

Behaviour Change: A Series of Practical Guides
for Policy-Makers and Practitioners

Number 7

Enhancing Sustainability at Farm Level

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Defra has commissioned and funded this study, but the views expressed in this guide do not necessarily reflect Defra policy.

1. Introduction to the series

Defra's 5 year strategy (*Delivering the Essentials of Life*¹) coupled with the UK Government sustainable development strategy (*Securing the Future*²) set out an ambitious agenda for environmental leadership and sustainable development. Embedding these core principles relies on influencing change and making it easier for producers and consumers to behave more sustainably. This is a sizeable task, since changing behaviours is a complex matter and innovative solutions are required.

In July 2005, Defra initiated a programme of research that aimed to broaden understanding of how Government (and others) can most effectively promote pro-environmental behaviour amongst producers and consumers. Several studies were commissioned as part of this research programme, each with a remit to explore a unique aspect of pro-environmental behaviour change.

This practical guide forms part of a series of papers that aims to summarise the key findings and policy implications from these studies.

A full list of titles in this series is provided below:

- Number 1: Sustainable Resource Use in the Home
- Number 2: Targeting Specific Lifestyle Groups
- Number 3: Sustainable Development as a "Collective Choice" Problem
- Number 4: Triggering Widespread Adoption of Sustainable Practices
- Number 5: Understanding Choice
- Number 6: Sustainable Shopping and Sustainable Production
- Number 7: Enhancing Sustainability at Farm Level
- Number 8: Tackling the Waste Challenge
- Number 9: Encouraging Sustainability Amongst Small Businesses
- Number 10: Sustainable Resource Use in Business and Organisations

¹ Defra (2004) *Delivering the essentials of life: Defra's five year strategy*, London: HMSO.
See <http://www.defra.gov.uk/corporate/5year-strategy/index.htm>.

² Defra (2005) *Securing the Future: UK Government Sustainable Development Strategy*, London: HMSO.
See <http://www.sustainable-development.gov.uk/publications/uk-strategy/index.htm>.

2. Project summary

This research connects two related bodies of work, one relating to the idea of **styles of farming** and the other the sociological idea of **habitus**, in order to explore whether these theoretical concepts can help to explain the divergences in farmers' propensity to engage in practices that enhance environmental sustainability at farm level.³ The attitudes and values of farmers and the practice of farming are necessarily connected through the **Agricultural Knowledge and Information System** (or AKIS), the network that links the farmer to a wide range of other actors with capacity to influence his/her behaviour.

A style of farming is a coherent set of social, economic, ecological and technological practices that provides the organisational underpinning of farm enterprises. From the mid-1980s, Dutch sociological researchers identified distinct and discernible differences in the farming styles of different farmers and produced typologies to reflect this diversity. Sometimes these categorisations are intuitive and at others they are based on formal statistical analyses of farm and farmer characteristics.

Pierre Bourdieu developed the concept of habitus, which he saw as a social template that guides behaviour, underpinned by particular attitudes and values. He connects three other important concepts to the idea of a habitus. He argues that individual actors' habituses create the ground-rules for a **game** (what different actors do), played out in a **field** (the particular social and geographical space), in which actors accumulate **symbolic capital**, (that capital which confers social status, and which contains social, cultural and economic elements). In the case of farming, the symbolic capital necessarily manifests itself in the farming style, suggesting an intimate connection between the twin concepts of farming style and habitus.

The Agricultural Knowledge and Information System (AKIS) comprises the networks of information used by farmers and other actors within the agro-food complex. It is widely acknowledged that different farmers will use different parts of the AKIS, depending on their predispositions to act and farming styles and practices. Within the AKIS, knowledge can be disseminated from research at the core or derived from practice on the ground by a range of actors and organisations.

Both the idea of farming style and habitus suggest a strong likelihood of continuity of attitude and action among farmers, which might be seen to act as a potential brake on the uptake of new pro-environmental practices, where these are not already embedded in particular farming styles. This is especially so where the environment-enhancing behaviour generates little, if any, symbolic capital for the farmer, or where such environment-enhancing behaviour requires a change in farming style. For example, if symbolic capital is accumulated through having a tidy farm or a clean weed-free crop, this may reduce the potential for biodiversity enhancement. When the sense of being seen as a good farmer by one's peers revolves around a productivist set of values, pro-environment behaviour may be seen as eccentric.

