performed to attain some other outcome. For instance, a farmer might undertake environmental activity as part of an AES in order to receive a payment (Legault, 2016).

Table 1 Motivations for undertaking environmental management

Extrinsic motivations <ul style="list-style-type: none"> • Financial incentives • Profit maximisation • Security, long-term farm viability and/or risk minimisation, securing the family future and its continuity • Capital investment • Community image, standing within the community, respect amongst peers • Regulation (fear of penalty) • Recognition in wider society
Intrinsic motivations <ul style="list-style-type: none"> • Personal sense of environmental responsibility and accountability • Commitment and interest in the environment • Personal sense of enjoyment • More durable than extrinsic

Source Mills *et al.* (2013)

Mills *et al.* (2013) have identified an array of extrinsic and intrinsic motivations for undertaking environmental management (Table 1). It has been argued that the strength of and interplay between these motivations can have a profound effect on a farmers behaviour and environmental management, where actions taken as a result of intrinsic motivation may have greater longevity and permanence than some of the actions

motivated by extrinsic reasons (De Young, 1985). In addition, it has also been argued that some extrinsic motivations can undermine and suppress intrinsic motivations (Ryan and Deci, 2000) and can even lead to crowding out of intrinsic motivations (Greiner and Gregg, 2011). Although, others suggest that the interplay between intrinsic and extrinsic motivations is more complex and cannot be straightforwardly separated (Darragh and Emery, 2017)

Within the research on motivations, the main interest has been on the balance or tensions between extrinsic and intrinsic motivations behind subsidised environmental activity. This paper differs by considering the balance between extrinsic and intrinsic motivations in unsubsidised environmental behaviours.

Those who demonstrate extrinsic motivations respond to rewards. In the context of AES these can be direct rewards, in the form of payments to the farm business, either for investment or to enhance income, or indirect rewards through recognition from their peers and from society. Many studies emphasise the importance of financial incentives for participation in AES. Wilson and Hart (2000, 2001) noted in their extensive transnational study that most farmers surveyed were driven in their AES participation decisions primarily by perceived financial benefits, despite the fact that AES are designed to be income neutral. This mirrors findings from other national and international studies that have highlighted the financial imperative behind scheme participation in most EU AES (for example Brouwer and Lowe, 1998; Buller *et al.*, 2000; Morris and Potter, 1995; Whitby, 1996; Wilson, 1996; Wilson and Hart, 2000).

Intrinsic motivations are those which reside in the values, beliefs and environmental sympathies of the individual (Vinning *et al.*, 1992) and are often reflected in a personal sense of environmental responsibility and accountability. Commitment to the natural environment and a personal interest in wildlife are clear intrinsic motives identified by a number of studies (Berentsen *et al.*, 2007; Herzon and Mikk, 2007; Mills *et al.*, 2016). Motivations often over-looked are those that relate to social and psychological factors. These may for example, relate to the impact on social status or reputational benefits, or even a sense of moral obligation (Borkey *et al.*, 1999; Burton and Paragahawewa, 2011).

An understanding of farmers' motivations to undertake voluntary environmental activities can help with the development of advice and information strategies for enhancing environmental management and in framing appropriate messages for the adoption of specific practices (Mills *et al.*, 2016). Research shows that the way in which a message is framed can affect the degree of persuasion elicited (Smith and Petty, 1996). Frames

can be defined as interpretive structures through which individuals organise and make sense of an ambiguous stream of events in the world (Goffman, 1974). The framing literature distinguishes between information that focuses on the positive consequences of undertaking a particular behaviour (gain frame), and information on the negative consequences of not undertaking a particular behaviour (loss frame) (Spence and Pidgeon, 2010). For example, advisory information could state that the establishment of field margins will increase the number of farmland birds (gain frame), or conversely, if field margins are not established then farmland bird numbers will continue to decline (loss frame).

The idea of message framing is based on regulatory focus theory (Higgins, 1997) which postulates that individuals have two distinct types of orientations in pursuit of their goals, the pursuit of positive outcomes (i.e. a promotion focus) or the avoidance of negative consequences (i.e. prevention focus), which impacts on message persuasiveness. Interestingly, research has also linked different goal pursuits to individual characteristics. Those individuals demonstrating a promotion focus in their goal pursuits tend to concentrate on needs that relate to hopes, accomplishment and progress (Higgins, 1997). They also have an independent self-view with a focus on themselves (Aaker and Lee, 2001). In contrast, those who exercise a prevention focus are concerned with safety, responsibility and security needs and tend to have an interdependent self-view (i.e., a focus on others) (Aaker and Lee, 2001; Higgins, 1997).

The heterogeneity of farmer motivations and environmental behaviour is well documented (Dwyer *et al.*, 2007; Mills *et al.*, 2013). Therefore it is inevitable that the impact of message persuasiveness to undertake unsubsidised environmental management will vary depending on the individual farmers' underlying motivations. This paper seeks to identify the motivations for undertaking specific environmental management activities, thereby providing evidence with which to develop engagement strategies and to frame messages to encourage more widespread unsubsidised uptake of environmental management practices. We argue that to achieve sustained and durable environmental management, the ultimate aim would be to frame messages that encourage a shift from extrinsic motivations towards more intrinsic ones that become embedded in the social norms of the farming community.

