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Agriculture and Climate Change: Evidence on Influencing Farmer Behaviours

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AGRICULTURE AND CLIMATE CHANGE:

EVIDENCE ON INFLUENCING

FARMER BEHAVIOURS

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ABBREVIATIONS AND ACRONYMS USED IN THE REPORT

ACC programme – The Agriculture and Climate Change: Evidence on Influencing Behaviours Programme

AD – Anaerobic digestion

AESs – Agri-environment schemes

CAP – Common Agricultural Policy

Defra – Department for Environment, Food and Rural Affairs

ECA – European Court of Auditors

ESA – Environmentally Sensitive Areas Scheme

FAS – Farm Accounts Survey (Scotland)

FBS – Farm Business Survey (England)

FFBC – Farming for a better climate

FiT – Feed-In Tariff Scheme

GAEC – Good Agricultural and Environmental Condition

GHG – Greenhouse Gas

LFAs – Less Favoured Areas

NDPB – Non Departmental Public Body

NFUS – National Farmers Union of Scotland

NVZ – Nitrate vulnerable zones

OECD – Organisation for Economic Co-operation and Development

PAS2050 – Publicly Available Specification 2050

QMS – Quality Meat Scotland

RESAS – Rural and Environment Science and Analytical Services

SAC – Scottish Agricultural College

SEPA – Scottish Environmental Protection Agency

SFP – Single Farm Payment

SG – Scottish Government

SMR – Statutory Management Requirements

SNH – Scottish Natural Heritage

SRDP – Scotland Rural Development Programme

EXECUTIVE SUMMARY

Introduction to the Programme

Policy context in Scotland

The Scottish Government (SG) has estimated that agriculture and related land use could contribute around 20% of total Scottish greenhouse gas (GHG) emissions. The Climate Change (Scotland) Act 2009 sets in statute the target to reduce Scotland's emissions by 80% by 2050, with an interim target of a 42% reduction by 2020. Farmers have a key role to play in meeting the targets, both because of the contribution of agriculture to total GHG emissions, and because farming can fix carbon in the soil, acting as a permanent sink.

The overarching context for agricultural policy in Scotland is the Common Agricultural Policy (CAP), which is designed to protect agriculture throughout the European Union by influencing prices, outputs and farmers' incomes. Currently the CAP provides a level of income security to farmers as well as a „cross compliance' framework for sustainable management of the environment.

Within Scotland, Farming for a Better Climate (FFBC) is currently the only policy initiative set up by the SG with the specific aim of mitigating climate change in agriculture. FFBC is a targeted communication strategy designed to encourage farmers to adopt efficiency measures that reduce emissions, while at the same time having an overall positive impact on business performance.

Many actions encouraged through FFBC potentially qualify for grant funding through the Scotland Rural Development Programme (SRDP), a major programme of economic, environmental and social measures designed to develop rural Scotland. Broader incentives designed to support the growth of renewable energy in Scotland can also benefit farmers, and initiatives operating outwith the SG, such as Future Proofing Scotland's Farming, support the implementation of agricultural policy in Scotland.

The CAP will undergo major reform at EU level post 2013. There is potential for specific measures to be considered through the cross compliance regime that links farming practices to subsidy payments, as well as opportunities for introducing further climate action measures.

The need for a programme of evidence gathering in relation to agriculture and climate change behaviours

A large volume of research, from a range of disciplines, is available on factors influencing attitudes and behaviours. Research indicates that very rarely is a decision made in full knowledge of all the costs, benefits and risks, or in isolation from outside influences. Making permanent changes to long established habits takes time, even when change is perceived as necessary. Outcomes of interventions are difficult to predict, and responses vary by target groups.

These findings from research relating to the general population are relevant to farmers. However, there are circumstances relating to farmers as business people which are unique. Agricultural systems are dynamic, since producers and consumers

are continuously responding to changes in crop and livestock yields, food prices, input prices, resource availability. This volatility is largely due to factors that farmers have no, or little, control over; such as weather conditions, extreme weather events, outbreaks of disease and pests. To provide farmers with some protection against external shocks, agriculture has historically accessed programmes of subsidy payments. Any attempts to influence farmer behaviours must therefore acknowledge the social, environmental and economic cultural context of farming in Scotland.

The Agriculture and Climate Change: Evidence on Influencing Behaviours Programme (ACC programme) was set up in 2011 and carried out by analysts in the Rural Analytical Unit within the SG. The programme had three overarching aims:

- To gain a better understanding of the range of factors influencing farmers' behaviours (in general, and in relation to environmental issues),
- To consider the effectiveness of the climate change mitigation measures in use/available to policy makers
- To consider how policy makers in Scotland, and opinion formers working with farmers, could most usefully draw on these behavioural insights to refine the suite of initiatives which aim to influence farming practice in relation to mitigating climate change.

The objectives of the programme were to:

1. Explore what is known about the **range of factors influencing attitudes and behaviours**, both of farmers and the general population
2. Consider the range of **approaches taken by governments** to date to influence farmer behaviours in relation to climate change, and what is known about their effectiveness
3. Examine **factors influencing farmers' uptake** of policy measures
4. Synthesise the available evidence on farmers' **awareness** of climate change issues, and **uptake** of mitigation measures
5. Consider what can be learned from **aspects of policy initiatives that have been, or are proving to be more/less successful**
6. Investigate how policy development and delivery can be informed by understanding and modelling the **behaviours and motivations of groups of farmers who share particular farming styles**
7. Identify **critical gaps** in the evidence base and consider how best to fill these gaps
8. Draw together the key messages and make recommendations for **more effective policy development and delivery** in relation to mitigating agricultural emissions in Scotland

A scoping study was carried out to coordinate information on the policy initiatives that the SG, key non-departmental public bodies (NDPBs) and industry in Scotland have underway that seek to influence farmer behaviours in relation to climate change mitigation. Individual policy measures were then mapped onto the type of behavioural levers they are using, in order to investigate whether there may be opportunities to consider additional/alternative approaches. The main elements of the ACC programme were an international literature review and a series of interviews with opinion formers in the agricultural community in Scotland. Naturally, it was vital to include the perspectives of farmers themselves. Both the analysts and policy makers involved in the programme were very aware of the burden that

research already places on farm businesses. When the literature review indicated that a number of recent, relevant studies had included Scottish farmer perspectives, along with the views and experiences of farmers across the UK, it was decided not to conduct interviews, or a survey, with farmers themselves, but to seek the views of a range of opinion formers who communicate regularly with farmers.

Methodology

Literature review

The literature review synthesised the available evidence from Scotland, elsewhere in the UK and internationally to address research questions relating to: influences on farmer attitudes and behaviours; the characteristics of groups of farmers who are, or who are likely to be, more/less responsive to individual measures; approaches governments have taken to influence farmer behaviours in relation to climate change and evidence of their effectiveness; factors affecting uptake of policy measures. The report is structured around these questions.

Interviews with opinion formers

Through their work as agricultural consultants, with agricultural lobby groups or environmental non-departmental public bodies, „opinion formers' are familiar with a broad range of farmer experiences. Fourteen of these opinion formers were interviewed as part of the ACC programme. Interviews focused on: farmer awareness of climate change mitigation initiatives in general, and Farming for a Better Climate in particular; the main factors that appear to influence whether or not mitigation measures are taken up by farmers; and suggestions for improving climate change messages and advice to farmers.

Factors influencing farmers' attitudes and behaviours

Key points from the literature

Key drivers of behaviours in the general population are: external factors (the context for change), economic factors (financial costs and effort); internal factors (habit, personal capacity etc); and social factors (personal and societal values, social commitment etc). Naturally all of these apply to the decision making processes and behaviours of farmers.

Many additional considerations are specific to farmers and to climate change, since changes in the climate influence many components of agricultural systems.

- **External** factors create the context in which farmer behaviours can, or cannot, be influenced. These include: capacity to change (some environmental behaviours are just not possible within certain farm environments); size and type of farm; farmer demographics
- **Economic** factors influencing farmer behaviours relate to: market volatility (the dynamic nature of agricultural systems; present and future levels of subsidy, market prices and operating costs); the nature of economic motivation; quality assurance issues; whether or not to participate in environmental schemes; issues re non-profitable farming systems
- **Internal** factors, such as attitudes, values and beliefs, are influential, although with farmers, as with the general population, there are wider issues about the links between attitudes and behaviours and the implications about changing one

without the other. Farmers, tend to work to long timescales so, once they commit to decisions, they are often tied into specific actions for years. However, there are specific „moments of change' when it is easier to make alterations to farm management practices

- **Social** factors include ways in which farmers are influenced by the views and behaviours of family members, peers and neighbours. The farming community contains a diverse range of decision makers, who respond to policy levers and economic influences in different ways. Within a farm business it is important to consider who is responsible for making key decisions. If the farmer is not acting alone, how might the characteristics of others affect farm business decisions?

Opinion formers also wished to stress that:

- Measures do not necessarily have to be profitable to be adopted by farmers, but it is important that they cost little or nothing to implement, and that the incentives on offer are commensurate with the scale of the challenge
- Farmers work long days and deal with many issues. They may be aware of mitigation options, and interested in taking advantage of them, but lack the time to deal with planning and implementation.

Some implications for policy development and delivery

- Since farmers are influenced by their social networks, desired behaviours in the innovator/early adopter group need to be encouraged, endorsed and promoted.
- Farmers' capacity to change is a key consideration in influencing behaviours. Designing advice as well as payments and incentives to target farmers in particular circumstances may make it easier for them to adapt their business decision making.

Characterising groups of farmers to inform agricultural policy development and delivery

Key points from the literature

The diversity of the farming community is widely recognised, making it important to find ways to group together certain behaviours and attitudes into more heterogeneous sub-groups, or segments in order to effectively influence behaviour. Extensive work on farmer segmentation has been carried out by Defra, and a five group model built up on the basis of the evidence. The likely responsiveness of the individual groups to policy measures has also been investigated.

- **Custodians** are ready to be influenced, particularly if their conservation role is recognised. They will obey the rules, but prefer to be persuaded and encouraged. The cost and time of keeping up to date with regulations is relatively greater for them, as their holdings are often smaller
- **Lifestyle choice** farmers are likely to be responsive to messages around the emotional aspects of farming, and are familiar with environmental issues. They are unlikely to be well informed about regulations, or to have time to keep up to date with them
- **Pragmatists** wish to be compliant for the good of the business, as long as the cost of compliance is not excessive. Their emotional connection to farming may make it difficult to influence them where respecting environmental constraints would impact on their freedom to farm in particular ways

- **Modern family businesses** want to know the potential business gains. They are likely to be familiar with the environmental regulations that are important to them, and appreciate information, but trust their own judgement. Clear justification for legislation is needed; they are susceptible to influence if compliance is practical
- **Challenged enterprises** are likely to be least engaged with management techniques, and unfamiliar with the rules. Any time spent on paper work is likely to focus on finances. Where regulation incurs costs or restraints on current practices, they may choose to disobey. A tailor-made approach, such as linking compliance to financial incentives, might be required to reach them.

The Defra segmentation approach has been used in several studies and, of course, the percentages of farmers grouped into the various segments varies from study to study. However, challenged enterprises and lifestyle choice groups are consistently the smallest (each less than 10% of the sample). One study placed over 50% of the sample in the pragmatist group; but the initial Defra survey indicated that more than 40% were classified as modern family businesses, and 23% as custodians. It should be noted that farmers often display characteristics from all of the segmentation groups and tend to be placed into the „best fit' category.

Work to place the segmentation framework within an existing survey on the physical and economic performance of farm businesses showed that the expectations of the characteristics of the segmentations groups were broadly met. However, the choice of segmentation group could be influenced, to a certain extent, by factors impacting on the farmer at the time of interview.

Some implications for policy development and delivery

- Invoking both the profit and stewardship motives in farmers would be likely to encourage a balance of business and environmentally oriented behaviours
- The segmentation approach allows for better targeting of initiatives that are sensitive to farmers' values, as well as their circumstances. There is potential to use the Scotland's Farm Accounts Survey to gather information that will allow a similar segmentation approach to be developed in Scotland. However, it is important that the segment groupings make sense to Scottish farmers. It must also be acknowledged that segment categorisation is largely subjective, and is not necessarily fixed.

Approaches taken by governments to influence farmer behaviours in relation to climate change, and what is known about their effectiveness

Policy and economic mechanisms available to policy makers

A range of policy approaches is available to governments to encourage positive environmental behaviour among farmers:

- **Regulation** – placing restrictions on what farmers are legally allowed to do and prohibit undesirable management practices. This works best in situations where the target group is already, or can quickly be, persuaded that the regulated actions fall below an acceptable „reference level' of responsible farming practice
- **Economic incentives** – taxes and subsidies are the most widely used and analysed instruments
- **Market-led and 'voluntary' approaches** – promoting environmentally beneficial management practices to encourage higher standards of environmental

behaviours among farmers. These have significant potential to encourage higher standards of management practice on farms and are attractive because they offer „win-win' options to motivated producers, but are likely to be insufficient to drive enhanced management of the countryside as a whole
- **Education/information provision** – raising awareness of environmental issues, what can be done to address them and why this could be beneficial to farmers. This works in tandem with any/all of the above mechanisms.

Each approach has different advantages and disadvantages in terms of cost, success at influencing behaviours, speed of implementation etc. Success almost always depends on a range of factors. Understanding the interplay between these different elements within a particular policy or commercially-driven approach can be crucial to understand how and why they succeed or fail in different situations.

The SG is currently using a range of policy mechanisms to influence farmers' environmental behaviours. However, only the focus farms which are part of Farming for a Better Climate use the four types of policy levers available to influence behaviours: making it easier to change; giving the right signals; getting people involved; and leading by example.

Key points from the literature
- **Cross compliance** – farmers need clear information about the rationale for cross compliance measures and why the rules are needed. It is important to make it as easy as possible for them to keep up to date with regulatory requirements
- **Nitrate vulnerable zones** – although there is sometimes resentment among farmers about NVZ designation, and a widespread feeling that others should share the costs, the evidence suggests that farmers who are disengaged present a greater challenge to policy than farmers who are resistant
- **Focus farms** – there is no evidence to date on the effectiveness of focus farms in Scotland, although they follow a model (monitor farms) which has been evaluated positively. Potential tensions between the commercial imperative and environmental measures may be alleviated if CAP reform includes increased emphasis on environmental cross compliance measures
- **Agri-environment schemes** – farmers' decisions to participate in AESs are influenced by factors such as farm type and size, tenure arrangements and previous experience of participation. Refining policy to improve targeting might help to encourage „newcomers,' small farms and tenant farmers. Giving farmers more opportunity to innovate within schemes, and setting targets that would allow farmers to see, measure and communicate their conservation progress, would meet their needs to enact and display their skills to their peers
- **Renewables** – farmers are aware of and interested in renewables initiatives, and the potential additional income they provide. However, there are (or are perceived to be) substantial transaction costs involved in the adoption of renewables measures. Clearer information and better signposting to available support could help to increase uptake of schemes. Farmers could also be encouraged to collaborate with each other in the adoption of initiatives.

Opinion formers also wished to stress that:
- The more time and money farmers spend complying with regulations, the less they can spend on creating and selling produce (although regulation may also

bring other benefits). Better regulations and clearer instructions would make it easier for farmers to comply
- Making mitigation measures mandatory does not persuade farmers of their merit, whereas voluntary measures are usually adopted because farmers have been convinced that they have value. However, if farmers can see why mandatory measures are necessary and/or beneficial, they are more likely to support them
- The five key actions encouraged through FFBC are all seen as good practice, so farmers looking to increase their efficiency would be likely to take them up anyway
- The process of applying for grant funding through SRDP is perceived to be over complicated
- Farmers are aware of, and interested in, renewables initiatives and the Feed-in Tariff Scheme, in particular.

Some implications for policy development and delivery
- Farmers need to be convinced by the science, particularly the science supporting cross compliance measures
- Farmers who do not engage present the greatest challenge to policy makers – using newer channels of information transfer may attract farmers who do not actively seek information
- Learning from initiatives elsewhere in the UK - many of the activities being carried out as part of Farming Futures (England) and Farming Connect (Wales) are already going on in Scotland, but it might be useful to look at how Farming Connect works with women and younger farmers. The short fact sheets produced as part of Farming Futures appear to be a useful resource, for their focus on a breadth of perspectives (including „what the scientists say'), and their lists of challenges and opportunities
- Current proposals for CAP reform beyond 2013 provide a number of opportunities for using additional policy levers, or strengthening levers already in use. Examples include expansion of farm advisory services; additional investment in research and innovation, and steps to translate research results into practice; and measures to stimulate entrepreneurship in rural communities.