It is recognised that both farming styles and habitus can and do change in response to a range of internal and external stimuli. However, such change is often seen to be slow. Where the policy objective is to increase farming sustainability at farm level, it is evident that different farming styles and associated habituses create differential room for manoeuvre with respect to the adoption of environment-enhancing practices. Further, if there is little or no symbolic capital to be acquired through engagement with environment-enhancing behaviour, then involvement with such action is unlikely. The room for manoeuvre to improve environmental sustainability is contingent not only on the technical aspects of the farming system, but also on the predispositions to act of the farmer.

³ The full summary report produced as part of this study is available at:
http://www.defra.gov.uk/science/project_data/DocumentLibrary/SD14004/SD14004_3521_FRP.doc

3. Key findings

This research summarises findings from two related bodies of work, one from general sociology (the concept of habitus) and one from rural sociology (the idea of a farming style) to better understand the likelihood of farmers engaging in environment-enhancing actions. The first two concepts are connected through a third, the Agricultural Knowledge and Information System (AKIS), which comprises the wide-ranging networks through which information flows to and between farmers, and amongst other actors and stakeholders in the agri-food system and its wider environmental connections.

Farming style

The idea of farming style has its roots in investigations in the Netherlands where E. W. Hoftsee, a Dutch rural sociologist, identified regionally specific styles of farming. More recent work has indicated that rather than comprising regionally specific adaptations of farming systems, farming styles are socio-technical systems that embrace a strategic notion of how to farm, a set of technical practices and a set of linkages between farm and other connected actors in government, the food system etc. In other words, a style of farming will tend to reproduce itself over time, but can also change or be changed, either by incremental adaptation to a changing external environment, or as a result of changes in farm household composition or values.

A farming style may comprise an entity identified by farmers and/or researchers and may be based either on statistically significant differences in attitudes and practices or on a set of descriptive criteria. In the Dutch literature, farming styles are often differentiated in relation to two key variables: first, whether or not the business has a global or local orientation in its markets and, second, whether it exploits a core technology or is based on locally adapted farming methods. In a recent review of the farming styles, Commandeur (2004) has suggested four orientations that influence farming style.⁴

- **technocrats** are those farmers who emphasise and value highly the technical aspects of farming;
- **inheritors** are those farmers for whom family succession and continuity of occupancy of the land is a principal concern;
- **entrepreneurs** are those farmers who emphasise the risk-taking and financial rewards from farming; and
- **stockmen** are those farmers who emphasise good husbandry, and especially the stockmanship of livestock enterprises.

In many ways, a style of farming is similar to the notion of a particular farming subculture. The farming style reflects both the values and knowledge of particular farmers. Vanclay, an Australian researcher, argues that there is a need to recognise the diversity of farming practices (or styles) in relation to environmental management, which make it easier for some farmers to respond to demands for more sympathetic environmental management. Broadly, it is possible to equate the observable diversity of practices with a farmer-based concept of farming style, although Vanclay takes issue with the extent to which some Dutch classifications of farming style are based on researchers' ideal types rather than farmer-perceived categories.

⁴ We have changed the category names to aid translation, but retained the essential differences of Commandeur's styles.

The original work on farming styles focused on adaptations of farming practices in particular places. Over the 1990s under the guidance of Jan Douwe van der Ploeg, a series of Dutch studies were undertaken which explored the diversity of ways in which farmers have responded (or not responded) to the imperatives of the post-war modernisation project in the farm sector. Their categorisations represent a significant advance beyond the dualistic categories of productivist farmer and post-productivist farmer and highlights farming style as a social construction rather than a set of adaptive responses to particular biophysical conditions.

Various authors attest to the extent to which farming styles change over time, although there is little in the literature to identify whether trigger events come from external factors such as market prices or supply chain changes or endogenously through changes in farm household values or attitudes. Intuitively one might expect changes in style to be ushered in, or at least triggered, by major life cycle changes such as succession.