Whilst studies have explored the extrinsic and intrinsic motivations for participation in AES, our review has found little research that has considered the motivations for undertaking unsubsidised environmental management on a voluntary basis. The focus of this paper, therefore, is to identify amongst a group of English farmers the extent of unsubsidised environmental activities on mainly arable land, the motivations for

undertaking this unsubsidised activity and the interaction between the subsidised and unsubsidised environmental management practices.

3. Methods

Three sources of data which provide insights into farmer motivations are used to address these foci/questions. Data are derived from a large face-to-face Government survey of 1,345 farmer businesses and from in-depth face-to-face interviews with 60 farmers. Findings are also presented from an analysis of the national dataset of English AES (Entry Level Stewardship (ELS) and Higher Level Stewardship (HLS). The research focuses particularly on arable farms because we were interested in the motivations of farmers who had joined CFE, which is the largest initiative promoting unsubsidised management ever undertaken in England and which at the time applied only to arable land.

3.1 Analysis of Farm Business Survey

The quantitative data presented in this paper are derived from the UK Government's 2008 Farm Business Survey (FBS) of England. This survey provides a valuable dataset with which to examine the question of farmer motivations for undertaking subsidised and unsubsidised environmental activity. It is a national face-to-face survey funded by the UK Government that provides information on the physical and economic performance of farm businesses. The survey represents all aspects of agriculture and covers all types of farms in all regions of the country. It includes owner-occupied, tenanted and mixed tenure farms. Results are weighted to represent the whole English population of farm businesses with at least the minimum size of ½ Standard Labour Requirement.

The following analyses presented in this paper are based on a subset of the main sample that responded to a section on countryside maintenance and management in 2008 and the results have been re-weighted to take account of non-response, so as to represent the overall FBS target population (Department for Environment Food and Rural Affairs, 2010). Only those farms in the FBS which were managing the land in a positive manner were eligible to complete the survey module (henceforth referred to as eligible farms). Positive management was defined as any land management measures or activities that deliver a positive environmental outcome as identified by the farmer. 95% confidence intervals were calculated and are shown as error bars around the percentages presented in Figure 2.

The countryside maintenance and management module of the FBS questioned farmers about 27 types of environmental activity, all options with the English AES, Entry Level Stewardship. The analyses presented here focus on 7 activities that relate specifically to arable production and had a sufficient number of responses to conduct significance tests¹. These environmental activities, that may have been subsidised (occurring within an AES) or unsubsidised, are presented in Table 2 along with a description of the associated environmental benefits.

Table 2 Description of environmental activities used in FBS survey

Activity	Description
Field corner management	Uncultivated corners of a field (often awkward or irregular in shape) providing potential foraging areas for birds and insects
Wild bird /pollen and nectar mixture	Strips of land sown for wild bird cover or wildflowers
Buffer strips	Areas of land maintained adjacent to watercourses in permanent vegetation that help to control soil and water quality
Overwintered stubble	Fields where the stubble of the harvested crop is left overwinter to provide food and winter refuge for wildlife.
Uncropped land (excluding buffer strips)	Arable land which is not used for growing crops, such as field margins, set-aside land
Hedges: maintenance	Hedges that are maintained for the environment through a cutting regime that provides food for birds
Ditches: maintenance, restoration	Ditches that are maintained or restored to benefit the environment, affecting floating and submerged aquatic species and riparian species on ditch banks.

The FBS asked respondents to select from a list of 16 predetermined responses, the primary reason (or motivation) for undertaking each environmental activity. These responses were then grouped by the survey designers into 5 main motivations as presented in Table 3.

Table 3 Grouping of motivations for undertaking environmental management activities

General group	FBS Questionnaire motivation
Financial	Maintain capital value of farm/appearance of farm Contributes to overall business e.g. shooting, open farm Financial benefits of scheme membership Other Financial reasons
Environmental	Safeguarding environmental features for future generations

¹ The Chi-square test is used to determine if the differences between intrinsic and extrinsic motivations for undertaking subsidised and unsubsidised environmental activity are statistically significant (Figure 3). The significance level was set at $P < 0.5$, indicating that there is a 95% probability that differences are not due to chance.

	Interest in agri-environment management Good for long term sustainability of the farm
Agronomic	Ground conditions/Wet Autumn Stock keeping Part of rotation Provides a natural means of controlling pests
Outside farmers control	Cross compliance (regulation) Feature has always been there Landlord/owner likes it/condition of tenancy agreement Legal Requirement (regulation)
Other	Other

The FBS analysis enabled us to link the pattern of subsidised and unsubsidised environmental activity at a national scale with some broad categories of attributed motivation. However, we recognise its limitations in providing only a limited range of mainly extrinsic motivations. The analysis was therefore supplemented by in-depth face-to-face interviews which enabled a more nuanced approach allowing for a broader range of motivations, including social and psychological factors.

3.2 Face-to-face interviews

The qualitative analysis was based on in-depth, face-to-face interviews with 60 mixed or arable farmers. The interviewees were selected from a Government postal survey of 754 farms in relation to the CFE and the interviews were held with the main decision-maker on environmental management on the farm. The selection covered each of the 8 regions in England, although as the study was focused on arable areas, a greater proportion of the interviews was undertaken in the predominantly arable regions of England (Eastern and East Midlands) than the pastoral areas of the country. The aim of the selection process was also to obtain a good coverage of the different combinations of subsidised and unsubsidised environmental management activity and farm sizes. This analysis was valuable as it allowed a direct comparison of motivations between a group of farmers who were undertaking subsidised and unsubsidised environmental activity.