Evidence on farmer awareness of climate change issues and uptake of mitigation measures

Key points from the literature
- **Awareness of climate change issues** – recent research conducted in Scotland and England has indicated that many farmers have a limited understanding of climate change issues. The role of effective information provision and guidance is of paramount importance, as farmers cannot act to mitigate environmental issues if they are not aware of their existence
- **Farmers' self reported actions in relation to climate change** – farmers who said they were taking action reported that it was rising input prices that had made them more careful about using resources efficiently. The most common reasons for **not** taking actions were that farmers did not see climate change affecting their land, and did not believe that there was much they, personally, could do to mitigate the effects of climate change.

- **Analysis of uptake of climate change measures within SRDP Rural Priorities** revealed that external factors such as size of farm, sector and region all have an influence on farms' uptake of climate change options
- **Monitoring the implementation of GHG mitigation measures** – a scoping study in 2011 concluded that the ability of existing data to describe the uptake and GHG impact of the mitigation measures prescribed by the FFBC programme is reasonable, although it could be improved by monitoring farm practice activity, improving the robustness of the emissions factors related to such activity, and attribution of the emissions changes to FFBC.

Opinion formers also wished to stress that:

- Awareness of climate change issues has substantially increased amongst farmers in recent years, but awareness will not be enough to „galvanise action'
- Mitigation measures are already being taken up in large numbers, and renewables initiatives are particularly popular with farmers
- Many farmers adopt mitigation measures because they are seen as good practice, or because they make business sense, rather than because they connect them with climate change
- Where farmers are not taking up measures which, on paper, would seem to cost them little and benefit their businesses, this could be partly due to transaction costs (perceived or actual), and scepticism (both about the reliability of the science in relation to climate change, the reliability of the measures and the difference that one farm, or even one country is able to make to emissions).

Factors influencing farmers' uptake of policy measures

Key points from the literature

Cost issues. Many mitigation options entail additional costs to farmers, and smaller farms may be less willing or able to tolerate these costs. Farmers are also required to assess risk in relation to the uncertainty of return on investment. The additional paperwork and administration associated with individual schemes are particularly unpopular with farmers.

Relationships between farmers and policy makers

- **Farmer perspectives on environmental responsibility** – farmers' first priority is the farm business. However, they may also see themselves as stewards of the landscape, and feel frustrated when this role is not acknowledged. Where environmental problems are recognised, farmers often feel unfairly singled out as responsible. Farmers also feel that particular policy measures (such as NVZ areas) discriminate against particular groups of farmers
- **Farmer endorsement of agricultural policy** – if farmers believe that government policy is unjust, or unscientific, they are less likely to support it. This has implications for the costs of enforcing regulations, as well as damaging relationships between government and farmers.

Opportunities for retailers to help drive up standards. All major UK supermarkets are currently promoting low carbon products and encouraging producers to calculate the GHG emissions of their products. However, data availability and transparency are major issues in relation to assessment of life cycle GHG emissions of goods and services.

Relationships between farmers. A number of environmental goods and services demanded of agriculture are difficult to provide without collective action. Farmers are generally considered to value their independence, but there have been successful instances of farmer cooperation in Scotland: marketing and buying cooperatives, for example. There is also a tradition of collective action in some areas, such as crofting communities. Broadening the role of farm advisory services and the scope of funding sources, and strengthening existing farmer networks, would help to foster a culture of collaboration and cooperation.

Opinion formers also wished to stress that uptake of policy measures could be increased by:

- **Ease of implementation** – farmers do not mind making minor adjustments to their management practices, but even measures that appear to be „win/wins' will not necessarily be adopted if they are perceived to be difficult to implement
- **Incentivising measures** – without the possibility of a new, or increased, revenue stream, most farmers do not have the time/money to implement new methods. However, it is important to convince farmers (through provision of appropriate advice) that measures are beneficial in their own right, or farmers may revert to their previous practices when the initiatives end
- **The role of supermarkets** – supermarkets have the potential to be a major influence on farmer behaviours, as they are in a position to work with suppliers to raise environmental standards, as well as being well placed to influence consumer behaviour. However, interviewees raised concerns about where the additional financial burden would fall if supermarkets should insist on more stringent environmental standards for products in the future.

Some implications for policy development and delivery

- **Transaction costs** - a variety of ways to ease transaction costs are suggested in the literature, including reimbursement of some costs, particularly for smaller farms; increased targeting of schemes, with clearer objectives and use of existing networks to channel information; development of farmer networks and collective options for scheme entry; an engagement strategy which offers support for administration and emphasises the resource saving aspects of the regulation
- **Farmers' responsibility for public goods** – it is important to acknowledge the role of farmers as stewards of the environment
- **Continue to develop agricultural policy in consultation with the farming industry** – this includes building trusting relationships and being aware of the constraints that farmers face, as well as setting clear targets, simplifying processes where possible and considering the flexibility of measures
- **Consider whether, where and how collective action might be encouraged** – this includes making benefits more apparent to participants; raising awareness of the benefits of cooperation; customising policy measures to local circumstances; collective initiatives serving as gateways to other services, such as group training.

Improving communication and knowledge exchange

Key points from the literature – communication mechanisms

- **Mass media** – this is the main vehicle for making farmers aware of new technology and schemes. The farming press is a particularly important source of

information for farmers. However, other mechanisms are more effective in encouraging farmers to respond to the information they are given

- **One-to-one advice** – farm visits from agricultural advisers are highly valued by farmers, as advice can be tailored to specific farm situations, and farmers encouraged to take up actions appropriate to their farms. To be most effective, the one-to-one advice must be impartial and from a trusted and credible source
- **Demonstration farms** are particularly useful for showing how technologies and ideas can be applied in the circumstances of particular farms, and provide opportunities for farmers to meet and exchange ideas. To be effective, they must be widely promoted and marketed
- **Group learning** – discussion groups can encourage exchange of ideas and experiences. Events should be no longer than two hours; subject matter should be relevant and focused and include a practical or applied element
- **Information technology** – with much greater use of the internet/social media etc, farmers may be becoming more receptive to these methods of communication.
- **Formal or structured education or learning** – farmers who attend training courses are already predisposed to farm conservation activities. However, workshops run by initiatives that provide economic incentives as well as environmental benefits have been particularly successful.

Opinion formers also wished to stress that:

- Farmers like to see the approaches that their neighbours are taking. If they witness the „win/wins' for themselves, they are able to assess the benefits
- It can be difficult to persuade farmers to attend events but, during winter months, farmers have more time to consider changes to their management practices
- Only farmers who actually attend events will benefit from them so this will have limited scope for change
- It is important that typical farms are used, so that farmers feel they can realistically follow the example of those demonstrating their learning.
- Major national events, such as the Royal Highland Show, can engage farmers away from the hectic environment of their own farms, when they may be more open to ideas and suggestions.

Key points from the literature – the message

- Written materials should be topical, snappy, colourful and personally relevant. Information should be clear and practical
- Messages should aim to convince the receiver that the problem is serious, it affects them, the recommended actions will solve the problem, and that they are capable of performing the actions
- Advice is most likely to be well received and acted upon if it offers a clear financial dividend and/or is compatible with running a successful business
- Farmers appreciate advice which helps them to address current concerns
- Better coordination of advice to farmers would prevent duplication, and prevent messages from being undermined by conflicting statements.

Opinion formers also wished to stress that:

- Messages are more effective when „climate change' is not the only benefit
- Materials should be written in plain English, by people who understand farming

- There is a lack of awareness at the farm level of issues such as soil quality and the amount of fuel used for specific tasks. Better information would allow farmers to save money through making more cost-effective choices.

Key points from the literature – the messenger

- Those who communicate with farmers should combine experience, practical knowledge, good listening skills, good networking with other experts, fluency, energy and enthusiasm, common sense and the ability to relate technical information to the farm setting
- Farmers are more willing to engage with advice when they see the process to be one of mutual respect. The reputation of the organisation employing advisers is also important
- Farmers need to be sure that the organisation supplying the advice does not have its own agenda or, if it does, that the agenda is transparent and fits with the farmer's experience.

Opinion formers also wished to stress that:

- It can take a long time to earn farmers' trust and, once it has been lost, it is not easily regained.

Key points from the literature - working with farmers and their social networks

- Farmers place a premium on information from locally known and credible sources. It is important that scientists whose research underpins advice have (or gain) direct local experience
- Within any community there is a multitude of different „agri-cultures,' each with their own concept of „good farming.' Influencing behaviours involves targeting more than individual farmers – it involves targeting whole cultures of farming
- There is a need to involve farming culture in the process of problem framing and resolution. Developing solutions with farmers should involve an iterative process of informing farmers about the issue and contextualising it within local farming circumstances
- Messages passed through a group are likely to have higher „in-group' status and create a positive social norm.

Opinion formers also wished to stress that:

- Farmers receive messages about climate change from a range of sources over which the Scottish Government and its agencies have no (or little) control. Tabloid newspapers, in particular, are often hostile to climate science
- Messages about mitigation measures can be more effective coming from within the farming community.

Key points from the literature – knowledge exchange

- Understanding, and practical implementation of, the provision of advice have both seen a shift in response to a changing agricultural context
- Modern agriculture requires both top-down knowledge transfer and bottom-up knowledge exchange (using local farmer knowledge, for example).

Opinion formers also wished to stress that:

- Farmers need a better understanding of both the likely benefits and negative impacts of climate change
- There is a degree of scepticism amongst farmers about what difference they, or even Scotland, can make, as the climate changes
- Although it is inevitable that science evolves, and policy initiatives and guidance change to accommodate developments in research, farmers may be confused by what they perceive as a lack of consistency in the actions they are being encouraged to take.

Key points from the literature - targeting messages

- A range of receiver characteristics may influence the uptake of a message, so any promotional strategy should use a variety of message approaches
- Defra's segmentation model has been analysed in terms of the communication strategies required for different farmer categories. Farmers in the Custodians and Lifestyle Choice segments favour engagement in terms of respect, partnership working towards mutual benefits, and protecting the future. Modern Family Businesses and Challenged Enterprises are focused primarily on business, productivity and input costs. They value hard facts and concrete reasons
- Non-adopters may be currently unaware of schemes, or aware of schemes and resistant to them. Different messages are required for each of these groups
- Farmers who are averse to information seeking and disengaged from agricultural policy in general are likely to prove the most difficult to influence.

Opinion formers also wished to stress that:

- Farmers who are most resistant are unlikely to be accessed via the usual communication channels. Suggestions for reaching this group include using the farming press and providing attention-grabbing, practical information at livestock markets, the Royal Highland Show and local events.

Using a range of mechanisms to influence behaviours

The literature on influencing behaviour in the general population is more explicit about the need for effective written materials to be supported with one-to-one (or group) interaction, and with some kind of social prompt. A framework of contexts has been developed as one way to isolate behaviour change mechanisms and better understand the rationale that underpins them:

- **The individual context** – referring to initiatives that seek to change the attitudes and choices of consumers in ways that encourage more sustainable behaviours
- **The social context** – attempting to shift the cultural conventions and social norms that underpin different activities
- **The material context** – the objects, technologies and infrastructures that enable and constrain ways of behaving.

Messages for policy development and delivery

- In addition to the key messages summarised above, a Good Practice Guide, Influencing environmental behaviour using advice, includes 16 good practice principles for „policy makers who design such initiatives and their colleagues who manage such initiatives.' The Guide also provides a useful checklist for the provision of effective advice

- Although farmers are more receptive to messages about increasing the efficiency and profitability of their farm businesses, the „values' literature emphasises the importance of targeting intrinsic values (such as environmental stewardship) to achieve sustained behaviour change.

Conclusions

Why this programme is important

Farmers have a key role to play in mitigating climate change. There is a large evidence base in relation to influencing environmental behaviours; however, farmers operate in circumstances that are distinct from other industries. Climate variability has a strong influence on yield, productivity and, ultimately, farm income. The history of subsidisation is another unique factor within this industry. So it is important to have a good understanding of factors influencing farmer behaviours, as well as what is known about the effectiveness of the policy measures available to, and in use by, the Scottish Government. This programme set out to collate the available international evidence and assess its relevance to Scotland. The perspectives of a range of „opinion formers' who are familiar with Scotland's farmers' current experiences and views add value to the work of the evidence gathering programme.

The work is timely, given Scotland's ambitious GHG emissions targets. There is also the opportunity to influence measures which could be implemented under CAP reform after 2013, and the next phase of the SRDP, as well as feeding into the ongoing development of agricultural and climate change policy more generally.

Is change practical and possible?

- A range of policy measures is required to take account of regional and farm-specific circumstances. Where relevant, the issue of climate change needs to be contextualised to local farming circumstances
- Uptake of measures is improved by flexibility within regulation, access to finance, and by appealing to the farmer's underlying values and motivations. There are also particular times and circumstances when farmers are more receptive to change – it is important to capitalise on these
- The segmentation approach provides a means of representing different farming styles and should support better targeted initiatives which are sensitive to farmers' value systems, as well as their circumstances.

How can uptake of measures be encouraged?

This programme has identified a number of key issues that need to be addressed:

- **Cultural capital issues**. It is important to farmers that they are able to demonstrate their expertise; that signs of their skills are visible to others. Productivist symbols are easy to demonstrate; environmental stewardship ones are less so.
- **Encouraging innovation**. Since farmers are influenced by their peer group, it is important to ensure that innovative farmers are supported as exemplars. Allowing farmers more innovation in conservation practices may encourage a sense of pride in their expertise.

- **Demonstrating new farming techniques/technologies.** Farmers appreciate the opportunity to try things out for themselves, but they have limited time and need to be sure that techniques/technologies will work in their particular farm circumstances. Demonstration activity does not necessarily require a permanent network of farms. Using a wider range of farms for specific activities might make it more convenient and relevant for farmers to attend demonstration events.
- **Mandatory and voluntary issues.** Mandatory policy measures will have higher levels of uptake but, if farmers resent or do not understand them, there are implications for the cost of monitoring and enforcement, as well as breakdowns in trust between farmers and policy makers/regulators, as well as possible spillover in terms of lack of uptake of voluntary measures.
- **Collective action.** Climate change has many impacts which are difficult to address at the level of the individual farm; and major renewables initiatives may only be feasible if farmers collaborate. There is mixed evidence in relation to collective action, however. Further research (to examine models operating in other OECD countries, for example) may provide useful lessons for Scotland
- **Considering all available policy levers** and obtaining a mix of measures working in tandem. It may be useful to consider which levers are not being used at present, and whether/how they could be included.
- **Working with farmers**. It is important to consider the farming industry when developing agricultural policy, in order to build trust and so that policy makers are able to benefit from the experience and expertise of farmers.

What do farmers need to know about the impact of climate change, and what they can do to mitigate its effects?

- It is crucial to consider the nature of „the message'; how it is expressed and presented; who communicates it and how. It is also important to consider wider knowledge exchange activities that acknowledge farmer experience and expertise, and to involve farmers in discussion and direction setting. The development of scientific goals and research, and how results are communicated, should be considered to help both parties understand and respect each other's needs.
- Interviews with opinion formers highlighted a number of issues where there are specific information needs in the agricultural community, as well as misperceptions and misunderstandings. For example, some farmers expect emissions targets to be introduced at the level of the individual farm and are planning to wait before implementing their „quick hit.' It is important to make it clear to farmers that targets, if introduced, would relate to broad management practices, and that farmers will not be penalised if they adopt technologies and practices that anticipate targets.

How do we achieve sustainable farmer behaviours in relation to climate change mitigation?

- The role of changing social norms is important in achieving sustainable farming behaviours. However, more research is needed to explore engagement techniques especially to help contact and influence those who are disengaged.
- Although economic incentives can induce positive environmental behaviour among farmers, it is questionable whether there is necessarily any corresponding attitudinal change. Where behaviours are changed without changes in attitudes, they are potentially unsustainable without continued support and intervention.

- There is an increasing body of evidence on the importance of using intrinsic values in a consistent way to drive long-term culture change. Promoting farmers' environmental stewardship role, in addition to business benefit motives in farming, would be likely to encourage a balance of business and environmentally oriented behaviours, stimulating sustained behaviour change.