One core concept in understanding the capacity of different styles of farming to accommodate change is the idea of **'room for manoeuvre'**. Some farmers may be confronted with a much wider range of options in terms of adjustment possibilities, whereas other farmers may be locked into particular styles of farming, or more generally into particular farming systems, regardless of style. Clearly, within a mixed farming system on land that can be devoted to a range of stocking and cropping, the room for manoeuvre is much greater than either under an all-arable unenclosed farming system or an all-dairy system. Although room for manoeuvre is usually conceived of as a crude indicator of the scope for adaptation of a particular farm enterprise, it also can be used to explore the scope for the farm-level enhancement of environmental sustainability. However, whether we are looking at general business adjustment, diversification or environmental management, the room for manoeuvre is not only seen as a set of technical constraints but is also conditioned by behaviour and attitudes. This leads to a need to explore the ways in which attitudes and values are structured.

Habitus

The concept of habitus was developed by Pierre Bourdieu, a French sociologist. Habitus can be defined as the socially conditioned disposition of an individual to act in a particular way in particular situations. Bourdieu described it as 'a system of dispositions of being, seeing, thinking or a system of long-lasting schemes or structures of perception, conception and action' (2005). In a farming context, the style of farming and the engagement of the farm household with a network of advisers, intermediaries, suppliers and buyers, is seen not so much a result of a rationalist act of a profit maximising entrepreneur, but instead as a durable socially structured and conditioned set of technical, behavioural and market responses to an embedded set of values. Bourdieu saw the habitus as defining the rules of a 'game' played out in a 'field' in which the accumulation of 'symbolic capital' becomes a defining feature of an individual's actions. The capital is symbolic because it provides a set of signs or symbols about what an individual actor values. These habituses, games and rules can be seen in large organisations such as the armed forces, in universities, or in particular occupational groups.

It has been argued that the symbolic capital of being a good farmer is often associated with visual evidence of good farming practice. Sometimes, as with well-managed hedgerows or well-maintained traditional buildings, this might also result in environmental benefits to biodiversity or landscape. However, at other times, the desire to grow a clean weed-free crop or the desire to

3. Key findings

bring uncultivated patches of land into productive use might compromise the delivery of some of the environmental services provided by farmers. Ongoing work on farmer groups and networks in Wales (Dwyer et al. 2002) indicates that there may be scope for accumulating symbolic capital through collective action to increase environmental sustainability. In this and a number of other studies it is argued that targeted local actions, facilitated by respected local actors can engage even rather recalcitrant individuals in a collective learning project, especially where stimulated by policy 'carrots'.

Rather than a generic farming habitus, it is likely that there are different habituses for different types of farmers. In its first use in a farming context in the UK, Mark Shucksmith described how the habitus of conservative farmers in upland Aberdeenshire limited their capacity to diversify, even where it might have been in their commercial interest to have done so. A specific group of farmers with deeply entrenched traditional values prefer to retain non-profitable livestock enterprises, and eschew diversification. However, another group, whom Shucksmith terms 'accumulators' are much more willing to engage in new practices and unfamiliar enterprises. He concludes that it is essential to combine an understanding of structural relationships and different actors' motivations and values to better understand the adoption or lack of adoption of new practices. Habitus can thus be seen as a set of socially constructed and often unseen and unperceived constraints on an individual farmer household's behaviour.

Bourdieu argued that habituses change very slowly. Later commentators have questioned this assertion, arguing that in some situations habituses can change rather fast, as when migrants from developing countries break away from their traditional family networks and move to developed country cities. However, in a farming context, where a large proportion of the farming community is tied through family history to a particular farm and embedded into a particular locality and community, the capacity for habituses to change may be much less. The whole setting for farming activity can be seen as a highly visible inter-generational tapestry, representing the work of farming forbears and current actors in creating land management systems that provide for the needs of the farm household.

The knowledge system

The concept of an Agricultural Knowledge and Information System (AKIS) has been advanced to describe the networks and flows of information between institutions and to the wider farming community through which farmers learn about and share new knowledge. It has been argued that much of the architecture of the contemporary farming AKIS, in Britain and more widely in Europe, has been developed to support the post-second world war mission to increase both production and productivity.