The methodology for the in-depth farmer interviews was based on a semi-structured questionnaire incorporating a fairly open framework which allowed the interviewer to probe for details or discuss particular issues as they arose. The interview guide aimed to identify the farmers' motivations or barriers to environmental management activities. Questions also focused on understanding the different contexts in which the farmers operated, the local conditions in which they made their decisions, and the role of farming

culture, focusing beyond the individual. The interviews took place at the farm, taking on average 1 hour to complete.

3.3 Analysis of the national dataset of English AES

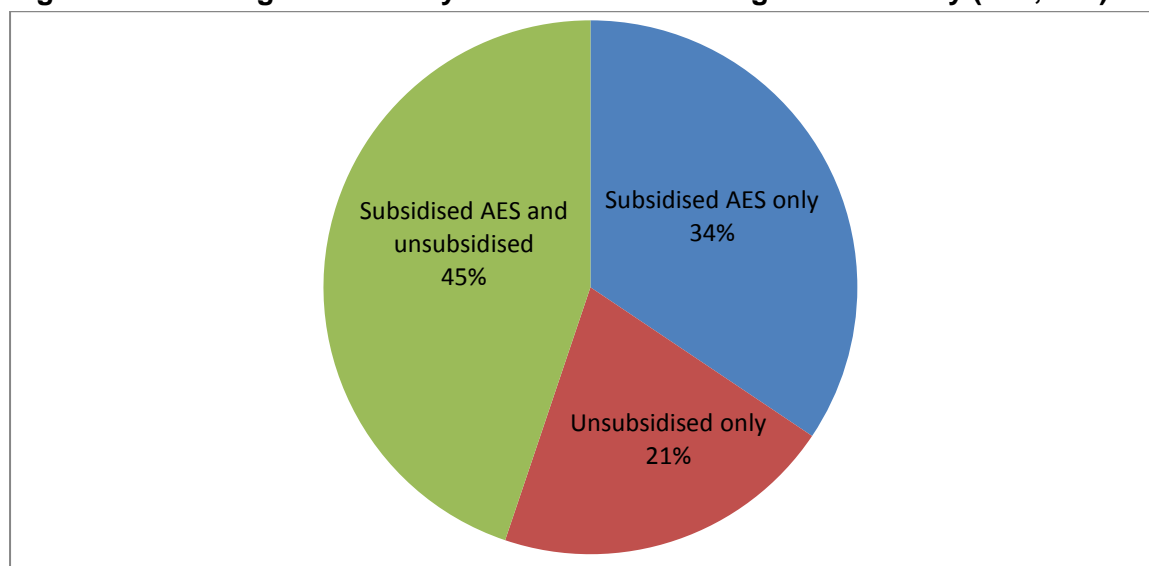
Analysis of the agreement holder data was undertaken for AES operating in England, which provides some insights into the interaction between subsidised and unsubsidised environmental activity at the farm scale. At the time of the analysis in 2013 around 70% of all agricultural land in England was under an AES agreement. The scheme was comprised of the Entry Level Stewardship (ELS) scheme, which was a basic fixed payment scheme based on points which related to the total area of agreement land². The basic ELS could also be combined with a Higher Level Scheme (HLS), requiring more demanding options.

4. Results

4.1 Comparing the extent of subsidised and unsubsidised environmental activity

Analysis of the FBS data identified the proportion of respondents on eligible farms that were undertaking their environmental activities either as a subsidised AES, unsubsidised, or a combination of both. As Figure 1 shows, four out of five farmers (79%) were members of an AES, while two thirds (66%) undertook unsubsidised environmental management activities. The most common category was to undertake environmental management activity both as part of an AES and unsubsidised (45%).

Figure 1 Percentage of farms by environmental management activity (n=1,345)