1. INTRODUCTION TO THE PROGRAMME

1.1 Agricultural policy context in Scotland

Introduction

The Scottish Government (SG) has estimated that agriculture and related land use could contribute around 20% of total Scottish greenhouse gas emissions. The Climate Change (Scotland) Act 2009 sets in statute the target to reduce Scotland's emissions by 80 per cent by 2050, with an interim target of a 42% reduction in emissions by 2020. Farming contributes to carbon dioxide emissions through the direct use of fossil fuels in farm operations; the indirect use of embedded energy in inputs which are energy intensive to manufacture and distribute, such as fertiliser and compound feeds; and the cultivation of soils resulting in the loss of soil organic matter. However, farming can also fix carbon where organic matter containing carbon accumulates in the soil, acting as a permanent sink. Carbon also accumulates in timber or biomass, which can substitute for fossil fuels as an energy source[1]. Consequently, farmers have a key role to play in addressing the challenges of climate change.

Common Agricultural Policy

The overarching context for agricultural policy in Scotland is the Common Agricultural Policy (CAP), which is designed to protect agriculture throughout the EU by influencing prices, outputs and farmers' incomes. Currently the CAP provides a level of income security to farmers as well as a „cross compliance' framework for sustainable management of the environment[2]. In addition, there are related policies which will impact on greenhouse gas emission targets, such as requirements under the Water Framework Directive.

Farming for a Better Climate

Within Scotland, Farming for a Better Climate (FFBC)[3] is currently the only policy initiative set up by the SG with the specific aim of mitigating climate change in agriculture. FFBC is a targeted communication strategy designed to encourage farmers to adopt efficiency measures that reduce emissions, and help them adapt to climate change, while at the same time having an overall positive impact on business performance. The FFBC initiative also includes four „focus farms,' working with advisers to decide how best to facilitate savings and reduce greenhouse gas emissions. Open days take place on the farms, to demonstrate how emissions can be cut, while improving the efficiency and profitability of farm businesses.

Scotland Rural Development Programme

Many of the measures encouraged through FFBC potentially qualify for grant funding through the Scotland Rural Development Programme (SRDP)[4]. SRDP is a major programme of economic, environmental and social measures designed to develop rural Scotland. The most relevant eligible activities include: manure/slurry storage

[1] http://www.sruc.ac.uk/info/120175/farming_for_a_better_climate
[2] www.odi.org.uk/resources/download/5912.pdf
[3] http://www.sac.ac.uk/climatechange/farmingforabetterclimate/
[4] http://www.scotland.gov.uk/Topics/farmingrural/SRDP

and treatment; support for renewable energy in agriculture; treatment of run-off of nutrients and other pollutants.

Renewables
Broader incentives designed to support the growth of renewable energy in Scotland can benefit farmers. An example is the Feed-In Tariffs Scheme (FiTs)[5], a financial subsidy for renewable electricity generators. Farmers can also be paid for the electricity generated using renewables.

Other initiatives
There are also initiatives operating outwith the SG that support the implementation of agricultural policy in Scotland. One important example is Future Proofing Scotland's Farming[6], a three year programme delivered by Soil Association Scotland (in partnership with Quality Meat Scotland). This uses on-farm events and other resources to prepare agricultural businesses for the impacts, opportunities and risks that both climate and economic change bring.

Looking to the future: CAP reform
The CAP is due for major reform at EU level post-2013, and there is potential for specific climate change mitigation measures, including some of those encouraged in FFBC, to be made mandatory through the cross compliance regime that links farming practices to subsidy payments. There is also the opportunity to introduce further climate change action measures. Better understanding about farmers' attitudes and behaviours will enable policy makers to shape and target initiatives appropriately.

1.2 The need for a programme of evidence gathering in relation to agriculture and climate change behaviours

Attempts to influence farmer behaviours must acknowledge that a major culture change must be achieved in order to deliver climate change outcomes. This is no different to delivering climate change outcomes across other business sectors and indeed individual households.

Individual farmers and farm businesses are the drivers of that cultural change and so, while farm characteristics (such as size of farm, type of tenure, agricultural sector, type of business structure) are important considerations for policy makers, it is also necessary to understand the attitudes, values and goals that influence farmer actions.

Behaviours are complex. Research indicates that very rarely is a decision made in full knowledge of all the costs, benefits and risks, or with the individual making that decision in isolation from outside influences. Making permanent changes to long established habits takes time, even when change is perceived as necessary. Accordingly, fully evaluating the outcomes of interventions is difficult, and

[5] http://www.sruc.ac.uk/info/120360/renewable_energy/515/hydro_power/6
[6] http://www.soilassociation.org/farmersgrowers/futurefarming/futureproofingscotlandsfarming

behavioural responses to policy interventions will also vary by target groups (Defra, 2008).

A large volume of research is available on factors influencing behaviours. This comes from a range of disciplines, including economics, psychology, and sociology (Darnton, 2008). There is also a considerable amount of literature that focuses on farmer behaviours, both in general and in relation to environmental issues. A good deal of this relates to the UK, or England, but there is less that focuses specifically on Scotland. The SG needed a better understanding of what the research can tell us about the issues faced by Scotland's farmers, as well as what Scotland can learn from findings relating to other countries.

At a global level, it has been noted that the majority of current mitigation measures are related to management practices, and their implementation does not depend on costly or complex technological changes (United Nations Framework Convention on Climate Change, 2008). In addition, various studies have illustrated that actions by farmers which should represent „win-win' opportunities (i.e. be both profitable and reduce greenhouse gas emissions) are not being implemented by farmers (Moran et al, 2011; MacLeod et al, 2010). If farmers are not taking advantage of opportunities that would appear to benefit their businesses, as well as helping to meet climate change mitigation targets, it would be helpful to know why. For example, is it that the full costs of the measures have not been captured and that, from farmers' perspectives, the options appear less attractive than they should? Or is it that the main barriers are cultural, or perhaps relate to information gaps, or farmers' capacity to change? Whatever the situation, better evidence would help the targeting of initiatives and the measurement of their success.

A range of voluntary and mandatory policy options is available to the SG, but it is important to coordinate and assess the existence and reliability of evidence of their effectiveness in the complex context of farming practice needs. Evidence of the policy options adopted by other countries is also available, but the literature needed to be explored to investigate whether lessons are transferable to Scotland.

The Agriculture and Climate Change: Evidence on Influencing Behaviours Programme (ACC programme) was designed to coordinate and review the available evidence on the external factors, attitudes and motivations underpinning farmers'[7] behaviours in relation to climate change mitigation (and broader environmental) measures, and to identify policy levers which are most likely to be effective in encouraging behaviours that will support actions to reduce GHG emissions.

The ACC programme was set up early in 2011 and completed in mid 2012. It was carried out in-house by SG social researchers in the Rural Analytical Unit (RAU), along with an Economic and Social Research Council PhD student during her internship in RAU.

[7] In order to set realistic parameters to this in-house programme, the focus is specifically on farmers. However, it is anticipated that many of the findings are applicable to land managers more generally.

1.3 The focus of the programme

In identifying the need for the ACC programme, it was important to be clear about areas in which evidence already exists, and where the gaps are, so the programme could be focused appropriately. We know that farming style, attitudes and values are important in determining willingness to change behaviours, but the programme was designed to gain a better understanding of the external factors and attitudes and motivations which underpin farmers' decision-making processes.

The SG already had a good idea of the mitigation actions that farmers in Scotland need to take, if agricultural emissions are to be reduced. Also, as indicated above, policy initiatives already provide a range of measures to achieve those actions. However, evidence was lacking on the levers that could encourage and barriers that might prevent farmers from taking up measures.

It was also important to consider the extent to which farmers, as decision makers, respond to signals from government, the industry, society and the market. This may depend on a number of factors, including where the message is coming from, how it is delivered, the opinions and behaviours of others, and whether farmers have the opportunity to contribute their own views and experiences.

1.4 Aims and objectives

The ACC programme had three overarching aims:

- To gain a better understanding of the range of factors influencing farmers' behaviours (in general and in relation to environmental issues).
- To consider the effectiveness of the climate change mitigation measures in use/available to policy makers.
- To consider how policy makers in Scotland, and opinion formers working with farmers, could most usefully draw on these behavioural insights to refine the suite of initiatives which aim to influence farming practice in relation to mitigating climate change.

The objectives of the programme were to:

1. Explore what is known about the **range of factors influencing attitudes and behaviours**, both of farmers and the general population
2. Consider the range of **approaches taken by governments** to date to influence farmer behaviours in relation to climate change, and what is known about their effectiveness
3. Examine **factors influencing farmers' uptake** of policy measures
4. Synthesise the available evidence on farmers' **awareness** of climate change issues, and **uptake** of mitigation measures
5. Consider what can be learned from **aspects of policy initiatives that have been, or are proving to be more/less successful**
6. Investigate how policy development and delivery can be informed by understanding and modelling the **behaviours and motivations of groups of farmers who share particular farming styles**
7. Identify **critical gaps** in the evidence base and consider how best to fill these gaps

8. Draw together the key messages and make recommendations for **more effective policy development and delivery** in relation to mitigating agricultural emissions in Scotland

1.5 How the objectives were addressed

A number of separate exercises were designed to address the eight objectives. An initial scoping study was carried out to coordinate information on the policy initiatives that the SG, key non-departmental public bodies and industry in Scotland have underway that seek to influence farmer behaviours in relation to climate change mitigation, and the specific measures by which they aim to encourage action by farmers. This exercise also considered government initiatives in England and Wales.

The individual measures included in the various initiatives were than mapped onto the types of behavioural levers they are using. This part of the programme drew on the „Four Es' approach devised by Defra[8], which encompasses factors that:

Enable	make it easer for people to change their behaviours
Engage	get people involved
Encourage	through the right signals from government
Exemplify	leading by example.

It is not always necessary for a measure to encompass all four factors. However, a better understanding of the policy levers that the SG and other governments are, and are not, currently using to influence farmer behaviours will help to indicate where there may be opportunities to consider additional or alternative approaches.

Objectives 1 to 7 were primarily addressed via a literature review. This considered the available evidence from Scotland, elsewhere in the UK and from OECD countries about factors that facilitate and hinder influencing farmer behaviour in relation to climate change mitigation (or environmental issues more widely). It also examined approaches taken by governments to influence farmer behaviours, and what is known about the effectiveness of particular initiatives. (Details of the methodology are included in Chapter 2.)

Objectives 4 and 5 were also addressed by a series of interviews with opinion formers in the agricultural community. In the main, these comprised the industry bodies and government agencies represented on the SG's Agriculture and Climate Change Stakeholder Group. Interviews explored the opinion formers' views of farmers' awareness of climate change issues and specific mitigation initiatives operating in Scotland; the main factors affecting adoption/non-adoption of measures and suggestions for improving uptake. (Details of the methodology are included in Chapter 2.)

Objectives 7 and 8 were addressed once the various strands of work had been completed and discussed with policy colleagues and the Programme Management

[8] Changing behaviour through policy making
Changing behaviour through policy making - ARCHIVE: **Defra**

Group. The key messages are summarised in a question and answer format in Chapter 9.

The individual strands of work were developed in tandem, and were revised as the work progressed. For example, the original programme plan included a scoping exercise to consider the messages/advice currently being communicated to Scottish farmers in relation to climate change mitigation: who is communicating; how; what are the messages; are they consistent? However, an early finding from the literature review was that a wealth of information exists on effective communication with farmers, and it is likely that much of this is already being used It was decided that it would be more profitable to coordinate the key findings and communicate directly with the communicators during the dissemination phase of the programme's work.

At the start of the programme, no firm decision had been made about how to involve Scotland's farmers in the work. Naturally, it was vitally important to include farmer perspectives. However, both the SG analysts and policy makers were very aware of the burdens that research already places on farm businesses. When the literature review indicated that a number of recent, relevant studies had included Scottish farmer perspectives, along with the views and experiences of farmers across the UK, it was decided not to conduct interviews, or a survey, with farmers themselves, but to seek the views of a range of opinion formers who communicate regularly with farmers.

1.6 Programme Management Group

The work of the programme was overseen by an internal Programme Management Group, whose role was to:

- Provide ongoing strategic direction throughout the life of the programme
- Identify and facilitate connections with relevant cross-office initiatives, and provide advice, contacts and introductions
- Monitor progress on the programme
- Provide a forum for examining the potential and limits of the research
- Provide feedback on outputs
- Promote the programme and use of its findings.

Representation on the group ensured that we kept up to date with the ongoing development of agricultural policy and plans for CAP reform etc. Group members also helped us to make appropriate links with:

- The SG Climate Change Behaviours Research Programme 2010-2012[9]. The programme features a range of research projects to better understand the behaviour areas that are central to addressing climate change, and the most effective mechanisms for stimulating, facilitating and supporting new and more sustainable ways of living.
- The SG Strategic Research Programmes (2012-2016) and, in particular, the Environmental Change Programme[10]. This includes a Theme which focuses on

[9] http://www.scotland.gov.uk/Topics/Research/by-topic/environment/social-research/Behaviour-Change-Research

[10] http://www.scotland.gov.uk/Topics/Research/About/EBAR/StrategicResearch/future-research-strategy/Themes

preserving and enhancing the ability of Scotland's rural economy to adapt to changing circumstances. It tackles key policy issues of CAP reform, the consequences of changes in the balance of trade, and how best to achieve robust adaptations that minimise the risks from climate change.

2. METHODOLOGY

2.1 Introduction

The various elements of the Agriculture and Climate Change: Evidence on Influencing Behaviours (ACC) Programme were introduced in Chapter 1. In this chapter, more detail is provided about the two key research exercises which were conducted as part of the programme.

2.2 Literature Review

The review synthesised the available evidence from Scotland, elsewhere in the UK and internationally (where messages were likely to be transferable to Scotland) to address five main research questions:

- What influences farmer attitudes and behaviours, both in general and in relation to climate change?
- What can be learned from the literature about what influences the attitudes and behaviours of the general population?
- What are the characteristics of groups of farmers who are, or who are likely to be, more/less responsive to individual measures?
- What approaches have governments taken to date to influence farmer behaviours in relation to climate change, and how effective have these been?
- What factors influence farmers' uptake of individual policy measures and what can we learn from aspects of policy approaches that have been more/less successful?

The search for literature took place in three main phases:

- Phase 1 - An initial scoping study was conducted to gain an understanding of the size and nature of the evidence base. A comprehensive list of search terms was compiled by analysts in consultation with policy colleagues. A search was then run using a range of search engines, including IDOX, KandE and Google Scholar. The search yielded a vast number of journal articles on „climate change' most of which at least mentioned „agriculture,' and it was necessary to find a robust way to filter the papers in order to select those that were most relevant
- Phase 2 - A series of key documents was assembled with the advice of contacts and colleagues in Scottish Government, Defra, SAC, the Countryside and Community Research Institute, the James Hutton Institute, Scottish Land and Estates, and the University of Reading. As well as highlighting the importance of documents that had already been found in the scoping study, this process also uncovered a number of valuable unpublished reports
- Phase 3 - The bibliographies of these papers were then examined to ensure their main sources were captured in the literature review. If carried out uncritically, this approach could lead to a selection bias (since authors may only cite authors with whom they agree). To prevent this, tools were used to find journal articles addressing similar subject matter, and to identify all articles that cited the original document, irrespective of whether they supported it. This led to a „snowballing' effect, and a large number of related sources were found. The references section provides a complete list of the papers included in the review.

Triangulating the data collection in this manner helped ensure that important reports were not overlooked, and that key documents from the unpublished „grey' literature were identified.

The literature reviewed for this study has generally been restricted to research published in journals after 2000, so that the findings and suggestions are as relevant to the current policy context as possible. Key studies published in the 1990s have been included where they add particular value (i.e. where the issues are still highly relevant but where no similar study, or none offering comparable insight, has been published since 1999).

Only countries that are members of the OECD (Organisation for Economic Cooperation and Development) were included, on the basis that these countries are broadly comparable with Scotland, in that they meet rigorous standards set by OECD in their commitment to market economies, backed by democratic institutions, and the wellbeing of all citizens.

2.3 Opinion Former Interviews

A series of interviews was conducted with individual opinion formers in the agricultural community. Through their work as agricultural consultants, with agricultural lobby groups or environmental non-departmental public bodies, „opinion formers' are familiar with a broad range of farmer experiences. As a result, they were able to speak about farmer **awareness** of climate change and climate change mitigation measures, farmer **experiences and views** of mitigation measures and broader environmental issues, as well as providing the historical and policy context for farmer attitudes and behaviours, and offering suggestions for actions to increase levels of uptake.