However, in practice an individual farmer will be connected to a particular subset of institutions and networks. Even if the dominant networks have been strongly geared towards increased production, there are other subsidiary networks linking such groups as organic farmers or Farming and Wildlife Group (FWAG) members, and others linked to breed societies, or local agricultural shows and societies. The extent to which these networks overlap or are discrete will strongly condition the flow of information within the network and the uptake of new values by particular subsets of farmers.

Recent work by Demos on influencing public behaviour for environmental goals (although not dealing with farmers) stresses the importance of understanding the networks with which actors engage and the need to 'spread the idea virus' through pivotal individuals – exemplars who are respected individuals and whom other farmers listen to. It may be necessary to identify these exemplar individuals in a range of farming styles.

The evidence base

The extent to which farmers will change the ways in which they operate their farms to contribute to enhancing environmental sustainability will be affected by many factors. There is a considerable literature in the UK on farmer adoption of environment-friendly measures or behaviour, most of it with a weak theoretical base. We summarise the principal findings below.

First, it will be conditioned by the nature of their farming systems and the particular style of farming practised. If the farmer's predisposition is to produce a clean tidy crop, and to use the latest technologies to ensure this, it is likely that the farm will suffer further reductions in already low biodiversity values. If, however, farming practices are less intensive and the farmer values the farmed landscape around him/herself and enjoys shooting, there is every chance that biodiversity values on the farm will be enhanced (Beedell and Rehman 1999). There is abundant evidence that many farmers want to be seen as good farmers and that the visual integrity of their farming practices are important components of their symbolic capital (Burton 2004). The frequency of the refrain in farmer interviews and comments that 'we do not want to be park keepers, we want to farm' reflects this point of view, although there are signs of diminishing stigma with this role.

Second, the enhanced uptake of actions that contribute beneficially to environmental sustainability will be conditioned by the room for manoeuvre of a particular farmer on a particular farm. This can be a function of both the farming style and its associated habitus which depend on the farmer, and the particular resource set of the farm which is determined by the natural endowment and past history of management and the ease of redeploying assets to create enhanced environmental sustainability. Whilst most UK literature refers to neither farming style nor habitus explicitly, there is clear recognition of differences between different groups of farmers in values, attitude and approach to farming.

Third, the extent to which the farmer picks up and responds to signals from government and wider society to enhance the environmental sustainability of contemporary farming depends on the particular knowledge networks with which he/she engages and the nature of the messages transmitted through those networks (Röling and Wagemakers 1998). It may also depend on whether certain actors, with figurehead status, engage in such actions and behave as exemplars. There is some evidence of this particularly in work relating to FWAG membership.

Fourth, the loss of trust of many people in government and authority is an endemic condition of modern society. A number of surveys reveal that farmers are confused by and mistrust the environmental messages emanating from Defra. They see the government department that formerly nurtured them as now compromising their values and threatening their survival. There is compelling evidence that new group-based participatory approaches can be used to rebuild citizen and farmer trust, but they may need to be premised on different delivery systems to those currently practised, which still tend to hinge around rule-based, top-down implementation of new legislation (Dwyer et al, 2002; SLIM 2005).

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Fifth, there is evidence from elsewhere in Europe that it is extremely difficult to engage certain groups of farmers explicitly in environment-benefiting actions, even where their farming systems are environmentally benign. This is particularly the case with those conservative farmers whose relatively low-intensity farming operations are relatively good for the environment, but who are dismissive about explicit engagement with the new environmental agenda (Schmitzberger *et al.* 2005).

However, neither styles of farming nor habituses are unchanging. Both external change and internal household changes can influence habitus change and farming style change, even if such changes take place rather more slowly than many policy-makers would wish.

4. Policy implications

Implications for policy-makers

The principal implications of these findings for policy-makers are that:

- there is a need to recognise the diversity of farming styles and better understand the room for manoeuvre afforded by different farming styles with respect to the scope for increased environmental sustainability;
- there is a need to understand that the symbolic capital of many farmers is not strongly oriented towards the delivery of enhanced environmental sustainability;
- the most easily targeted groups are those farmers who are connected to social networks that value environmental features, such as FWAG members or those associated with wildlife groups, but the most significant farmers to act as exemplars are those who have hitherto shunned voluntary environmental schemes but who are persuaded to enter them, either through value shifts or financial necessity. These individuals are more likely to stimulate a 'viral' effect among non-adopters than those whose environmental credentials are already widely recognised.