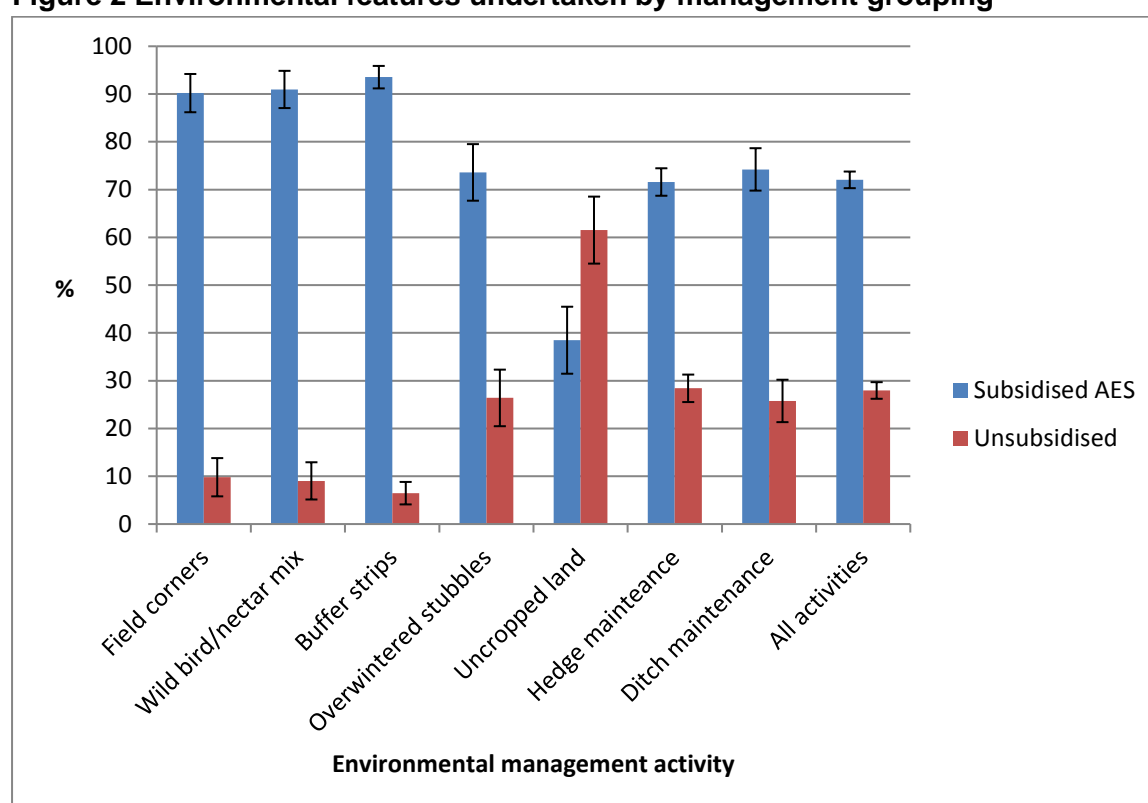


² points target = 30 points x hectares of agreement land

Analysis of the FBS data identified in more detail the extent of subsidised AES and unsubsidised environmental activity on English farms. In Figure 2, the FBS data for eligible farms were analysed by the number of arable environmental management activities undertaken either within a subsidised AES or unsubsidised. It is clear that the majority of environmental management activities take place within a subsidised AES (72%), although around a quarter of activity is unsubsidised (28%).

Figure 2 also shows that when comparing the area or length of different arable environmental activities, a higher proportion of uncropped land is unsubsidised, than in a subsidised AES. The other activities are more likely to be undertaken within a subsidised AES, particularly field corners, buffers strips and wild bird/pollen and nectar mixes.

Figure 2 Environmental features undertaken by management grouping



4.2 Motivations for undertaking subsidised and unsubsidised environmental activity

The FBS data were analysed to identify motivations for undertaking environmental activities on mainly arable farms within subsidised AES and as unsubsidised activity (Figure 3). Respondents were mainly motivated to undertake all arable environmental activities within a subsidised AES for financial reasons. Although AES are designed to

be income neutral, farmers perceived benefits in terms of maintenance of capital values and contribution to the overall farm business. Those who were managing wild bird / pollen and nectar seed mixes were more likely to cite environmental motivations for doing this compared to the other activities. Activities more likely to be motivated by agronomic reasons were overwintered stubble and uncropped land. Ditch management and buffer strips were activities more likely to be undertaken for reasons outside the farmer's control, which is likely to relate to regulatory requirements.

Figure 3 (around here)

The motivations for undertaking unsubsidised environmental activities are distinctly different to the motivations for undertaking subsidised AES activities. A striking difference in the responses is the extent to which agronomic and environmental motivations are of greater importance for unsubsidised activity. The agronomic reasons are particularly important for unsubsidised overwintered stubbles and uncropped land. Environmental reasons were given in particular for carrying out unsubsidised field corner management, and establishing wild bird/pollen and nectar seed mixes and buffer strips. Reasons 'Outside of farmer's control' were also of importance, particularly relating to maintenance of ditches, hedges and buffer strips. This explanation is likely to relate to regulatory requirements, such as Local Environmental Risk Assessment for Pesticides regulations (LERAPs), which stipulate pesticide spraying buffer zones near watercourses.

Table 4 provides a breakdown of the motivations for undertaking unsubsidised environmental activity by specific reasons.

Table 4 Primary motivations for undertaking unsubsidised environmental activities (%)

General group	FBS Questionnaire reason	Ditches maintenance, restoration n=129	Hedges, maintenance n=360	Uncropped land n=113	Overwintered stubbles n=42	Buffer strips n=51	Wild bird/nectar pollen mixes n=40	Field corners n=45
Agronomic (extrinsic motivations)	- Ground conditions/ Wet Autumn	4.5	0	31	27	6.8	8.4	18.5
	- Stock keeping	0.8	20.4		0	0	0	0
	- Part of rotation	0	0.3	8.6	49.3	2	0	1.9
	- Provides a natural means of controlling pests	0	0.3	0	0	0	0.8	0
Financial (extrinsic motivations)	- Maintain capital value/appearance	21.4	22.8	0	1.4	0	0	0

	of farm							
	- Contributes to overall business	2.7	0.7	13.9	5.9	5.5	42.4	0.6
	- Other Financial reasons	4.5	0	8.3	0.6	0	2.5	5.1
Environmental (intrinsic motivations)	- Safeguarding environmental features for future generations	2.4	1.5	3.8	0	4	0	5.9
	- Interest in agri-environment management	8.9	8.8	10.2	3.3	34.7	28.4	37.4
	- Good for long term sustainability of the farm	20.7	11.1	4.4	4.1	1.4	2.7	13.3
Outside farmers control	- Cross compliance	0	1.4	1.2	1.6	37	0	0
	- Feature has always been there	30.3	24.9	7.9	0	0	0	7.9
	- Landlord/owner likes it/condition of tenancy agreement	0.9	4.2	0	0	0	3	0
	- Legal Requirement	0	0.3	0	0	3.3	0	0
Other	- Other	2.9	3.3	10.7	6.8	5.3	11.8	9.4

Through the 60 in-depth farmer interviews it was possible to further explain and show the relevance of the motivations for undertaking unsubsidised environmental activities described in the FBS survey. The next section illustrates show how the extrinsic and intrinsic motivations reveal themselves in practice by focusing on several specific features.