During November 2011, an SG social researcher interviewed 14 of these „opinion formers.' Interviewees came from the following organisations: Scottish Agricultural College, Quality Meat Scotland, National Farmers Union of Scotland, Soil Association, Scottish Land and Estates, Scottish Environment Protection Agency, Scottish National Heritage, Royal Society for the Protection of Birds, National Beef Association and National Sheep Association.

The questions used in the semi-structured interviews were devised with the guidance of policy colleagues:

- Are farmers aware of Farming for a Better Climate? If so, what do they think of it?
- Are farmers aware of other farming-related climate change mitigation initiatives (relating to renewables, for example, or private sector initiatives)? If so, what do they think of them?
- What are the main factors that appear to influence whether climate change mitigation measures are adopted by farmers?
- Do you have any thoughts on why farmers are not taking up climate change mitigation measures which, on paper, would seem to cost them little or nothing, and would benefit their businesses?
- Are there specific areas where greater flexibility of measures and/or implementation would be particularly beneficial to achieve environmental goals?

- Are there particular occasions/situations when farmers will be most receptive to changes to farm management practices?
- What could be done to improve climate change messages and advice to farmers?
  - What information/guidance/advice/support do farmers find useful/less useful?
  - Who do farmers trust to communicate with them?
  - Do farmers have any preferences in relation to format, frequency of communication, style, length etc?
  - Should messages be tailored to specific groups of farmers?
  - Are farmers receiving consistent messages about climate change mitigation from different sources (such as Scottish Government, Non Departmental Public Bodies, industry)?

Interviews were mainly carried out by telephone, although two were held face-to-face. Interviews were recorded, with the interviewees' permission, written up in note format and then analysed.

It was made clear at the outset of each interview that the opinion formers were being invited to discuss their perspective on the views of farmers, rather than their own personal experiences.

Although there are many advantages to using the „opinion former' approach, it should be noted that the views of those who were interviewed will not necessarily be the same as the broader Scottish farming community. The sample of opinion formers was small and we cannot be sure that 14 different opinion formers would come up with the same messages. In addition, the farmers who interact with opinion formers are likely to be forward-thinking and innovative, not the more disengaged group who present more of a challenge to policy development and delivery.

Consequently, while the opinion former interviews complement the literature review and provide detail specific to Scotland at the end of 2011, these caveats should be borne in mind while reading the findings.

2.4 Presentation of findings

Naturally, the research questions which informed the literature review and the questions put to the opinion formers were not the same but, in many cases, they were exploring the same issues, and many of the same themes emerged. To avoid duplication between the sets of findings, information from the opinion former interviews appears throughout the report, providing a particular perspective where this seems to be most relevant. To differentiate from the reporting of findings from the literature review, the opinion former sections appear in shaded boxes.

A box of summary key points is included at the end of each chapter. Again, in general, it may be assumed that the views of opinion formers support findings from the literature review. However, key additional points or contradictions are highlighted.

3. FACTORS INFLUENCING FARMERS' ATTITUDES AND BEHAVIOURS

3.1 Introduction

Farmer attitudes and behaviours are influenced by a range of economic, external, internal and social factors. The evidence in relation to each of these factors will be discussed in this chapter, although of course it is a combination of factors that ultimately affect behaviours (a complexity which will be considered in later chapters).

Much of the literature on influencing the behaviours of the general population will also be relevant to farmers, and it is worth beginning by considering the key points from this before focusing specifically on the farmer population.

3.2 Factors influencing behaviours (general population)

In going about their daily lives, people will generally do what they have always done, what impulse tells them to do, or what their neighbours or friends do, even when this might not be the most beneficial option for them. People do not conduct a complicated cost-benefit analysis when faced with a choice and, often, they are well aware that their own actions are not in their best interests (for example, the obesity „crisis' will not be solved unless we as individuals give up sedentary lifestyles that, by and large, we know are damaging to our health (Prendergrast et al, 2008). In a paper examining behavioural change theory from an economic perspective, Prendergast et al focus on three key drivers of behaviours: external factors (financial and effort costs) internal factors (habits and cognitive processes) and social factors (learned behaviour, personal and societal values, in-group dynamics, and social commitment). Key points are summarised below:

External factors

- Monetary and transaction/effort costs – the affordability of choices, compared with the financial resources people have at their disposal, and the conditions which enable people to take advantage of these choices (such as accessibility or availability of information); or which act as barriers (complexity, inconvenience).

Internal factors

- Habit – everyday decision-making does not involve objectively weighing up all the available information. Individuals lack the patience and time to repeatedly consider their decisions: habits reduce the effort required to function effectively. Life-transition stages are significant in this context, because of the opportunities they provide for breaking established routines and forming new ones
- Personal capacity – while consumer choice has been generally perceived as a factor which increases people's sense of control and, subsequently, their motivation, there is a danger that information overload and an abundance of options may demand too much effort on the part of the individual
- Framing and emotions – people tend to make choices depending on how information is „bracketed.' Policy makers can use this information to frame problems in a way which makes the desirable choice more likely to be chosen. People's emotional responses are also susceptible to the way in which information is presented

- Loss aversion – potential losses tend to be weighted more heavily than potential gains. People are also likely to place additional value on what they currently possess, particularly when asked to exchange it
- Immediate gratification and pay offs – people tend to prefer present gains over what may be gained in the future. This makes it more difficult to justify investment or actions that involve future pay offs. People will also put off unpleasant tasks and avoid active decisions.

Social factors

- Learned behaviour – people look to those around them for guidance on how to behave when faced with choice and uncertainty. Actions taken by others can boost the perception that a request is legitimate and justified
- Personal and societal influence – what people value is partly prescribed by their wider culture. This shapes the values which they consciously pursue, as well as their subconscious behaviours
- In-group dynamics – people's behaviour as consumers is dictated by the social connotations they associate with certain products and activities
- Social commitment – this requires people to stand by agreements and fulfil their obligations. Once a belief or commitment has been expressed publicly, the individual exhibits a strong tendency to act in a way that is consistent with the commitment.

A Defra discussion paper (Collier et al, 2010) includes a further useful insight from behavioural economics: that people value fairness and attain some fulfilment from the levels of satisfaction and behaviours of others. For example, they may be willing to forego a benefit in order to punish someone they feel is acting unfairly. The key implication is that individuals may not display the „rational' behaviour that standard economic preference theory would suggest.

The above summary is not intended to be comprehensive (for a full review of behaviour change models and theories of change, see Jackson, 2005; Darnton, 2008; Chatterton, 2011). However, the intention is to highlight the range of factors influencing the behaviours of farmers as individuals, before moving on to the specific circumstances of the agricultural context.

3.3 Factors influencing farmer behaviours

The factors considered above will all affect the business decisions of farmers, including what to produce and how to produce it (farm management practices). However, there are additional considerations which relate specifically to farmers and to climate change. Farmers are different from other population groups in that climate is the primary determinant of agricultural productivity and, therefore, changes in the climate influence many components of agricultural systems, including crops and livestock production, input supplies, soil quality and water supply. Farming is also, historically, subsidised, to supplement volatile farm income, manage the supply of agricultural commodities, and influence the cost and supply of such commodities. In addition, farmers' decision making processes are more complex than those in other sectors, because agricultural activities depend on, and have a large impact on, natural resources. For example, when farmers are aware of how their own practices contribute to natural resource management, and to their role in the local community,

the effect of this awareness on the financial incentives and disincentives will be more complex than in cases where profit maximisation is the principal motor of decision making (Sasaki, 2012).

Farmer attitudes and behaviours are influenced by economic, external, internal and social factors. Each of these is considered in the section below. It should be noted that, in relation to farmers, a distinction is made between economic and external factors. Although there is a certain amount of crossover between the two, a number of specific economic factors influence farmer behaviours, and the main emphasis of the following section is on these factors.

Economic factors

Market volatility

Above all, agricultural systems are dynamic, since producers and consumers are continuously responding to changes in crop and livestock yields, food prices, input prices, resource availability and advances in technology. At present, direct payments support the income of farm households and provide farmers with some flexibility to adjust land use to prevailing market decisions. Any future reduction in levels of subsidy has implications for a range of business decisions made by farmers, including their ability to respond to the market.

Some parts of the industry are more dependent on support than others. An assessment of Farm Business Income without any subsidy (carried out as part of the Brian Pack Inquiry into the Future of Support for Agriculture in Scotland, 2010) indicated that only the average dairy and general cropping farms in the sample would be viable if support were to be removed. No other farm types would be viable although, in the case of cereals, profitability would vary significantly from year to year reflecting fluctuations in input and output prices (Scottish Government, 2010).

Economic motivation

Research carried out in 2009 examined the drivers and decision making of land managers in Scotland. Given the unpredictability of agricultural systems, it is perhaps not surprising that the research found that, only once economic conditions had been satisfied, could land managers focus on other priorities. However, „economic motivation' ranged from trying to make as much profit as possible, to trying to break even, and it was not always easy to distinguish the two (Macaulay Land Use Research Institute, 2009). The researchers suggested that even those study participants who appeared to be managing land at break-even, in order to maintain other lifestyle factors, might be doing so in part to cash in the asset (forestry or land) without losing value through inheritance tax. Therefore, although breaking even may look like a lifestyle choice, it may actually be about long-term economic gain.

Whether or not to participate in environmental schemes

Research has explored the factors which motivate farmers to participate in agri-environment schemes: economic considerations are acknowledged to be the primary driving force. In research by Wilson and Hart (2000), participants in 10 EU countries were interviewed. The research found that „financial reasons,' 'a secure source of income' and the fact that schemes fitted well with existing farm management plans were all important to the majority of farmers. The authors noted that this mirrored

findings from national and international studies highlighting the financial imperative behind scheme participation.

Davies and Hodge (2006) also summarised earlier research in which adoption decisions hinged on the „goodness of fit' between a farmer's own management plan (based on available resources and personal preferences) and the package of incentives and restrictions inherent in a particular scheme design. However, as noted by Slee et al (2006), there is a core of farmers (labelled variously „productivist,' „conservative' and „traditional,' who are uninterested by optional-entry environmental schemes, even where material gain may be made from such engagement. Slee et al note that the notion of being recognised as a „good farmer' is almost completely disconnected from good environmental management. Where environmental gain can generate a „win-win' situation, with the farmer benefiting through more efficient use of inputs and consequent effects on profit, it is easier to „sell' environmental enhancement. However, someone needs to identify and develop the „win-win' – „it may not be apparent at first glance.'

Issues relating to non-profitable farming systems

A number of farming sectors across the EU are under threat, and extensively farmed land is being abandoned as systems fail to maintain a sustainable level of income. Non-economic farming systems tend to be extensive, managing larger proportions of land under rough and common grazing. However, they also tend to be valuable from an environmental perspective. The loss of these farms will have an impact on the management of potentially valuable public goods but, if they are to be maintained, it is important that farmers are economically incentivised to continue farming production.

Subsidies for the production of public goods are available under rural development schemes. However, these schemes tend to ignore the costs of the labour element required, and therefore, potentially, are operated at a financial cost to the farmer. Research in 2011 (Barnes et al, 2011) explored the issue of so called „non-economic' farming systems, and tested several payment formulas to increase farm incomes to sustainable levels. The authors acknowledged the importance of testing the formulas further, but pointed out the importance of doing so as soon as possible. If the Single Farm Payment were to be removed or reduced, as may be likely in the mid- to longer-term, a much larger number of farming systems would become non-economic. It is clearly important that mechanisms are in place to support the most valuable public goods being produced.

Economic factors: messages from the opinion former interviews

Virtually all the opinion formers, across the various sectors, considered cost and/or profitability to be the most important single factor that influences farmers' adoption (or non-adoption) of climate change mitigation measures. Although measures do not necessarily have to be profitable, it is important to farmers that they do not cost anything, and that the incentives on offer are commensurate with the scale of the challenge.

Having capital to invest is particularly important in relation to renewables projects,

which require high levels of capital outlay. Farmers may be keen to implement these measures, but ultimately find „some of the ideals are just too expensive to fund'.

Market factors, particularly the cost of fuel and fertiliser, are key drivers in the adoption of measures. Interviewees considered it inevitable that the increasing cost of fuel will lead to greater interest in efficiency savings. They also felt that the desire to increase efficiency will be likely to lead to greater use of energy monitoring, carbon footprinting and, eventually, water auditing.

External Factors

In the context of farmer behaviours, „external factors' refers to physical, environmental, farm business structure, financial and time factors on farm management; all of which can have an impact on farmer behaviours.

Capacity to change

External factors create the context within which farmer behaviour can or cannot be influenced. Regardless of how willing the farmer is to alter their management practices, they must also have the capacity to change. Adopting some environmental behaviours is simply not possible within certain farm environments; for example, the practice may require a particular farm type, or a specific geographic location (Burton et al, 2006). This effect is likely to be particularly pronounced in Scotland, because much of the country is mountainous and 60% of the land has poor soil (Willock et al, 1999b).

Farm size and type

Many authors consider farm **size** to be one of the most important determinants of the adoption of environmental measures, with larger farms being more likely to participate in schemes (for example Manley and Smith, 2007; Macaulay Land Use Research Institute, 2009). This makes sense intuitively: staff on small farms may have less time and opportunity to research and implement environmental measures, for example; and there may be fewer investment opportunities on small farms. Discussing earlier research, Defrancesco et al (2007) concluded that research results are not consistent, and that farming **type** may have more influence. Research by Wilson and Hart (2000) indicated the extensive grassland farms are more likely to participate in schemes than intensive livestock and arable farms.

Farmer demographics

A useful summary on farmer demographics is provided by Ahnstrom et al (2008). Several studies claim that older farmers are less willing to change farm management practices, and that younger farmers, and those who have received more education, tend to be more willing to adopt new technologies and join conservation schemes. Farmers living on old family farms are likely to develop greater sympathy with the land and appear to be more interested in conservation-oriented farming, compared to relative newcomers to farming. Ownership of a farm creates emotional links and willingness to honour and maintain the status of the land.

External factors: messages from opinion former interviews

Diversity of farm and land type
Interviewees noted that there is a diverse range of farms in Scotland, and climate change mitigation measures can be practical for some businesses, yet impractical for others. Many agricultural practices only work on specific land types and geographies and, therefore, uniform regulations are not equally suitable in different regions. For example, soils in Dumfries and Galloway may be able to take fertiliser, while soils in Aberdeen cannot. As different farm types do not allow the same efficiency savings, there is a need for „nuanced, adaptive policy' to recognise this. Agricultural lobby groups, in particular, raised this as an issue.

Tenure
It was also noted that adoption of mitigation measures is often only possible for those who own their land. Interviewees felt that landlords can be reluctant to fund environmental initiatives for tenant farmers. If tenants self-fund, there is no guarantee that they will get the cash returned if/when they leave. This may make banks more cautious when considering whether to loan money to tenant farmers.

Availability of time
The issue of time was raised by many of the interviewees. They pointed out that farmers often work 14 hour days and have many other concerns to deal with, often of greater immediacy; for example, dealing with the wet harvest of 2011. Farmers may well be aware of mitigation options and could even wish to take advantage of them, but may not have the spare time to deal with planning and implementation.

One interviewee noted that running an anaerobic digester „takes maybe 30 minutes a day and you have to be a lot more careful about what you put through your slurry system. When you list all the extra bits and pieces you have to do, people think "oh maybe I'm not going to bother."'

Internal Factors
Internal factors, such as attitudes, values and beliefs, also have an important impact on farmer behaviours. Different groups of farmers may be subject to very similar external factors, yet their behaviours vary substantially, as a result of pre-existing beliefs and value systems.

The relationship between attitudes and behaviours is a complex and reciprocal one. Farmer attitudes may be altered without any corresponding behaviour change, just as behaviours can be changed without necessarily affecting attitudes[11]. However, one of the most popular models for testing the link between attitudes to behaviours, the Theory of Reason Action (Ajzen and Fischbein, 1980), later extended to the Theory of Planned Behaviour (Ajzen, 1991) has been successfully applied within an agricultural context (Artikov et al, 2006; Bergovoet et al, 2004; Elliot et al, 2011). Nevertheless, it has been suggested (Burton et al, 2006) that attitudes have a greater effect on behaviour in particular circumstances; for example, when the attitudes in question are consistent with underlying beliefs, based on high amounts of

[11] For example, as discussed later in this report, farmers in regions of Scotland designated as NVZ have been obliged to adopt specific measures, but findings from research indicate a higher level of ***disagreement*** with environmental and social goals than among farmers who are not subject to NVZ rules (Chapter 5)

issue-relevant information and personal experience, and were formed as the result of considerable issue-relevant thinking.