Policy

The key implication of these findings for policy development is the need to recognise the diversity of farming styles and different habituses and the consequential different capacity of different farmers to engage with new environment-enhancing behaviour. Policy needs to be designed with clear specification of target groups and with a good understanding of the value systems, subcultures and habituses connected with those groups. Policy-makers need to understand the composition of the symbolic capital of target groups and design policies accordingly.

Delivery

Target groups are easier to reach when the right 'buttons' have been touched. Essentially, it is necessary for the policy measure when implemented, to contribute to, rather than detract from, the accumulated symbolic capital of the farm household.

It is self-evident that some of those whose farming style is most closely wedded to the technical aspects of farming or to income and profit generation (the so-called productivist farmers) may find some measures to increase environmental sustainability inconsistent with their values and openly challenging to their habituses. Indeed, the practitioners of these very styles of farming may also be those who currently compromise environmental sustainability most. Two sets of factors can lead to value shifts: social ostracism (though this can lead to retreat into bunkers) or active engagement in area-based environmental projects with strong participatory elements.

Consequently, there is a danger that the measures to promote greater environmental sustainability will be most readily adopted by those whose habituses are least compromised by any necessary changes in farming practices. These same people are likely to be those whose farming styles generate modest environmental problems. However, there is also a group of relatively environmentally benign 'conservative' farmers, identified by Austrian researchers, whose predisposition to act to increase environmental sustainability is very low but whose delivery of environmental goods and services is rather high. This hard-to-reach group may need to be approached with particular sensitivity ideally through locally based participatory actions, where facilitation is by respected change agents.

4. Policy implications

Research

We still know very little about the pathways to the adoption of more environmentally sustainable behaviour. Whilst it is obvious that some styles of farming have fewer adverse effects on environmental sustainability, however defined, it is less obvious how to enhance environmental sustainability at a time when farming styles are being challenged by a range of internal and external forces. Given the heterogeneity of both farming styles and habituses of different farmers, we should anticipate different take-up rates and different responsiveness and interest to different measures. Rather than simply trying to explore differential uptake in relation to simplistic attitudinal differences, or in the context of rational models of behaviour, it is perhaps better to frame such analysis in terms of farming styles, farmer habituses and the room for manoeuvre created by these two important phenomena. It is crucial to use the networks of knowledge distribution with which particular styles of farmer are familiar and to recognise that pivotal individuals can act either as viral change agents or exemplars of reformulated notions of good practice.

Implications for knowledge transfer actors

The principal implications for knowledge transfer actors are as follows.

- The differences between the new extension 'mission' with its explicit desire to enhance the sustainability of farming and the old 'mission' to increase production are such that many farmers are confused by what they perceive as mixed messages and, furthermore, distrustful of the agencies from where these messages emanate.
- There is a need to recognise the diversity of styles of habituses and to design communication methods and messages accordingly, wherever possible recognising the important elements of symbolic capital of different styles of farmers.

Policy

There are several important policy implications for knowledge transfer actors. First, the trusted servants of the old advisory services may find it difficult to engage with the new mission to deliver multifunctional benefits and enhanced sustainability. Often the old advisory values were unintentionally antagonistic to environmental interests, and the incompatibility of the old and new messages creates an incongruous context for delivering environmental advice to farmers. However, the old production-oriented advisers may be more closely connected to the core of the farming community and may be more trusted than 'outsiders' bearing environmental advice. Where there are clear win-win situations with environmental gains coming on the coat tails of improved business or technical practices, the old advisers may be relatively well placed to act as effective extension agents for the new policy frameworks. Where a new type of advice is needed, it may be hard for those from more environmentally oriented backgrounds to engage effectively with certain groups of farmers although some groups may be much more predisposed to engage with environment-enhancing activities if they are compatible with habituses and farming styles.

Given the growing heterogeneity of the farm community, it is imperative that those advising different component parts of the industry all 'carry the flag' and support the commitment to increase the environmental sustainability of farming. Those network actors who are by their values least predisposed to carry the environmental message may, paradoxically, be those most likely to be listened to by diffident and/or recalcitrant farmer-as-environmental manager.