4.2.1 Agronomic motivations (extrinsic)

The survey analysis and interviews revealed that some activities identified by farmers as unsubsidised environmental management were in fact extrinsically motivated often arising as a result of agronomic convenience.

One such example is the use of overwintered stubble, an important food source and refuge for wildlife. In the FBS survey, 76% of farmers stated that the main reason for establishing unsubsidised overwintered stubbles was for agronomic reasons. Of these,

49% stated that the reason was due to their rotation, whilst the other 27% reported that it was due to ground conditions/wet autumn. For some farmers interviewed, whilst they recognised the environmental benefits of overwintered stubbles, they were extrinsically motivated to leave them agronomic reasons, because it fitted with their spring cropping rotation. Also areas of uncropped land were often left for agronomic reasons. For example, uncropped areas, such as grass margins around arable fields aided vehicular access across the farm. Areas were also left uncultivated due to the suboptimal condition of the land, or where the ground was too wet to cultivate in the autumn (31%) as illustrated by the following quote

“Next to the woodland it is a very cold dank piece of ground, it never dries out and is fairly heavy ground you can do what you like to farm it but it never grows anything, so if it doesn’t grow anything what is the point? We seeded it down and let it go au naturale”. (large sized, mixed farm).

Clearly, this farmer was extrinsically motivated to leave the field margin uncultivated, but still viewed it as an environmental activity.

4.2.2 Financial motivations (extrinsic)

The survey and interviews also revealed that some unsubsidised activities provided financial benefits. For example, around 45% of the FBS survey respondents were extrinsically motivated by financial reasons for establishing unsubsidised wild bird/pollen and nectar mixes, of which 40% claimed that the activity contributed to the overall farm business (Table 4). The farmer interviews revealed that financial considerations may arise from the establishment of these strips for game birds. Many arable farms in England have pheasant or partridge game shoots for which wild bird strips have been established. As some income is gained from these birds shoots there is a financial motivation for establishing such strips, although respondents were also convinced that these strips benefited wild birds on the farm, as the following quote illustrates.

“We have a little shoot on the farm. That is really good because we use 4 or 5 different mixes in there. We have maize, fodder rape, red and white millet, they love that. All the little finches and little birds that feed in the garden all winter are down there as well. If you walk down there are hundreds of birds coming out of the game crop into the hedge”. (large sized, horticultural, tenanted farm)

Interestingly, establishing game strips was one activity where farmers often took a holistic overview of the farm. For example, one farmer referred to locating the game

strips to make wildlife corridors through the farm, others had established blocks of game cover strategically around the farm. Also several of those interviewed had enjoyed experimenting with different seed mixes in order to find food plants that would function most effectively on their farm. It appears that pleasure was derived from the experiential learning involved in establishing these strips.

The interviews also revealed that the financial motivations for unsubsidised maintenance of ditches and hedges related to a desire to maintain the capital value and appearance of the farm. The respondents were prepared to undertake these management practices without any financial compensation as they saw the economic benefits of keeping fields drained and hedges trimmed to allow vehicular access and protect livestock. There may have also been an intrinsic motivation for maintaining these features related to aesthetic appeal and maintaining a sense of place for “features that have always been there.”

4.2.3 Environmental motivations (intrinsic)

An interest in the environment and wildlife provided a clear intrinsic motive for undertaking some unsubsidised activity. For example, a high proportion of farmers (57%) in the FBS survey stated that the primary motivation for undertaking unsubsidised field corner management was for environmental reasons. With many of these (37%) stating an interest in agri-environment management as a reason. The interviews revealed that field corners were often left by farmers to deliver environmental benefits. By leaving these small areas at the edges of productive land they felt they were making their contribution to the environment. Field corners were favoured by farmers as they provided environmental benefits whilst fitting in well with existing farm management systems and having minimal impact on production. So whilst there were intrinsic motivations for establishing the unsubsidised field corners, the behaviour, as with the uncropped land above, was also influenced by extrinsic motivations, for example, leaving existing areas of unproductive land, or awkward corners that were difficult to cultivate, sometimes due to an obstacle, such as a tree, as the following quote illustrates.

“One corner was taken out because there is an old oak tree in the corner and the sprayer won’t go between the oak tree so that is taken out. Another corner has been fenced with trees because it lies a little bit wet.... There are a lot of wildflowers, albeit a lot of the wildflowers are weeds!”
(medium sized, mixed, owner occupied farm)

Unsubsidised buffer strips were also cited by 40% of farmers as being undertaken for environmental reasons. Although a similar number (40%) stated that they implemented buffer strips for regulatory reasons. The farmer interviews revealed that the participants particularly understood the rationale for buffer strips against watercourse in terms of preventing water pollution. One farmer, for example, talked about leaving a larger margin against watercourses than the cross compliance requirements, as he had attended a number of spraying courses and was 'frightened' of causing environmental pollution through spraying. He felt more comfortable knowing that had he had some leeway with the spraying because he had established the extra wide margins, as the following quote highlights.

"With spraying you realise how many miles [of water course] that can contaminate, you start thinking, well for the sake of 6 meters of grass..."
(medium sized, mixed, owner occupied farm)

This farmer was clearly intrinsically motivated by a personal sense of environmental responsibility.