The literature on farmer attitudes towards climate change is small, and what exists does not acknowledge the diversity of opinion across the farming community. Dairy farming is an industry which could potentially mitigate a large amount of greenhouse gas emissions. Barnes and Toma (2012) developed a typology of Scottish dairy farmers from a large survey on attitudes, values and behaviours towards climate change related issues in Scotland. The sample was constructed using the June Agricultural Census database in 2009. Approximately half of the 550 farmers surveyed believed that average annual temperatures will increase in the future, and 32% agreed that climate change will only impact negatively in the long term. Despite this, only 16% were receptive to adopting practices which would reduce emissions (Barnes and Toma, 2012). This „value/action gap' is not unique to agricultural environments and is well-established in the broader behaviour change literature (Darnton, 2008).

In many situations, people may also need to acquire new skills and self-perceptions that allow newly acquired attitudes and intentions to be translated into actions. However, even when new skills have been learned, there is no guarantee that actions will follow (Burton et al, 2006).

The evidence shows that habit is an important influence on how people act. Once people develop routines and become accustomed to particular actions it can be difficult to influence them to do otherwise. This has already been noted in relation to the general population, but is particularly pertinent when considering farmers, who may have a strong personal attachment to the approaches which they have been taught and to the familiar ways in which they have always managed the farm. Even if a new approach has a clear economic benefit, this may not be sufficient to overcome the value that the farmer ascribes to the familiarity of the status quo (Macgregor and Warren, 2006).

However, the literature also shows that for farmers, as for the general population, there are specific „moments of change' when it is easier to make alterations to farm management practices. These „moments of change' arise periodically when fundamental farm management changes are required, such as when farmers plan to exit, diversify, extend or intensify production. Such windows of opportunity are particularly important because on these occasions, change is inevitable and all of the options available will have costs (either financially or in terms of farm management). Consequently, farmers are likely to be more receptive to suggestions as to how change may be accomplished most efficiently. It is important to capitalise upon such moments because after the decision has been made, farmers are likely to be locked into the chosen practices for some time (whether financially, practically, psychologically or ideologically) (Burton et al, 2006).

Internal factors: messages from opinion former interviews

Caution/forward planning
Interviewees suggested that, in general, farmers tend to be cautious by nature,

which may make them resistant to change. Also, they work to long timescales and, once they commit to decisions, they are often tied into specific actions for years. No matter how beneficial a new practice may appear to be, therefore, a certain amount of delay is inevitable before it is adopted widely.

Times of transition
Interviewees noted that there is potential for fresh thinking about future plans when a son or daughter joins the family business. Also, due to the extra „pair of hands,' there is often more time available for strategic thinking. New farmers often seek advice, and younger farmers may be more receptive to climate change messages. The potential for facilitating change at times of transition was highlighted across the opinion former sectoral categories.

It was suggested that one way to influence farmers during succession is through the Whole Farm Review Scheme. This is designed to help farmers and crofters to develop environmentally and financially sustainable businesses. The review is carried out with the help of an accredited farm business adviser, who reviews the agricultural business's recent performance, identifies the main strengths, weaknesses, opportunities and threats, and develops an action plan to improve the business:
http://scotland.gov.uk/Topics/farmingrural/Agriculture/grants/BDandM/WFRS

Social Factors
Social networks
Individual attitudes and behaviours do not take place in a vacuum, but are influenced by the social context in which they occur. Farmers' decisions are affected by the views and behaviours of their peers and neighbours as well as other family members and society at large. To gain a richer understanding of behaviour, this wider context must be considered to consider how strong such influences are, as well as whether they can be affected by policy makers. Willock et al (1999a, 1999b) integrated socio-economic, psychological and farming variables within a comprehensive framework in a study of over 200 Scottish farmers, using a number of scales to measure attitudes, farming objectives and farming implementation. The results of the study emphasised the importance of social and psychological factors in the decision making processes of farmers.

Farmers are influenced by the behaviour of their peer group. The literature shows that proficiently carrying out skilled farming improves both how farmers perceive themselves and how other farmers view them (Burton, 2004). It is suggested, by Ahnstrom et al (2008), that for environmental schemes to be successful, they must enable farmers to enact and display skilled behaviour.

Capitalising upon existing social networks can be an effective way of influencing farmer behaviours. For example, if respected authorities within farmer communities endorse environmental measures, this will lend them more credibility than the same information disseminated via government sources. Similarly, if environmental measures are judged negatively by peers this will probably have a detrimental impact on levels of uptake (Burton et al, 2006; Defra, 2008).

Farmers who are innovators or early adopters of technology also have the potential to influence their more cautious peers, so it would be useful to know more about the factors influencing adoption behaviour. Research by Diederen et al (2003) analysed the choice of a farmer to be an innovator, an early (or late) adopter and a non-adopter. The research found that structural characteristics explain much of the difference between types of farmer, and factors such as age, and farm size and type may dictate whether and when adoption is a viable proposition at all. However, the research also found that innovators and early adopters differ from each other in terms of behavioural characteristics – with innovators making more use of external sources of innovation and being more involved in the actual development of innovations.

„Agri-cultures'

The farming community contains a diverse range of decision makers who respond to drivers (including policy levers and economic influences) in different ways. These various groups each have their own value systems and differing approaches to determining best agricultural practice. To maximise effectiveness, policy-makers must consider these different „agri-cultures,' i.e. how the groups' distinct views, beliefs and behaviours inform their responses to particular policy measures (Dwyer et al, 2007; Burton et al, 2008). For example, most farmers may consider themselves primarily as „food producers' rather than environmental managers. This inevitably affects their attitudes to environmental measures, as well as their decision-making processes (Macgregor and Warren, 2006). They may view environmental actions as „not their job.' The literature also shows that farmers might be aware of environmental problems, but do not see their farming operation as part of the problem; or might see the environmental problem and see their operation as part of the problem, but the economic situation on the farm does not permit conservation actions to be taken (Ahnstrom et al, 2009).

Who is making the decisions?

Despite the evidence indicating the importance of social factors, farmers participating in a number of previous attitudinal studies have stated that they do not take these social factors into consideration when making farm-management decisions. This may seem counterintuitive; however, rather than taking this self-reported independence at face-value, some analysts suggest that farmers' responses to survey questions are more indicative of how they would like to be perceived. When they are asked if family members and peers influence their decision making, saying „no' is a matter of pride, and therefore their responses do not necessarily reflect realities on the farm (Burton et al, 2006; Manley and Smith; 2007).

Research into farm decision making has traditionally focused on individual farmers. However, over recent decades, increasing farm size and diversification of activities on UK farms have led to increased involvement of spouses and children in decision-making processes. Inevitably, family members of different ages/genders/ educational background will be influenced by different factors and make different decisions, so it is important to consider this aspect of the decision making process when considering how farmers' behaviours may be influenced (Burton et al, 2006; Macaulay Land Use Research Institute, 2009).

The existing literature relating to the influence of other family members is summarised by Burton et al (2006). The evidence suggests that, in larger complex farm businesses in particular, decision making is spread around family (and even non-family) members. Burton et al report that, although few studies have studied family decision making, research in Canada amongst 36 farm families investigated the goals of respective family members. The authors found that differences in opinion usually arose when young people wished to try new methods, while senior farmers wanted to stick to old ways (Taylor et al, 1998). There is evidence that roles are apportioned to family members within the farm, and some work has looked at decision making within families. However, Burton et al point out that issues such as communication within the family and the operation of power structures within family decision making processes remain almost entirely unexplored.

In a study of Scottish dairy farmers, Barnes et al (2012) asked farmers to identify the main influences on their decision-making. The majority of farmers consulted the family on matters of day to day decisions and strategy. However, in terms of environmental issues and dairy policy in general, the media are the most significant source of information. These media consist of general press articles as well as the farming press (Farmer's Weekly, for example).

The existence of multiple decision makers has important implications for policy makers because the characteristics of the decision-maker can influence their uptake of measures. If, for example, messages are targeted towards older farmers with a high-school education, but decisions are being made by their university educated sons and daughters, the measures are unlikely to be effective. Better understanding about who is making particular decisions would allow policy measures and messages to be tailored more appropriately.

Social factors: messages from opinion former interviews

Influence of peer groups
Interviewees noted that farmers are influenced by the activities of their peer group. If they see neighbours carrying out mitigation activities, they will probably be more inclined to try new practices themselves, particularly if they can see that these actions are having positive consequences. Competition between farmers also plays a role here, as people do not want to be „shown up' by their peers.

Similarly, messages about mitigation measures can be more effective if they come from neighbours, peers, and other members of the farming community, rather than from the government or NDPBs.

3.4 Some implications for policy development and delivery

One message that comes across very strongly, both from the literature and from the interviews with opinion formers, is that farmers are influenced by their social networks. For this reason, it is particularly important to encourage, endorse and promote the behaviour of innovators and early adopters.

Farmers' capacity to change is a key consideration in influencing behaviours. Factors such as size of farm and land type dictate whether particular measures are practical. Designing payments and incentives to target farmers in particular circumstances may make it easier for them to adapt their business decision making. In addition, it is clear that there are specific „times of transition' when farmers are likely to be more receptive to new ideas, or to have the time to think more strategically about their businesses.

Key points from the literature

Key drivers of behaviours in the general population are: external factors (financial costs and effort); internal factors (habit, personal capacity etc); and social factors (personal and societal values, social commitment etc). Naturally all of these apply to the decision making processes and behaviours of farmers.

Many additional considerations are specific to farmers and to climate change, since changes in the climate influence many components of agricultural systems.

- **Economic** factors influencing farmer behaviours relate to: market volatility (the dynamic nature of agricultural systems; present and future levels of subsidy, market prices and operating costs); the nature of economic motivation; quality assurance issues; whether or not to participate in environmental schemes; issues re non-profitable farming systems
- **External** factors create the context in which farmer behaviours can, or cannot, be influenced. These include: capacity to change (some environmental behaviours are just not possible within certain farm environments); size and type of farm; farmer demographics
- **Internal** factors, such as attitudes, values and beliefs, are influential, although with farmers, as with the general population, there are wider issues about the links between attitudes and behaviours and the implications about changing one without the other. Farmers tend to be cautious by nature, and they work to long timescales so, once they commit to decisions, they are often tied into specific actions for years. However, there are specific „moments of change' when it is easier to make alterations to farm management practices
- **Social** factors include ways in which farmers are influenced by the views and behaviours of family members, peers and neighbours. The farming community contains a diverse range of decision makers, who respond to policy levers and economic influences in different ways. It is also important to consider who is responsible for making decisions on the farm. If the farmer is not acting alone, how might the characteristics of others affect farm business decisions?

Opinion formers also wished to stress that:

- Measures do not necessarily have to be profitable to be adopted by farmers, but it is important that they cost little or nothing to implement, and that the incentives on offer are commensurate with the scale of the challenge
- Farmers work long days and deal with many issues. They may be aware of mitigation options, and interested in taking advantage of them, but lack the time to deal with planning and implementation.

Some implications for policy development and delivery

- Since farmers are influenced by their social networks, desired behaviours in the

innovator/early adopter group need to be encouraged, endorsed and promoted

- Farmers' capacity to change is a key consideration in influencing behaviours. Designing payments and incentives to target farmers in particular circumstances may make it easier for them to adapt their business decision making.

4. CHARACTERISING GROUPS OF FARMERS TO INFORM AGRICULTURAL POLICY DEVELOPMENT AND DELIVERY

4.1 Introduction

The evidence base indicates that a whole variety of factors affect farmers' behaviours, as discussed in Chapter 3. The diversity of the farming community itself is also widely recognised. For these reasons, it is important to find meaningful ways to group farmers into more heterogeneous sub-groups, or segments. By exploiting the similarities of the sub-groups, farmers' attitudes and behaviours can be better understood, modelled and predicted, and policy levers more effectively shaped to influence farming practice.

Extensive research has been undertaken to group farmers in ways that help to inform agricultural policy. A number of studies have generated farmer typologies which include personal attributes and characteristics as well as business structure and geographical and environmental characteristics (some of these are highlighted elsewhere in this report). This chapter explores work that focuses more on farming style, and the motivations, objectives and attitudes that underpin the approach that farmers take to their businesses. In particular, influential work by Defra has explored the diversity of farming communities and the range of factors motivating individual farmers. Identifying the characteristics of particular groups of farmers is important to more accurately predict the uptake of policy measures, and the ways in which uptake might be more effectively encouraged. The body of this chapter focuses on the key messages to come from the Defra work to date, along with other studies that have used the Defra segmentation model, but a summary of relevant earlier work is also included (Defra, 2008).

4.2 Farmer values

Although definitions vary in the literature, there is broad agreement that „values' are relatively enduring cognitive structures which underlie the choices and decisions that individuals make in various aspects of their lives. In a useful summary of the relevant literature, Garforth and Rehman (2006) summarise seminal empirical research by Gasson in the 1970s, which defined the values and goals associated with farming as follows:

- Instrumental – making a satisfactory income; safeguarding the income for the future; expanding the business; providing congenial working conditions
- Social – gaining recognition and prestige; belonging to the farming community; continuing the family tradition; working with other members of the family; maintaining good relationships with workers
- Expressive – feeling pride of ownership; gaining self-respect for doing a worthwhile job; exercising special abilities and aptitudes; the chance to be creative and original; meeting a challenge, achieving an objective, personal growth of character
- Intrinsic – enjoyment of work tasks; preference for a healthy outdoor farming life; purposeful activity, value in hard work; independence – freedom from supervision and to organise time; control in a variety of situations.

Gasson's research was based on surveys of farmers who ranked a set of value statements, and is important because of the support it provides to the importance of non-economic values in agriculture. As noted by Garforth and Rehman, subsequent studies have recognised the complexity of farmers' goals and values and that dividing them into behavioural types on the assumption of simple profit maximising behaviour is increasingly difficult to sustain. In 2006, they modelled farmers' attitudes and responses to the introduction of the Single Payment Scheme in England. They concluded that economic drivers are not necessarily paramount for all farmers: environmental, family, lifestyle and stewardship motives are equally, and sometimes more, important. These non-economic drivers are long term goals, while the economic drivers reflect shorter term objectives (Garforth and Rehman, 2006).

Scottish farmers' values and behaviours

Research by Willock et al (1999a, 1999b) investigated individual differences in Scottish farmers' attitudes, objectives, and farming behaviour, and associations between these individual differences and farmers' personality traits. A total of 245 farmers took part. The study found that farmer objectives (successful business goals, conservation, quality of life, status and off-farm goals) acted as mediators between attitudes and behaviour. Openness in farming (willingness to entertain the ideas of others, and to learn about innovations in farming practice) influenced quality of life objectives and had a direct influence on environmentally-oriented farming behaviour. The influence of farm size was largely independent of psychological factors.

Willingness to trade profits for stewardship

More recently, work in the US investigated the trade-off agricultural producers face between profits and stewardship activities when selecting farm practice (Chouinard et al, 2008). An empirical study and analysis of findings from farm practice surveys allowed the development of a model identifying three main types of farmer:

- A pure profit-maximising farmer, motivated only by income and wealth effects of farming, and indifferent to whether the farm is generating positive or negative environmental effects
- A farmer who values environmental effects only to the extent that they provide direct personal benefits, such as recreational opportunities, or a good view
- A farmer who is additionally motivated by the social utility from their stewardship actions. This type is equivalent to the true steward, who is willing to forgo personal profits in the interests of conservation.

The authors noted that, in reality, there is likely to be a continuum, rather than the three clear farmer types. However, the types are useful to test whether some farmers might be prepared to make personal sacrifices with no apparent personal reward. The evidence suggests that stewardship farmers have a stated willingness to forgo profits for conservation. Not all farmers stated a willingness to forgo profits, but the amounts stated by those who were willing to trade profits for conservation activities were at reasonable levels for the size of the farm in question.