Delivery

There is a substantial body of evidence that 'buy-in' is needed before the farm community as a whole will engage actively in enhancing environmental sustainability. Although there may still be some room for the old top-down extension model, there is also evidence that bottom-up local networks and farmer groups can be highly effective vehicles for helping farmers learn how to address environmental problems. This calls for new roles for advisers as facilitators of new learning.

Where there are obvious win-win situations, as where, say, pesticide or nutrient use levels can be cost-effectively reduced, it is much easier to accommodate the environmental messages. Where the environmental services are defined much more loosely in terms of 'public good delivery' or similar, there is a need to package the message differently, and probably a much greater need to incentivise financially any shift in behaviour.

Research

The principal research need is to elicit the most effective means of knowledge transfer which will facilitate change from less environmentally sustainable to more sustainable farming practices, recognising that this is likely to differ amongst different styles of farmer. There is also a need to pinpoint the elements of symbolic capital of the more recalcitrant adopters of environmental enhancement, to expose the possibilities of connecting to some elements of this capital.

Implications for educationalists

The principal implications for educationalists are:

- many educators are steeped in productivist values and continue to transmit these values in educational establishments; and
- the amount of evidence-based, socio-economic research in UK farming is very modest compared to many other countries and the transfer of new theoretical ideas into research and teaching is rather slow compared to many other countries.

Policy

There is a need for the development of a more holistic approach to agricultural education, which looks beyond the traditional technical/financial components of agricultural education and embraces a broader environmental and rural livelihoods perspective. In other words education must to a degree challenge the production-centred habitus of many agricultural students. Although progress has been made in broadening agricultural curricula, many elements of the broader curricula are taught in 'flanker' degree programmes such as those in Countryside Management and are not part of mainstream agriculture students' curricula. Policy guidance is needed to support the framing of a broader curriculum to meet the needs specified clearly in the Curry Commission report.

4. Policy implications

Delivery

The bold challenges to conventional agricultural curricula embodied in the systems-based Hawkesbury model developed in Australia have never been implemented fully in the UK. Learning based on whole system understanding, the explicit connection of theory to practice and ensuring a reflexive and critical experiential learning process are at the core of the Hawkesbury model. This more critical and reflexive approach to learning, and particularly the whole system perspective, challenges the narrowly circumscribed production-based knowledge which reinforces exiting habituses. Some elements of this approach might beneficially be re-introduced into UK-based agricultural education, though there are clearly tensions between the Hawkesbury approach and more conventional models.

Research

The most important pedagogic research needs are first how to develop deep learning about the wider systemic connections of farming and rural livelihood systems and transform this into practice and second, how to facilitate effective lifelong learning, which enables effective farmer adaptation to new situations, particularly situations involving adaptation to new environmental policy agendas.

Implications for farmers

The principal implications for farmers are:

- the multifunctionality agenda means that farmers have to deliver a wider range of goods and services for society and contribute more to environmental sustainability; and
- some gains in environmental sustainability can be readily introduced into extant farming enterprises and styles without great cost.

Policy

All farmers need to be made more aware of the win-win opportunities in adjusting their farming systems to enhance both profits and environmental sustainability. This represents the easiest entry point for environmental behaviour change. It is easier to work with existing habituses than to transform them. But, over and above this there is a need for farmers to come to terms with a renegotiated social and political contract with wider society. The Entry and Higher Level Stewardship Schemes should be presented as part of a social and political contract, which can be given added credence by being grounded in dialogue with both public and government bodies at local level and being nurtured by agents with the capacity to engage effectively with farmers on the ground.

Delivery

There is a clear need to use the communications systems favoured by different styles of farmer. Not all farmers will connect to the same networks and some may be remotely connected by their farming style and habitus to the developing environmental agenda.

Research

There is a need to explore more deeply the co-learning approaches, evident for example in the Landcare approach in Australia and in several catchment management schemes in the UK. These are approaches where farmers, in association with external facilitators, take control over the process of environmental enhancement and develop collaborative solutions to problems. This requires new co-learning approaches to research, in partnership with facilitators and farmer actors on the ground.