The FBS survey also revealed that around 30% of farmers stated environmental motivations for establishing unsubsidised wild bird/pollen and nectar mixes. Whilst the previous section identified extrinsic motivations for establishing wild bird strips, the interviews also revealed intrinsic motivations stemming from a personal interest in wildlife. These farmers in particular tended to be more observant of changes in species occurrence and abundance on the farm, although they viewed wildlife from a fairly narrow perspective, focusing on the higher species and not the less conspicuous species which are not part of everyday life. They were particularly keen on undertaking bird-friendly management activities and undertaking these unsubsidised activities reflected personal norms and contributed to self-esteem as the following quote illustrates.

"It creates a bit of habitat and some seeds for the birds, creatures, or whatever over winter. And I feel good about myself when I do that sort of thing." (small sized, dairy, owner occupied farm)

The in-depth interviews also captured other motivations for undertaking unsubsidised environmental management that were not covered by the questioning in the FBS survey. For example, a number of farmers in the survey abutted nature reserves and this motivated them to do more for the environment. This is illustrated by one farmer's reason for placing a wide margin against a watercourse

“It is easier to have the margin because on the other side of the ditch the land belongs to an ecological trust and they have trees and fancy grass and bird boxes and all that and I thought it might look like I was doing my bit as well” (medium sized, tenanted, horticultural farm).

They evidently felt under an obligation (or observation) to undertake environmental management practices, in part as it contributed positively to their community image. This is another example of an activity that is both intrinsically and extrinsically motivated.

4.3 Unsubsidised environmental activity within AES

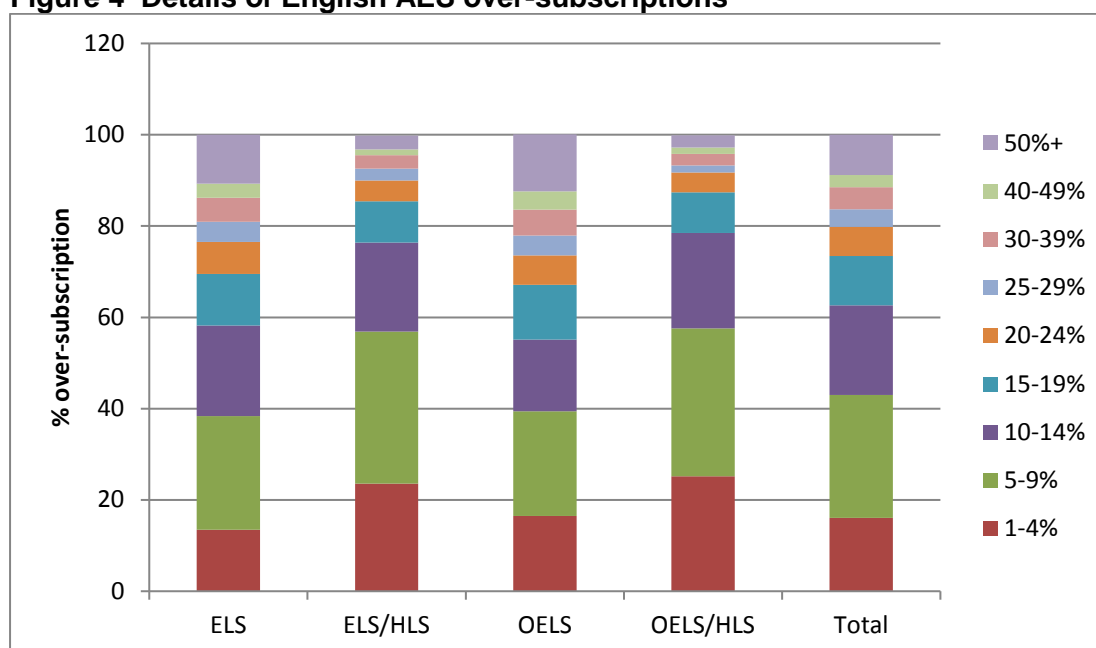
Analysis of agri-environment scheme data for England reveals that a significant proportion of the subsidised agreements exceeded their required points. In other words, they were delivering more environmental activity than they were receiving payment for. In 2013 this resulted in over 24 million excess points in AES which is equivalent to £24m annual value of unsubsidised activity (see Table 5). On average there were 11.6% extra points in ELS agreements, with clear differences between ELS only and ELS-HLS variants. The stand-alone ELS agreement delivered more excess points, than those ELS agreements combined with HLS agreements.

Table 5 Excess Points delivered by English AES

	Total Excess Points	Excess Points as % of Scheme Threshold
ELS	16,401,015	13.7
ELS/HLS	5,754,640	8.0
Organic ELS	1,293,780	17.3
Organic ELS/HLS	925,422	9.0
Grand Total	24,374,857	11.6

Looking in more detail at the subscription rates it can be seen from Figure 4 that 57% of agreements had 10% or more excess points and 20% of agreements had 25% or more excess points and 8% of agreements had 50% or more excess points.

Figure 4 Details of English AES over-subscriptions



Some of the farmers' motivations for this unsubsidised activity were identified during the face-to-face interviews with farmers. Field margins, in particular, were often additional to the AES requirements but were being managed to the prescriptions included in the agreement due to the increased flexibility that this offered the farmers. Having these additional margins provided the flexibility to change the location of the margins across the farm if necessary, or in the case of nectar/pollen strips acted as a back-up if another strip failed to establish properly.