4.3 Farming style

The „styles of farming' approach to understanding diversity in farming communities attempts to explain the social nature of diversity in agriculture. Developed in the Netherlands and applied in a range of farming situations in Australia, the essential

defining characteristic of a set of styles is that they explain the diversity in agriculture in a specific region (Vanclay et al, 2006). A recent, major study in the Victoria region of Australia which involved 1,500 farmers (Widcorp, 2009) set out to analyse and benchmark attitudes and level of knowledge about climate change, and to suggest useful guidelines for better targeting of climate change policy and advice. Cluster analysis of data was used to identify farming styles, based on specific characteristics (farmer attitudes towards farming and views on climate change). Four specific farming styles were derived from the survey data:

- Autonomous – older farmers; a traditional and self-reliant approach to farming; unlikely to try out or finance new ideas. If they understand how climate change will affect them, they are likely to be more interested.
- Speculative – little interest in developing their farming enterprise for the longer term, as farming is unlikely to be their preferred occupation. However, they may be prepared to take some risks to finance growth/diversification for short term gains.
- Ambitious – younger farmers; prepared to take risks to grow or diversify their enterprise; business minded, profit driver and plan ahead. Open to, and value, new ideas and new technology. Agree that they need more information to manage their farm better.
- Prudent – will take on new ideas and technologies, but are not likely to take financial risks. These are, on the whole, well educated farmers with small farms, who see climate change as serious and related to human activity.

Clearly there are substantial differences between Australian and Scottish farming environments, but messages in relation to farming style may be transferable.

4.4 Understanding and modelling the behaviour and motivations of farmers in responding to policy changes

The usefulness of a segmentation approach for agricultural policy is recognised in the UK, and extensive research has been undertaken by Defra in this area. An influential publication (Defra, 2008) explored a range of studies undertaken in England in relation to farming style and practical approach in the context of decision making.

As described more fully in a later paper (Pike, 2011), the Defra model of farmer segmentation is basically about defining farming style; i.e. describing how farmers approach their businesses. For example, some farmers are more business-focused; others value succession most highly. While farm decisions are constrained by physical conditions (such as soil and climate) and structure of business (fixed capital etc) the accommodation of change depends also on underlying motivations, objectives and attitudes. Continuity in these values does persist, but values can change over time (for example in terms of succession; changes in life stages and attitudes). The importance of a segmentation framework is in using a deeper understanding of who farmers are, what they do, what they think and feel, and how they respond to policies in order to help policy makers to articulate messages and design long-lasting solutions. Segmentation can help with:

- Promoting awareness and understanding
- Tailoring (and not a „one size fits all')
- Recognising why people behave differently (Wilson et al, 2011)

A telephone survey of 750 farmers (from the Defra database of registered holdings) used a selection of 17 objective and value questions which earlier research had identified as significant predictors and most influential in assigning respondents to segments. A five group farmer segmentation model was built up on the basis of the evidence: custodians (23% of the sample); lifestyle choice (6%) pragmatists (22%); modern family business (41%); challenged enterprises (7%).The chief characteristics of the groups are as follows:

Custodians
- Farming is their preferred lifestyle, and gives them a good quality of life
- The farm allows them to spend time with their families. They would be happy if their children wanted to inherit the farm
- Most profit is reinvested in the farm
- Proud to be farmers, supporting the tradition and protecting the countryside.

Lifestyle choice
- Farming is not their main source of income; often it is a hobby
- Entrance into farming happened through marriage or a conscious personal decision, sometimes late in life
- Prefer traditional farming practices; see farming as a source of joy, and of a balanced lifestyle
- Do not place much emphasis on succession, expansion or investment in the farm.

Pragmatists
- Well balanced between enjoyment from farming, money making and satisfaction from life
- The majority were born into farming and run the farm in partnership with family members. However, issues of succession are not that important to them
- Value the experience of previous generations, but are open to new farming techniques, and are in harmony with the environment
- Do not care about making huge profits, but want to stay in business and are willing to diversify/adjust their practices rather than quit farming.

Modern family businesses
- Majority were born into farming and hope their children will continue the family tradition
- Enjoy the fact that farming gives them independence and get satisfaction from passing their farming knowledge on to their children
- Prefer practical work to administration, but are comfortable with paper work
- Search for opportunities to expand and increase profit.

Challenged enterprises
- Likely to struggle the most financially, with hard work and long hours taking their toll on life satisfaction
- In farming because of obligation, rather than personal choice
- Feel isolated from the farming community, lack support and social life
- High costs, resource constraints and low profits make them pessimistic about the future of the business.

The Defra segmentation programme of work has also investigated the likely responsiveness of the individual groups to policy measures (Pike, 2011) and found that this is likely to vary a good deal:

Custodians
- Will obey the rules, but prefer to be persuaded and encouraged
- Resent regulations they consider damaging to the long term viability of farming
- The likelihood of being influenced is high, particularly if the communication message recognises their conservation role
- This segment is characterised by a high proportion of small holdings, so the cost and time required to keep up to date with rules is relatively greater for them
- May unconsciously disobey regulations, especially if the logic is not clear.

Lifestyle choice
- Likely to be responsive to messages around the emotional aspects of farming
- Information on good farming practice is also welcomed
- Unlikely to be well informed about regulations, or have time to keep up to date with them
- Get satisfaction from doing their job well; likely to be familiar with environmental issues
- Willing to comply, but require well targeted communication.

Pragmatists
- Likely to know the rules
- A forward thinking approach to farming techniques; willing to diversify. However, they may „blank out' more demanding requirements
- Likely to be open to influence, but their love of the farming lifestyle and emotional connection to farming may make them more difficult to influence in circumstances where respecting environmental constraints would impact on their freedom to farm in particular ways
- Business focus and concern for business continuity should ensure that they wish to be compliant, as long as the cost of compliance is not excessive.

Modern family businesses
- See themselves as business people and want to know the potential gains
- Likely to be familiar with the environmental regulations that are important to them, and appreciate advice and information, but wish to stay independent and trust their own judgement
- Clear justification for legislation is required; susceptible to influence if compliance is practical
- May disobey rules, but only if cost appears excessive, or if compliance might threaten their business
- Likely to respond to guidance and advice in an online form.

Challenged enterprises
- Require communication that recognises the challenges and difficulties they face, as well as offering opportunities to save money
- Likely to be least engaged with management techniques, unfamiliar with rules

- Where regulation incurs costs or restraints on current practices, they may choose to disobey
- The segment is characterised by a high proportion of pig and dairy farms, which require infrastructure investments to comply with regulation
- A tailor-made incentive approach might be required, for example linking compliance to additional grants or other financial incentives.

An important publication from work commissioned by Defra and conducted by ADAS and SAC (Barnes et al, 2010) investigated attitudes and motivations for uptake of mitigation measures. Primary research included three farmer workshops (47 people in total, representing the dairy, arable and grazing livestock sectors). Farmers within each of the sectors were characterised according to farm size, personal attributes and the Defra segmentation model. Although the sample was small, the findings do provide some important insights. As in previous work, the distribution indicated that the lowest numbers were in challenged enterprises and lifestyle choice groups:

- Analysis showed no strong divergences in behaviours between segments, although a stronger focus on „the bottom line' among modern family businesses and pragmatists could be important for encouraging uptake of measures
- Challenged enterprises might be the least eager group to take up new measures, as they are already struggling
- Custodians, lifestyle choice and modern family businesses attach the most importance to GHG reduction.

Findings indicated that the identified attitudes are not necessarily accompanied by actual behaviours. From the limited sample of farmers, uptake of mitigation measures was high in challenged enterprises and lower for custodians, in spite of their level of perception of the importance of climate change. The authors suggested that this might be explained by the economic drivers of uptake, which are dominant for all sectors. Since challenged enterprises struggle the most financially, their efforts to reduce cost might lead them to higher uptake of mitigation measures that reduce production inputs, such as petrol or fertilisers. However, as only five farmers were in the challenged enterprise segment, this finding may not be generalisable to the wider challenged enterprise farmer population.

Another recent study (Wilson et al, 2011) noted that Defra's segmentation approach has been used in previous work to capture farmer behaviours and characteristics in order to understand the drivers behind their decision making. This has often limited the coverage of physical and financial data that have been collected alongside segmentation data. The pilot study by Wilson et al placed the segmentation framework within the Farm Business Survey (FBS) research programme (the FBS is an annual survey which provides information on the physical and economic performance of farm businesses in England).

The main finding of the study was that the characterisation of the segmentation groups, when analysed alongside the FBS data, showed that the expectations of the characteristics of the segmentation groups were broadly met. The distribution of the groups was, broadly, similar to the original Defra assignment, with low percentages in the lifestyle choice (7%) and challenged enterprises (4%)groups. However, more than half the sample classified as pragmatists (53%); while fewer were custodians (14%)or modern family businesses (21%).

Qualitative findings from the research also broadly concurred with expectations, although there was some „fuzziness' at the boundaries of the segmentation groups. Since the research involved the farmers in the decision making as to their segmentation group, a number of additional factors affected allocation. For example, the presence of a spouse or other family member at the time of interview sometimes meant a difference of views about which was the most appropriate category. The researchers also reported that the choice of segmentation group could be influenced by the time of year, the timing of the visit, and other factors impacting on the farmer at the time of interview (Wilson et al, 2011).

The most recent piece of research by Defra on farmer segmentation, synthesises and supplements the work Defra has done to date. It further discusses the policy use of the segmentation framework and attempts made at integration of the framework within the FBS (Pike, 2011).

Having reviewed the studies, Pike notes that, since the segmentation framework was developed in 2008, the approach has been repeatedly applied and tested. This has helped to clarify the key statements most effective in identifying the most appropriate segment for individual farmers:

- „my priority is to pass on a viable business to the next generation'
- „farmers should provide congenial working conditions, hours, security and surroundings for themselves and their staff'
- „farming gives self-respect for doing a worthwhile job'
- „local authorities do not understand farmers and their needs'
- „paying attention to details is crucial in making a success of running a farm'

4.5 Some implications for policy development and delivery

The imperative of climate change makes it increasingly important to encourage a balance of business and environmentally oriented behaviours among farmers. Findings from the work by Chouinard et al in the US supports the concept that at least some producers have a direct stewardship motive to undertake some level of conservation practices, and that they are willing to forgo some profits to adopt these practices. The authors suggest that, to increase producer stewardship, policy makers could subsidise the technology. Invoking both the profit and steward motives in farmers would be likely to appeal to a larger proportion of farmers, and stronger responses from those who have both profitability and stewardship motives (Chouinard et al, 2008).

The usefulness of a segmentation approach has been confirmed in the literature. Gaining a better understanding of the different values, motivations and attitudes of farmers in different segments allows analysts to predict their behaviours more accurately and forecast the uptake of different measures. This potentially allows for better targeted initiatives, sensitive to farmers' value systems as well as their circumstances.

The qualitative element of the work by Wilson et al reflected the difficulty of selecting a particular group, with the researchers noting that a large number of farmers could have been placed in a different group, or one of three or four groups. Also, if farmers

are involved in the choice of an appropriate segment, social desirability bias might cause farmers not to reveal their true attitudes, to avoid being identified with a segment they believe to have negative connotations (such as challenged enterprises). The research also highlights the importance of considering that categorisation might change, depending on external or internal factors; and that different family members may have different views of the appropriate categorisation for their business (Wilson et al, 2011).

There are many reasons why challenged enterprises may struggle to keep up with regulations and engage with voluntary initiatives. Factors such as the burden of work, isolation, and pessimism about the future are all likely to play a part. For the same reasons, farmers in this category are likely to be difficult to reach, and to influence. However, both the original Defra work and the FBS research indicate that the percentage of farmers in this category is small. Similarly, the lifestyle choice segment may represent a challenge to policy makers, because farming is unlikely to be the main means of income for this category. This independence may restrict the number of policy levers that can be used. Again, however, the percentage of farmers in this category is not large.

When considering the targeting of scarce resources, it appears that the characteristics of the other three segments, which describe the majority of the farmer population, provide plenty of „hooks' for engagement. For example, custodians are characterised by their pride in farming heritage; pragmatists are in tune with their environment and balanced between love of farming and the need to make money; modern family businesses are focused on business planning and financial management for the farm.

The similarity between the FBS and its near equivalent in Scotland (the Farm Accounts Survey (FAS)) emphasises the usefulness of the pilot work by Wilson et al. The opportunity to use the FAS to gather information that will allow a segmentation approach to be applied has been recognised, and a questionnaire will be included in the 2013 survey. However, there are issues around the appropriateness of the Defra segment groupings: it will be important to ensure that the segment types make sense to Scottish farmers.

Key points from the literature

The diversity of the farming community is widely recognised, making it important to find ways to group farmers into more heterogeneous sub-groups, or segments. Extensive work on farmer segmentation has been carried out by Defra, and a five group model built up on the basis of the evidence. The likely responsiveness of the individual groups to policy measures has also been investigated.

- **Custodians** are ready to be influenced, particularly if their conservation role is recognised. They will obey the rules, but prefer to be persuaded and encouraged. The cost and time of keeping up to date with regulations is relatively greater for them, as their holdings are often smaller
- **Lifestyle choice** farmers are likely to be responsive to messages around the emotional aspects of farming, and are familiar with environmental issues. They are unlikely to be well informed about regulations, or to have time to keep up to

date with them

- **Pragmatists** wish to be compliant for the good of the business, as long as the cost of compliance is not excessive. Their emotional connection to farming may make it difficult to influence them where respecting environmental constraints would impact on their freedom to farm in particular ways
- **Modern family businesses** want to know the potential business gains. They are likely to be familiar with the environmental regulations that are important to them, and appreciate information, but trust their own judgement. Clear justification for legislation is needed; they are susceptible to influence if compliance is practical
- **Challenged enterprises** are likely to be least engaged with management techniques, and unfamiliar with the rules. Any time spent on paper work is likely to focus on finances. Where regulation incurs costs or restraints on current practices, they may choose to disobey. A tailor-made approach, such as linking compliance to financial incentives, might be required to reach them.

The Defra segmentation approach has been used in several studies and, of course, the percentages of farmers in the various segments varies from study to study. However, challenged enterprises and lifestyle choice groups are consistently the smallest (each less than 10% of the sample). One study placed over 50% of the sample in the pragmatist group; but the initial Defra survey indicated that more than 40% were classified as modern family businesses, and 23% as custodians.

Work to place the segmentation framework within an existing survey on the physical and economic performance of farm businesses showed that the expectations of the characteristics of the segmentations groups were broadly met. However, the choice of segmentation group could be influenced, to a certain extent, by factors impacting on the farmer at the time of interview.

Some implications for policy development and delivery

- Invoking both the profit and stewardship motives in farmers would be likely to encourage a balance of business and environmentally oriented behaviours
- The segmentation approach allows for better targeting of initiatives that are sensitive to farmers' values, as well as their circumstances. There are plans to use Scotland's Farm Accounts Survey to gather information that will allow a segmentation approach to be applied. However, it is important that the segment groupings make sense to Scottish farmers. It must also be acknowledged that segment categorisation is largely subjective, and is not necessarily fixed.

5. APPROACHES TAKEN BY GOVERNMENTS TO INFLUENCE FARMER BEHAVIOURS IN RELATION TO CLIMATE CHANGE, AND WHAT IS KNOWN ABOUT THEIR EFFECTIVENESS

5.1 Policy and economic mechanisms available to policy makers

A range of policy approaches is available to governments to influence environmental behaviour among farmers. Dwyer et al (2007) provide a useful summary of these types of mechanisms and the evidence relating to them:

Regulation – places restrictions on what farmers are legally allowed to do and prohibits undesirable management practices:

- This can be effective to promote enhanced environmental behaviour. It works best in situations where the target group is (or can be) persuaded that the regulated actions fall below an acceptable „reference level' of responsible farming practice
- The act of persuasion (using advice, information, peer pressure and other tactics) can be critical to ensure successful regulation and/or cross compliance. This may be more important than the severity of sanctions if farmers fail to comply.

Economic incentives – taxes and subsidies (environmental payments) are the most widely used and analysed instruments:

- These are important to increase farmers' participation in environmental management, in particular if payments and schemes are tailored to local natural and agronomic conditions. However, it is not yet known whether payments and schemes have a long term positive impact on farmer behaviours.

Market-led and 'voluntary' approaches – promote environmentally beneficial management practices to encourage higher standards of environmental behaviour among farmers:

- These have significant potential to encourage higher standards of management practice on farms
- They are attractive because they offer „win-win' options to motivated producers seeking to increase or consolidate their markets through adopting demonstrably higher management standards.

Education and/or information provision – raise awareness of environmental issues, what can be done to address them and (if relevant) why this could be beneficial to the farmers involved:

- This approach works in tandem with any/all of the above mechanisms as stimulants to influencing behaviour.