Conclusions

This guide asserts that there is a need for better understanding of both farming styles and habituses of different groups of farmers as a precondition for understanding the capacity of different actors in the farming community to adopt environment-enhancing behaviour.

From the literature concerning farming styles it is apparent that there are some farmers who are strongly commercially motivated. Although such farmers have often exhibited a tendency to intensify their operations and potentially to put substantial pressure on the environment, their responsiveness to commercial incentives suggests that they can be persuaded to engage with new environment-enhancing actions, if the incentives are sufficient. Other farmers deliver environmental goods and services as an explicit part of their approach to (or style of) farming, as in the case of organic farmers and LEAF or FWAG members. A further group deliver environmental goods because their innate conservatism has led them not to intensify their farming systems and the environmental goods are unintended by-products rather than explicit acts of intentionality.

Given the wide range of styles and habituses, it is almost inconceivable that a one-size-fits-all policy can deliver the desired environmental response from different styles of farmer. It is incumbent on those who design policies to think both about the optimal processes and channels of delivery as well as the policy instruments, if the practices of environmentally sensitive farming are to be more speedily introduced in UK farming.

There is also a need for renewal and reorganisation of training and facilitation skills within the whole of the Agricultural Knowledge and Information System. The skills that are needed to increase the environmental sustainability of contemporary farming systems in the UK relate to the facilitation of learning, not just among farmers but in a co-learning process where farmers, advisers, educationalists and those implementing policy work together to meet the new environmental challenges.

5. Supplementary information

Much of the more recent work on farming styles is available in English but by Dutch authors. A good starting point is Chapter 3 of Jan Douwe van der Ploeg's *The Virtual Farmer* (2003; van Gorcum, Assen), which recaps the earlier work. Commandeur's *Styles of Pig Farming* is a good example of a specific application of the concept. For an Antipodean critique of this work Frank Vanclay, Luciano Mesiti and Peter Howden's *Styles of Farming and Farming Subcultures: Appropriate Concepts for Australian Rural Sociology* (Rural Sociology 8.2, pp 85-125) exposes some of the frailties of the Van der Ploeg approach.

The original texts by Pierre Bourdieu are somewhat impenetrable, although selected readings and interpretations are often available. Those in Hillier and Rooksby's *Habitus – a Sense of Place* (2005, Ashgate, London) are a good starting point. A number of other papers in the book, particularly the introduction and conclusions also offer useful guidance to the ideas. Mark Shucksmith's paper in the *Journal of Agricultural Economics* (1993) is the earliest application of the idea of habitus in a UK farming context.

With regard to information on the Agricultural Knowledge and Information System, the work of Niels Röling is accessible and a useful introduction. In *Facilitating Sustainable Agriculture* (1998, Cambridge CUP), he and others focus on connecting AKIS ideas to environmental concerns. The work of the LEARN group (2000, *Cow up a Tree*, INRA Editions, Paris) provides a good introduction to the new network based approaches to farmer learning.

Much of the literature on uptake of environmental behaviour in the UK is weakly connected to the above-mentioned theories. Shucksmith's 1993 study is the exception. Beedell and Rehman (1999) use an alternative theoretical framework to explore engagement with FWAG. Burton (2004) provides a compelling account in the journal *Sociologia Ruralis* of how farmers view good practice and how this guides their environmental behaviour. Dwyer et al. (2002) in a study for English Nature on diffuse water pollution and the SLIM project (2005) have both explored the scope for farmer engagement in area-based projects to stimulate environmental learning. The work of Schmitzberger et al. in the journal *Agriculture Ecosystems and Environment* in 2005 on Austrian farmers is a model example of how the farming styles can shape environmental attitudes and behaviour.

From a different perspective Collins et al's work for Defra (2003, *Carrots Sticks and Sermons: Influencing public behaviour for Environmental Goals*) offers some interesting overlapping ideas, although the marketing language sits uncomfortably with some of the theoretical social sciences literature.

A full list of references and further information is contained in the final report for this study: *Habitus and style of farming* in explaining the adoption of environmental sustainability-enhancing behaviour. This can be accessed through the Defra website.

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