"We have a half acre pollen and nectar mix running down the side of the margin. This is also in HLS. We have another one that is not in HLS and not paid for. We put that one in because you have to rotate them every 5 years because the cover runs out of steam so you get a year without any cover on it because you have to plough it up, so I have two. So if anyone comes round to inspect I have another one". (medium sized, mixed, tenanted farm)

The interviews also revealed that some larger farms, in particular, were managing an extra 10% on their margins as a risk management strategy to ensure compliance with the scheme prescriptions in order to protect their AES payment. This additional unsubsidised activity also applied to regulatory requirements. Wider cross-compliance strips were being left in order to protect their Single Payment Scheme payments, which were viewed as an important source of income.

Also, in situations where farmers had not renewed their AES agreement, some had retained AES prescriptions for certain features, particularly margins and field corners and consequently AES had led to a permanent change in behaviour. Some were 'between' AES agreements, therefore, this management contributed only temporarily to unsubsidised environmental management.

5. Discussion

This paper has explored the patterns of uptake of subsidised and unsubsidised environmental activity at a national level in England. The results indicate that at the time of the survey the majority of environmental activity in terms of occurrence and scale on farms in England was subsidised, but around 25% of all environmental activity was unsubsidised, although as shown in Figure 1, often subsidised and unsubsidised activities take place alongside each other on the farm. However, as we also reveal, the activities classed as 'environmental' may have been extrinsically motivated, rather implemented solely for environmental benefits. This supports Darragh and Emery's (2017) finding that definitions of what constitutes environmental behaviour on a farm is complex.

5.1 Understanding motivations and engagement strategies

The paper sought to identify farmers' motivations for undertaking unsubsidised environmental activities. The analysis provides insights into the extrinsic and intrinsic motivations for undertaking these activities, revealing that these are not discrete types but are heterogeneous and overlapping. There are, however, clear differences in farmers' motivations for undertaking subsidised and unsubsidised management activities. A complex mix of motivations influenced farmers to undertake subsidised activities within an AES, of which financial motivations dominated. The environmental motivations were considerably less apparent and we would argue that to ensure durable and sustained environmental management, advice and engagement strategies need to shift the financial extrinsic motivations of farmers participating in AES to more intrinsic environmental motivations which are known to have greater permanence (Mills et al, 2016). The activities most likely to be undertaken within an arable AES for environmental reasons were the wild bird/pollen and nectar mixes, possibly because the environmental benefits of such activities are clearly visible.

In contrast, there were clear environmental motivations for undertaking some of the unsubsidised activities; this was particularly the case for field corner management, buffer strips and wild bird/pollen/nectar mixes. Generally, the farmers surveyed understood the rationale for undertaking these unsubsidised activities for the benefit of the environment, clearly believing that their actions would benefit wildlife.

The findings also revealed that whilst intrinsic motivations were important for undertaking unsubsidised activities, extrinsic motivations, particularly agronomic and financial ones, also influenced decisions. One such activity already mentioned was the use of wild bird seed mixes for game shooting. Game shoots provide a financial income, although for many of the arable farmers in our study they were viewed as a cultural activity often used informally with friends and family. They were also considered environmentally beneficial for smaller wild birds. This example, illustrates an interesting interplay between extrinsically-motivated actions and their overlap with intrinsically-motivated cultural and environmental concerns. An environmental activity mainly driven by agronomic motivations in the arable context was over-wintered stubbles, where cereal stubbles are left uncultivated and unsprayed after harvest for as long as possible. This practice can provide an important food source for seed-eating birds, whilst working well with spring cropping enabling a spreading of the workload and improving spring weed control. Other practices that might be undertaken for agronomic reasons, include grass margins, field corners, nectar and pollen strips for pollinators and cover crops which provide a habitat for many different species above ground, and also help improve the activity of microbes in the soil.

Clearly, there is the potential to promote some unsubsidised environmental activities by highlighting the agronomic and financial benefits that resonate with farmers' extrinsic motivations. Whilst there will often be a need for financial incentives for the more demanding environmental activities that impact on agricultural productivity, evidence from our study points to the potential to develop win-win scientific solutions and advice that can benefit both farming and the environment and therefore require no financial incentives.

The data analysis also revealed some interesting interaction between subsidised and unsubsidised activity, with environmental features moving between the two. There was evidence that some environmental features continued to be managed positively for the environment once a subsidised AES contract had finished, although further research is required to understand the full extent to which this happens. Our interviews also provided some explanation for the AES over-subscription identified in terms of managing risk and contributing to farm management efficiency. Whilst the scheme guidance

document did recommend delivering options slightly in excess of the target points, some of the oversubscription identified was considerable, going beyond expectations for normal risk management and would benefit from further exploratory research.

5.2 Advice and Message framing

The survey has clearly identified that many environmental activities are undertaken without subsidies, however, what is more questionable is the quality of the environmental management. The ecological surveys conducted during the research (Removed for review, 2013), found that often those unsubsidised environmental areas, such as buffer strips, field margins and field corners were left unmanaged, with no active management to improve, or at least maintain, environmental quality. Farmers in the study often viewed the act of taking land out of production as sufficient for providing environmental benefits. However, for most environmental features active management is required. For example pollen and nectar strips, require specific cutting regimes and even with best management practice need to be re-established after 3-4 years (Pywell et al, 2011). This finding highlights the value in providing guidance and advice to ensure unsubsidised features are managed to their optimum environmental potential.