Each of these approaches has different advantages and disadvantages in terms of cost, success at influencing behaviours, speed of implementation etc. Providing economic incentives or prohibiting by regulation are unlikely to be sufficient, on their own, to promote positive environmental behaviour. Success almost always depends on a range of other factors. Understanding the interplay between the different elements within a particular policy or commercially-driven approach can be a crucial

factor in understanding how and why they succeed or fail, in different situations (Dwyer et al, 2007).

5.2 Agricultural policy context in Scotland

Common Agricultural Policy

Agricultural policy in Scotland is dominated by the EU Common Agricultural Policy (CAP), which provides a level of income security to farmers. Currently the CAP is based on a two pillar structure: Pillar 1 support includes direct payments to farmers, while Pillar 2 focuses on rural community development, including agri-environment programmes and less favoured area support[12].

To date, the main approach to climate change mitigation through the CAP has been to encourage desired farmer behaviours with financial incentives, through making the size of single farm payments dependent on specific environmental actions (cross compliance), and incentivising environmental actions that should then deliver efficiency (and thus financial) savings to farmers (agri-environment schemes).

Farming for a Better Climate (FFBC)[13]

Launched in September 2009, this is currently the only policy initiative in Scotland set up by the SG with the specific aim of mitigating climate change in agriculture. It is a targeted communication strategy designed to encourage farmers to adopt efficiency measures that reduce emissions, and help them adapt to climate change, while having an overall positive impact on business performance. The strategy targets five key areas for action:

- Using energy and fuels efficiently
- Developing renewable energy
- Locking carbon into the soil and vegetation
- Optimising the application of fertilisers and manures
- Optimising livestock management and storage of waste.

FFBC has been developed jointly by the SG and the Scottish Agricultural College (SAC). SAC hosts a dedicated website which provides farmers with a list of practical measures that can be taken in each of these areas:
http://www.farmingforabetterclimate.org

Climate Change Focus Farms

Four farms have been selected as FFBC focus farms, demonstrating how to tackle avoidable GHG emissions, while balancing sustainable food production and maintaining a competitive farming industry. The focus farms represent three agricultural sectors (dairy, upland livestock and arable). The fourth farm is a diversified farm business and can be used for education and public demonstration. The programme will run until 2013 to establish best practice and monitoring and reporting procedures. Participating farms open their books and SAC advisers work with them to decide how best to facilitate savings and reduce emissions. Farm

[12] http://enrd.ec.europa.eu/en/home-page_en.cfm

[13] This section summaries information from the „Rural Land Use' Chapter of *'Low Carbon Scotland: Meeting the Emissions Reduction Targets 2010-2022; The Report on Proposals and Principles, March 2011*http://scotland.gov.uk/Publications/2011/03/21114235/17

accounts are monitored, so that change can be measured. Open days and demonstrations take place on the farms, with the aim of showing how emissions can be cut while improving the efficiency and therefore profitability of farm businesses: http://www.sruc.ac.uk/info/120200/climate_change_focus_farms

Climate change case studies
A number of case studies have been made available on the FFBC website. The case studies highlight the environmental issues affecting agriculture and demonstrate how different farming enterprises are addressing the effects of climate change in the five key action areas:
http://www.sruc.ac.uk/downloads/120175/farming_for_a_better_climate

Scotland Rural Development Programme
Many of the measures encouraged by FFBC potentially qualify for grant funding through the Scotland Rural Development Programme (SRDP):
http://www.scotland.gov.uk/Topics/farmingrural/SRDP

The SRDP is a programme of up to £1.5 billion of economic, environmental and social measures designed to develop rural Scotland. The 2007-13 SRDP brings together wide-ranging measures into a single programme of support. The programme contributes to:

- Improving the competitiveness of agriculture and forestry by supporting restructuring, development and innovation (Axis 1)
- Improving the environment and the countryside by supporting land management (Axis 2)
- Improving the quality of life in rural areas and encouraging diversification of economic activity (Axis 3).

The most relevant eligible measures include:

Manure/slurry storage and treatment – supports capital investment in:

- improved storage and handling facilities for manures and slurry, to improve water quality
- structures, machinery and equipment for the anaerobic digestion of slurry, to produce biogas and/or compost: http://www.scotland.gov.uk/Publications/2010/05/05134234/88. Biogas fuels a generator which produces electricity and heat either for use on the farm, or for sale to the national grid.

Support for renewable energy in agriculture – contribution to the initial capital investment in the technology and equipment required to establish renewable energy capacity: http://www.scotland.gov.uk/Publications/2010/05/05134234/90

Treatment of run-off of nutrients and other pollutants – to increase the efficiency and environmental performance of the agriculture and forestry sector through targeted capital investments to reduce and treat run-off of nutrients and other pollutants from farm and forest holdings:
http://www.scotland.gov.uk/Publications/2010/05/05134234/99

Broader initiatives in relation to renewables (Example – Feed-In Tariff (FiT) Scheme)
The FiT is a financial subsidy for renewable electricity generators below 5MW. It offers a payment per kWh produced each year, depending on the technology and size of generation. If farmers install electricity generating technology from renewable technology, they can be paid for the electricity generated, even if they use it themselves, as well as for any surplus electricity exported to the grid. Technologies that qualify for the scheme include:

- Solar electricity (roof mounted or stand alone)
- Wind turbines (building mounted or free standing)
- Hydroelectricity
- Anaerobic digesters
- Micro combined heat and power.

Initiatives that support the implementation of agricultural and climate change policy in Scotland (Example – Future Proofing Scotland's Farming)
Future Proofing Scotland's Farming (2011-14) is delivered by Soil Association Scotland in partnership with Quality Meat Scotland, with support from the National Farmers Union of Scotland and the Scottish Agricultural Organisation Society. The aim of the programme is to help farmers and other land managers:

- Minimise the negative impacts of climate change and capitalise on opportunities through appropriate adaptation measures
- Implement practical measures to cut on-farm GHG emissions and reduce dependence on expensive inputs
- Create sustainable and profitable agricultural enterprises based on low carbon principles.

Farmers are offered practical advice on how to raise the financial performance of their businesses and benefit the environment. On-farm events and written/on line advice and guidance cover a range of areas such as nutrient management; water and wetland management; woodland management and biomass; anaerobic digestion; low carbon farming.

5.3 Voluntary and mandatory approaches

As indicated above, to date the Scottish Government has largely utilised voluntary initiatives to address environmental goals. To successfully meet emissions targets, it may become necessary to broaden the scope to include more mandatory measures.

Both voluntary and mandatory approaches have advantages and disadvantages, and it is not necessarily straightforward to determine which will be most effective in a given situation or, indeed, to attribute outcomes to specific instruments. As summarised by Davies (2006), pricing mechanisms for conservation goods (voluntary) not only offer the power of exchange, but send clear signals about the value from the public perspective of the goods that are being offered for exchange. Information provision (voluntary) can help to identify cost savings or profit opportunities that in turn bring their own rewards. Regulatory instruments (mandatory) backed up with the threat of prosecution also send a signal about what is ethically valued, as do market-based instruments (voluntary) aimed at delivering similar quality targets through more flexible mechanisms.

Research by Barnes et al (2007) included a number of findings that are useful when considering mandatory policy measures in Scotland, and their impact on farmers' attitudes and behaviour. Specifically, the work highlighted that farmers involved with mandatory environmental schemes may be more likely to have negative attitudes towards the environment. If there is a possibility that regulation is adversely impacting the environmental views of farmers then there is clearly a need for further research to assess to what extent this is „spilling over' into other domains and whether mandatory policies remain beneficial overall, or if they are ultimately counterproductive (Barnes et al, 2007).

5.4 A tool for considering all the factors required to influence behaviours

Given the range of policy approaches available and the importance of achieving the right mix of options for achieving specific policy goals, it is useful to focus on addressing both internal and external barriers to change. A tool has been developed by Defra for use within a policy context[14]. To establish new and more sustainable ways of working and producing, policies need to:

Enable – make it easier for people to change(systems and capacity)
There is no point asking people to change if they do not know how to, or if they know what to do, but what they need to do it is not available. The challenge for policy is to help people make responsible choices by providing them with the appropriate education, skills and information, and making choices easy, with accessible alternatives and suitable infrastructure.

Encourage – give the right signals(incentives and disincentives)
Policy should consider the most effective techniques to encourage and, where necessary, enforce, behaviour change. This might include taxes or other ways of giving price signals, peer pressure, league tables, funding or regulation. There is also scope for positive initiatives to reward desired behaviours.

Engage – get people involved (co-production)
People need to be involved in policy development from early on – so that they take full responsibility for what they do. Consultation and engagement over a long period helps to identify what people care about and real-life examples they can relate to. Targeted communication (such as face to face contact, rather than remote messages from government) should be part of a larger process of involving the public, coordinated with other interventions, such as regulation.

Exemplify – lead by example
The government (and its agencies) should be seen to be carrying out its own operations in the ways it expects its stakeholders to act; policy making should be consistent and policies joined up.

The principles underlying this tool can be translated into actions at each step within the policy development process. Depending on what the policy is intended to do,

[14] **Changing behaviour through policy making** - ARCHIVE: **Defra**

and the current situation for the target population, the four types of levers (the „4 Es') can be used individually or in combination.

It may be helpful to apply the tool to identify which types of levers are used as part of existing agricultural policies. This would allow policy makers to consider whether they are using the range of levers and/or the most appropriate types of levers. Table 5.1 represents an initial attempt to map measures onto the four potential policy levers. Boxes are shaded where the specific policy measure currently employs the relevant lever. Table 5.1 also includes an indication of whether farmers are being encouraged by the use of incentives (+) such as funding schemes, or disincentives (-) such as regulation.

Table 5.1: Mapping measures onto types of levers used to influence farmers' environmental behaviours

		Enable	Encourage	Engage	Exemplify
Common Agricultural Policy					
	Cross compliance		-		
	Nitrate Vulnerable Zones (NVZs)		-		
	Agri-environment schemes (AESs)		+		
Scotland Rural Development Programme					
	Grant funding for eligible activities		+		
Farming for a better climate					
1	Using energy & fuels efficiently				
2	Developing renewable energy sources		+		
3	Locking carbon into the soil & vegetation		+		
4	Optimising the application of fertilisers & manures		+		
5	Optimising the management of livestock & storage of manures		+		
	Climate Change Focus Farms		+		
Feed-In Tariff Scheme (FiTs)			+		
Future Proofing Scotland's Farming					

The focus is primarily on enabling and encouraging, with only the climate change focus farms which are part of FFBC using all four types of policy levers. This may be appropriate; however, it might be worth considering opportunities for more engagement to involve farmers in policy development, and ways to exemplify best practice.

In the next sections, UK and international evidence, and messages from the opinion former interviews, relating to each of these measures is discussed. Where information is available, each section is structured as follows:

- Introduction to the measure
- Types of policy levers used
- Farmer attitudes and behaviours in relation to the measure
- Approaches to implementation
- What is known about the effectiveness of the measure
- Messages from the opinion former interviews
- Some implications for policy development and delivery.

Naturally the types of evidence relating to each measure vary a good deal, so each section is slightly different from the others. In addition, there is no specific evidence relating to Future Proofing Scotland's Farming, and the opinion formers did not mention the initiative, although the type of activities which are part of it were frequently highlighted as being popular with and useful to farmers. It is included here as an example of a non-SG initiative that supports the implementation of agricultural and climate change policy in Scotland, and because it uses three of the four available policy levers.

5.5 Cross Compliance

Introduction

Cross compliance was introduced in the UK in 2005, setting obligations for farmers to manage their farms in sustainable ways, in order to receive their Single Payment. There are two elements: Good Agricultural and Environmental Condition standards largely relating to the protection of soils, habitats and landscape features; and Statutory Management Requirements, which are either pre-existing legislative requirements or those that Member States must implement under EU law. The aim of cross compliance measures is to achieve a common minimum standard, rather than to maximise environmental benefits.

Farmers must in any case comply with all legislation affecting their businesses. The significance of cross compliance is that farmers' receipt of direct aids depends on their doing so. Failure to comply can result in deductions from, or cancellation of, the subsidies farmers receive. For the vast majority of farmers, who cannot afford to risk losing their subsidy, cross compliance is effectively mandatory.

Types of policy levers used

In terms of the types of policy levers used, cross compliance primarily uses encouragement, with the disincentive of setting environmental obligations for farmers, backed by regulation and the potential loss of subsidy. Farmers need to keep up to date with information on regulatory requirements, which may make them more proactive in seeking out advice: enabling activity.

Farmer attitudes to cross compliance

Since farmers are obliged to adopt cross compliance measures in order to receive subsidies, it is not possible to establish their opinions of the measures by simply monitoring rates of uptake. They may adopt the measures out of financial necessity, rather than because they are supportive of environmental goals.

Davies and Hodge (2006) carried out research to investigate whether farmers endorse the basic principle of cross compliance. The research (a survey of 100 farmers in East Anglia) found that several factors may influence the perceived acceptability of cross compliance as a governance mechanism:

- Economic advantage – as cross compliance does not itself increase income, and increases management costs for the farm business, it might be expected that farms would reject such a policy on principle. However, farmers may perceive an indirect economic advantage – to establish a competitive advantage for UK producers in the global market, for example

- Viability - farmers' ability to meet cross compliance requirements is key to their willingness to endorse it as a general principle. Two important concerns are:
  - Current financial stress, as an indicator of the ability of the farmer to bear any increased burden on the farm business
  - „Situational stress' on the farm, in terms of the current difficulties encountered in managing the overall farm production environment
- Perceived legitimacy of cross compliance – three sets of attitudinal factors come into play:
  - The level of confidence farmers have in conventional, chemical-intensive, farming methods, and whether such methods are associated with benign or negative effects on the environment
  - Farmers' views on environmental maintenance and a management ethic of environmental stewardship (as farmers indicate higher levels of concern for a stewardship role for farming, their support for cross compliance is likely to increase)
  - The relative priority farmers assign to financial management and profit in their overall approach to farming (a more economically rational focus being associated with a decline in support for the principle of cross compliance).

It should be noted that the Davies and Hodge research was carried out in 2001, at a time when the concept of cross compliance was highlighted in a number of policy fora, but was a principle for which farm financial and management implications were both still uncertain. However, the findings indicate the range of factors potentially influencing farmers' attitudes to cross compliance and, in particular, the importance of two distinct cognitive aspects – technological beliefs, and a normative „stewardship' motivation – in making the judgement on policy acceptability. The authors suggest that if government is engaged in convincing farmers of the rationale for cross compliance, it might achieve some success with certain sections of the farming population by changing either of these factors, but that both need to be addressed to bring about acceptability across the farming population (Davies and Hodge, 2006).

What is known about the effectiveness of cross compliance

The European Court of Auditors investigated the effectiveness of cross compliance as a policy in 2008. The audit set out to determine whether cross compliance is effective, by analysing its setting up and implementation by the Commission and a sample of Member States. The audit concluded that:

- The objectives and scope of cross compliance are not well defined, making it unclear what cross compliance is designed to achieve
- The complex legal framework poses considerable difficulties
- Cross compliance and rural development are not well adapted to one another
- Data provided by the Member States on checks and infringements is not reliable and the Commission's performance monitoring was found wanting.

The audit only included a sample of seven Member States (not including the UK) so it is not clear to what extent the criticisms apply more broadly. However, an evaluation of cross compliance in England was carried out for Defra by ADAS (also in 2008). This set out to assess the effectiveness of cross compliance in England in meeting its objectives; the nature and magnitude of the costs imposed on farmers and any others in meeting cross compliance conditions; whether the policy

represents value for money; whether there are any unintended consequences; and whether there has been a change in farmer behaviour in response to the introduction of cross compliance.

Using a review of secondary evidence and collection of primary data via a farmer survey (300 respondents), the research highlighted generally high levels of compliance, although there was considerable variation across the measures. Generally, standards relating to legislation that had been in place for some time were found to be well observed. The main unintended consequences in terms of the impacts of cross compliance were:

- Additional engagement of farmers with advisers
- Increased awareness of existing legislative requirements
- Disproportionate impact on small farms (fixed cost component)
- Some farmers incurring unnecessary costs by over-reacting to standards
- Anxiety (which is possibly unnecessary) on the part of some farmers in terms of the risk of penalty
- The limited scale of penalties may cause some to risk being caught rather than comply, notably where high capital cost is needed to comply with regulation.