The CFE developed general guidelines setting out best practice for environmental management. However, the interview responses from farmers highlighted a reluctance to follow these guidelines for unsubsidised management activities, preferring to adapt practices to fit in with their farm management, such as allowing vehicular access on grass margins or flexible cutting times. If a policy objective is to improve the quality of existing unsubsidised managed land, then alternative mechanisms, other than general guidelines are required to disseminate this information. Advice needs to be able to understand and cope with the heterogeneity in farmers' motivations that engender unsubsidised environmental practices and to adapt and target messages depending on the farmers' predisposition. To be able to develop this understanding and locate advice in its farm specific context requires some degree of personal engagement. We would suggest that further research, particularly approaches involving action research and working closely with farmers in the co-production of knowledge and understanding, could help to clarify and test the most appropriate engagement messages and approaches required in different situations.

Understanding the motivational pull for farmers to undertake unsubsidised environmental management practices can help with message framing in any advice or engagement strategy to encourage adoption of these practices. As discussed earlier, message framing effects can vary depending on the farmer predispositions. For those

farmers that respond to gain framing messages, highlighting the positives of activities, the win-win situations where practices appeal to agronomic and financial motivations by fitting in with the existing farming system and/or having financial advantages as well as benefiting the environment, can be effective. Particularly if environmental practices are promoted that are compatible with farmers' cultural values. Such messaging can create new beliefs that environmental activities on farm can enhance production (Home, 2015). From our research findings, for example, the message might relate to field corner management and highlight the efficiency of taking awkward field corners out of production. Furthermore, positive messages might, for example, highlight the positive impact of establishing wild bird mixes on increasing farmland bird numbers, rather than focusing on continued bird population decline through inaction.

Others farmers, with more interdependent self-views, may respond better to loss framing messages with a personal or cultural connection, particularly those that instil fear if a particular environmentally beneficial behaviour is not performed, or evoke concern for a particular target species (Dickenson et al 2013). Examples from our research is the voluntary implementation of wider buffer zones alongside watercourses undertaken for fear of causing widespread water pollution from chemical spraying, or the introduction of skylark plots in recognition of the decline of this iconic farmland bird. This type of messaging requires an acceptance of responsibility by the farmer and perceived response efficacy.

Fear messages promoting the possibility of regulation prompted some unsubsidised environmental action under the CFE initiative. The industry-led CFE was a response to the regulatory threat of compulsory set-aside (Powell *et al.*, 2012). The motivation for action was to pre-empt additional regulatory burdens which may have brought additional, and uncertain, costs. Our findings also indicate that fear of incurring penalties led to additional unpaid activity within AES and cross-compliance

Ultimately, to embed durable and sustainable environmental management in farmer behaviour requires an increase in farmers' intrinsic motivations to undertake these activities. However, as discussed elsewhere (Mills et al, 2016) this shift often requires a change in farmers' underlying values and beliefs which are influenced over time by societal norms. To achieve this shift there is the need for a coherent policy and advice framework in which regulations and incentives are important elements for signalling societal norms and expectations, but in which advice and engagement are equally important in helping to understand farmers existing intrinsic and extrinsic motivations and encourage sustained behavioural change on the ground.

6 Conclusions

As the environmental quality of agricultural land across Europe continues to decline there is an ever increasing need to find ways of encouraging environmentally beneficial farming practices. The policy response has been characterised by a mixture of three mechanisms; regulation, incentive schemes and voluntary/social approaches to re-join agricultural practice and beneficial environmental management. Whilst regulation and AES are part of the solution, there may emerge a need under the current neo-liberalised agenda to find ways to encourage farmers to undertake unsubsidised environmentally beneficial practices. This type of activity has greater potential to embed lasting beneficial environmental management in farmer behaviour than regulation and incentive schemes.

From a policy perspective it is helpful to understand the motivations for existing unsubsidised activity as this can inform appropriate engagement strategies and message framing that will encourage uptake of more widespread voluntary environmental behaviour. Our research has identified that around 25% of all environmental activity undertaken on arable farms in England is already unsubsidised. However, an in-depth examination of motivations for undertaking this activity reveals an interesting interplay between extrinsic and intrinsic motivations. The evidence highlights that intrinsic environmental motives are important for delivering unsubsidised environmental practices on arable land, related to a personal interest in wildlife, although social concerns about pollution and reputational effects are also important and messages should therefore be framed accordingly. However, the evidence also clearly indicates that extrinsic motivations, particularly agronomic ones, are important for key unsubsidised environmental practices and therefore messages should be framed to highlight the potential agronomic benefits of environmental activities.

Also, subsidised activity can be a trigger for more unsubsidised activity. Whilst there is 25% unsubsidised activity this often spills out from subsidised activities (especially relating to field margins). This is worthy of a little more critical reflection in the paper. Both because this intersection is interesting in itself and also it presents unsubsidised activities in a very different light. Evidence that farmers receiving subsidies for environmental are doing extra without payment, which is worthy of more research.

Finally, advice needs to be able to understand and cope with the heterogeneity in farmers' motivations that engender unsubsidised environmental practices and to adapt and target messages depending on the farmers' predisposition. However, to be able to develop this understanding and locate advice in its farm specific context requires some

degree of personal engagement, which is often lacking in the current policy instruments and engagement strategies used to support environmentally-beneficial land management practices.

Acknowledgements

We would like to acknowledge the support of the Department of Environment, Food and Rural Affairs (Defra) in funding the research project that contributed to this paper. Our sincere thanks also go to all the farmers who took their time to participate in this research.

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