The key behavioural issue identified by the evaluation was the negative attitudes held by farmers, due to perceived additional costs arising as a result of cross compliance. However, where farmers reported high costs, these related largely to compliance with underlying regulations rather than cross compliance per se (ADAS, 2009).

Mandatory measures: messages from the opinion former interviews

Concerns about mandatory measures
The opinion formers were unanimous in their view that farmers have negative attitudes towards compulsory initiatives: „No farmer likes the word „mandatory'.' The following issues were also highlighted:

- The additional regulation associated with cross compliance measures can have a negative impact on production. The more time and money that farmers spend adhering to regulations, the less they can spend on creating and selling produce (although regulation may also bring other benefits). Better regulations and clearer instructions would make it easier for farmers to comply
- Variations between cross compliance measures across the EU mean that some regulations apply in the UK, but not elsewhere in Europe
- Some farms currently gain a competitive advantage by voluntary adoption of high standards. If particular behaviours are mandatory, they lose their market advantage.

Looking to the future, opinion formers noted several concerns about increasing the number of mandatory actions, and focusing more explicitly on climate change mitigation:

- Currently, farmers are penalised for unambiguous breaches of cross compliance measures that are straightforward to measure, such as uncovered pesticide. Actions to mitigate climate change may be less easy to see, measure, and

penalise.

- Cross compliance measures need to consider „acts of God.' For example, if a farmer puts nitrogen in a field, and then there is torrential rain, much of this could be lost into watercourses through no fault of the farmer.
- Some farmers are already struggling in relation to awareness of current cross compliance measures
- Some interviewees urged for better, rather than more, regulations.

Support for mandatory measures

Opinion formers acknowledged that some compulsory measures are necessary, and can even be beneficial for farmers. For example, cross compliance can assist in ensuring that the British brand is associated with good quality. Specific areas where mandatory measures were considered acceptable by opinion formers included tree planting, health and safety, and compulsory set-aside. It was suggested that it may be necessary to adopt a mandatory approach to tree planting because trees take up valuable land, and require many years to grow, so the financial incentive is not there in the short term: „their children would benefit, but they need the money now.'

There was some acknowledgement that, as farmers receive public money, there should be a basic good practice standard. Opinion formers also felt that a minority of farmers will not adopt climate change mitigation measures if they are optional. However, some argued that, if mandatory measures are implemented, it is vital that they are proportional, that they are not an obstacle to business, and that disregarding them has real consequences. The guidance that farmers receive should be clear, so that they are not penalised for missing, or misunderstanding information.

Achieving „buy in' from farmers

A number of interviewees expressed the opinion that making mitigation measures mandatory does not persuade farmers of their merit, and the measures may be perceived as „box ticking,' or „just another hurdle.' Voluntary measures, on the other hand, are usually adopted because farmers have been convinced that the measures have value. However, if farmers can see the impact of mandatory measures – the reasons that they are necessary and/or beneficial – then they are more likely to be supportive of them.

Impact of reduced single farm payment

Some interviewees felt that if the single farm payment (SFP) was reduced, a minority of farmers would reconsider whether meeting the criteria for the subsidy was worth the effort. However, the majority opinion was that lowering the SFP would be unlikely to reduce adherence to cross compliance measures for three main reasons:

- The SFP is so important to the survival of farm businesses that farmers would not take any action that could put it at risk. Lowering the level of the subsidy would make the remaining sum even more valuable, and could even increase adherence to cross compliance measures
- Some cross compliance measures represent good practice, so many farmers would carry them out even without subsidy (although there might be some impact on less immediately profitable measures)
- Even with reduced SFP, measures would still be compulsory, so not adhering to them would be a risk for farmers (assuming that disobeying the regulations has

real consequences).

Implications for policy development and delivery

Findings from the audit and the evaluation highlight a potential need for more attention to be paid to the principles of cross compliance in the provision of support by advisers, and better links with the inspection agencies, to ensure a more balanced view of the policy and its implementation. The evaluation concluded that two clear messages need to be made more effectively:

- Clarification of the rationale for a number of the standards
- There are actually good reasons for the rules, eg public goods such as water quality and access to the countryside; preventing animal disease or weed spread (ADAS, 2009).

Given that the pressure of keeping up to date with changing regulatory requirements can cause stress and worry for farmers (Report of the independent Farming Regulation Task Force, 2011), making it easier for farmers to comply and giving them a better understanding of the principles of cross compliance would enhance enabling levers and would be likely to have a positive effect. The evidence also indicates that farmers need to feel more engaged in policy development.

5.6 Nitrate Vulnerable Zones

Introduction

Nitrate Vulnerable Zones (NVZs) were established throughout Europe in an attempt to address the issue of diffuse pollution (particularly through agriculture). If nitrate levels in groundwaters are found to be above a given reference point (50mg N/l) then EU member states are obliged to take steps to reduce these levels, although they have some flexibility in how they address the issue. NVZs can be designated at either a regional or national level and, across European member states, there are examples of both approaches underway. Scotland is among the countries adopting a regional approach: four nitrate vulnerable zones have been designated since 2003 covering 14.2% of land area. Actions to reduce nitrate pollution are as follows:

- Detailed record keeping on the use of all organic and inorganic nitrogen fertilisers
- Nitrogen application limits
- Closed periods when nitrogen cannot be applied
- Practical application restrictions (for example: land type, distance to watercourse)
- Ensuring enough capacity to store slurry/ poultry manure during the closed periods.

The NVZ rules are one of the Statutory Management Requirements for cross compliance under the Single Farm Payment Scheme. Failure to ensure that the NVZ Action Programme is implemented in required areas is a criminal offence, and the farmer could be punished with a fine or conviction on indictment to a fine of an unlimited amount. Furthermore, failure to adhere to the NVZ rules can lead to a deduction to farmers' Single Farm Payments[15].

[15] http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/Environment/NVZintro/NVZGuidanceforFarmers

Types of policy levers used
At present, encouragement through legislation is the primary policy lever being used in Scotland specifically in relation to NVZs. Enabling activity includes the provision of accessible guidance for farmers about their NVZ responsibilities.

Farmer attitudes and behaviours in relation to NVZ measures
NVZ measures are effectively mandatory, so there is little focus in the literature on factors affecting uptake. It is generally taken for granted that farmers will comply with these regulations, due to the penalties involved for disregarding them. However, to fully abide by the NVZ measures requires farmers to have a thorough understanding of exactly what they entail. Therefore, information provision and education and advice have important roles to play.

The attitudes and behaviours of farmers affected by NVZ regulations received little attention in the literature before 2007. A study was carried out by Barnes et al to address this data gap and maximise the impact and efficiency of advice to farmers operating within NVZs. The research included interviews with 376 Scottish farmers, and intended to achieve a balance between those within and outwith NVZ regions.

NVZ farmers demonstrated attitudes which were more orientated towards production and profit and, compared with non NVZ farmers, showed a higher level of disagreement with environmental and social goals. However, NVZ farmers' knowledge of NVZ rules was sporadic, and their main negative comments were directed towards the unfairness of the designations, along with scepticism over the scientific basis. In addition, they perceived that they experienced an undue burden in record-keeping requirements (Barnes et al, 2007).

The work of Barnes et al also demonstrates a statistically significant relationship between farmer attitudes and behaviour. The ethical attitudes of farmers, such as an awareness of and concern about water quality issues, drive farmer goals for conservation and nitrate reduction. In turn this impacts on the propensity of farmers to practise good water management. The authors suggest that, if ethical attitudes are raised, through, for example, providing appropriate levels of information about the benefits of NVZ, then this may engineer some behavioural change towards positive societal outcomes (Barnes et al, 2007).

Research has also considered the attitudes of farmers in a region of Scotland which was about to become an NVZ, before the date of designation. This was a small, qualitative study, but the findings indicated that farmers rarely considered environmental issues beyond the boundaries of their farms unless the productive capacity and economic viability of their farms were affected. Despite evidence to the contrary, farmers did not believe that they were responsible for water quality problems (Macgregor and Warren, 2006).

More recent work by Barnes et al (2011) aimed to develop a typology based on the attitudes and values of farmers before and after the introduction of NVZs. This is useful because it focused more specifically on attitudes to nitrogen management, agricultural practice and environmental damage; and changes in farming practice since designation as an NVZ. Three distinct clusters of farmers were identified: multifunctionalists, „resistors' and „apathists':

Multifunctionalists
- Appreciated that agricultural land has many uses
- Least likely of the three groups to have received post-school education
- More likely than other groups to pass the farm on to other family members
- Favoured using agricultural advisers and Government sources for information concerning water pollution management.

Apathists
- Responsible for smaller than average farms
- Lower median income; low level of off-farm investments
- Neither disagreed nor agreed with the majority of statements on environmental factors, responsibility, regulations and farm management, and seemed to be disengaged from the regulations
- Less likely than other groups to be dependent on income from the SFP
- Less inclined to seek advice from external bodies.

Resistors
- Generally slightly younger
- Higher median incomes
- Managed larger areas than the other groups.
- Mostly negative to NVZ regulations, which were seen as having a detrimental impact on income and increasing workload.
- Sceptical about the connection between water quality and their farms' activities
- Responsive to information seeking and consulted with agricultural advisers on a frequent basis.

Farmers were asked to identify any voluntary changes in their management practice since designation that would be beneficial to water quality. Although some polarised views were expressed between the „resistors' and the „multi-functionalists' towards the regulations, both types had significantly higher levels of activity compared to the „apathists.' Thus, even though the „resistors' had an underlying negative perception towards water quality management, they were the most likely to use external consultants and advisors, which may explain their adoption of voluntary tools such as buffer strips and manure management software (Barnes et al, 2011).

What is known about the effectiveness of NVZs

Most of the available evidence is science based (relating to the effectiveness of NVZs in achieving their objectives, without specific consideration of their impact on farmer behaviour). However, one study in 2007 compared adoption processes in Denmark (where the whole country level designation was applied) and England (where a regional approach has been taken). The research included the perspectives of respondents from significant actor groups in the implementation process (Nimmo Smith et al, 2007). Overall, respondents from both countries considered that whole country designation was a more effective policy instrument for the following reasons:
- Ease of enforcement
- Economic efficiency
- Political expediency

- Environmental effectiveness
- Farmer equity.

The research identified one disadvantage of the whole country system: it is not possible to differentiate between very sensitive regions and those with no NVZ issues. In general, however, Nimmo Smith et al concluded that successful implementation is likely to depend on a range of factors in addition to the type of designation. These include:

- The process for deciding designation type (the lengthy, complex and costly designation of distinct zones in England was criticised by the majority of respondents)
- Strong political will and levels of environmental awareness amongst society as a whole (Denmark acted swiftly and decisively, and the designation of the whole country as an NVZ reflected severe water quality problems throughout the country, including contamination of its drinking water source and coastal pollution).

In Scotland, research has identified that the regional approach to NVZ regulations has led to a feeling of victimisation amongst farmers in the affected areas (Macgregor and Warren, 2006). Many farmers who took part in the research commented that NVZ designation was just another set of unnecessary bureaucratic controls. They stressed that they already adhere to codes of good practice for quality assurance: „If we don't then we can't sell our grain.'

Macgregor and Warren also stressed the point that, unlike point source polluters (who may be able to pass on the economic impacts to their consumers) farmers have to bear most, or all, of the costs themselves. This is because the prices for agricultural commodities are largely controlled by global pricing structures or by supermarket chains, „both of which pay little regard to the costs of production.'

Implications for policy development and delivery

If farming practices are to be influenced, farmers need to be convinced by the science (both in relation to identifying areas of NVZ in the first place and actions within the programme), be able to access clear advice and information about the regulations, and be willing to take action.

The 2011 research by Barnes et al concludes that farmers in the „apathist' group are likely to present the greatest challenge to policy makers, since these farmers' aversion to information seeking and indifference towards production-led goals may lead to wider problems of low efficiency and low take-up of environmental initiatives. Barnes et al suggest that newer channels of transfer for scientific and management-related information might attract farmers who do not actively seek information. However, this may not prove cost-effective for all farmers operating within the NVZs and, while more group level information transfer can be directed at the other two types, an increased share of the budget and a more individualist approach may be needed for the „apathists'. Although the farmer sample for this study was relatively small (184) there are useful messages on engagement and provision of advice that are likely to be relevant to farmers in NVZ regions more generally.

The 2007 research by Barnes et al included workshops where farmers expressed their frustration with (what they perceived to be) the overly-centralised and general nature of NVZ rules. They sought greater flexibility in three main areas:

- Customisation of closed periods at farm level, to better reflect seasonal changes, local conditions, farmer knowledge and weather conditions
- The spread of farmyard manure and nitrate applications to be determined by farmers, based on their own experience, judgement and knowledge
- Imposing limits on use of fertiliser can restrict potential crop yields and impact on profits.

Farmers are the actors responsible for the practical delivery of broad environmental aspirations, yet the evidence makes it clear that farmers' attitudes to environmental protection and conservation are diverse, and are likely to affect their adoption of other measures. As noted earlier, guidance is published by the SG about farmers' NVZ responsibilities, but this guidance is no longer available in hard copy. Also, it is a lengthy document, although it can be downloaded in the form of separate booklets. Enabling activity could focus on ensuring both the delivery method and content meet farmers' needs. There are clear messages from the evidence about the need for better information on water pollution, for example. Better engagement with farmer perspectives in relation to NVZs would also help to make farmers feel more involved in decision making processes.

5.7 Monitor Farms and Focus Farms

Introduction

The „Monitor Farm Programme' in New Zealand was set up in 1991 to strengthen links between farmers and their communities. The key to monitor farms is that they are driven by local community ownership and commitment, combined with the input of specialists and industry to aid planning and implementation. Local community groups select a facilitator and monitor farmer who is relevant and applicable to the local region, both geographically and in the issues being addressed by the farm business. A business plan is then developed and implemented, along with associated monitoring plans, over a defined period. Monitor farmers are assisted through the process by a community group, comprising local businesses, farmers, vets, scientists, financiers, processors and consultants. The purpose is to „learn through sharing and doing,' although the learning is focused on farm viability and competitiveness, rather than environmental management. The evidence base suggests that monitor farms are effective at influencing farmers' behaviours and are regarded by the industry as a successful programme (Dwyer et al, 2007).

In 2003, the monitor farm model was launched in Scotland, and by 2011 there were 11 monitor farms across Scotland[16]. The programme seeks to improve the performance and profitability of a commercial farm, typical of the local area, over a three year period. Monitor farms in Scotland are funded and facilitated by agri-business related organisations such as Quality Meat Scotland, Enterprise Network, Highland Council, Scottish Agricultural College (SAC). Facilitators are responsible for writing reports and taking minutes, as well as organising trials, speakers and

[16] http://www.qmscotland.co.uk/index.php?option=com_content&view=article&id=720&Itemid=96

press. Participating farms hold a number of meetings each year specifically for other farmers, as well as an open day, for the wider community.

The four climate change focus farms established in Scotland as part of the FFBC programme work by the same principles as monitor farms, but with a greater emphasis on achieving environmental outcomes. SAC work with the farms to show the benefits that can be gained by minimising harmful GHG emissions. The programme lasts for three years, and includes the input of SAC specialists, focus farmers and farmer discussion groups. Measures being explored at the farms are the key actions which are part of FFBC (or as many of these as are relevant to particular farms). Farmer discussion groups meet approximately five times a year and cover a range of topics designed to improve the farm business and reduce GHG emissions. Reports on the discussion at each meeting are posted on the SAC website, along with news of forthcoming meetings, and a quarterly newsletter is circulated, following progress on all four focus farms[17].

Types of policy levers used

The FFBC focus farms initiative is currently the only agricultural policy measure in Scotland that uses all four types of policy levers: enabling through the provision of a range of advice and information; engaging through a number of mechanisms including discussion groups, personal contacts/enthusiasts, opinion formers and wider networks; encouraging through recognition; and exemplifying by leading by example.

What is known about the effectiveness of monitor farms/focus farms

An investigation into the role and effectiveness of Scottish monitor farms (ADAS, 2008) found that the programme had been effective in bringing about business improvements on the monitor farms themselves, among community group members and in the wider farming community. The analysis estimated multiplier effects from programme spend. The evidence suggested that, in relation to organisation, a strong farmer chairman, supported by a committee with the facilitator and monitor farmer, provides a clearer focus to managing the programme and in setting objectives. The bottom up approach and the involvement of community group members in decision making was viewed as a very positive aspect of the programme, as it fostered both ownership and commitment.

At the stage that the research took place, the programme was largely technically oriented, with a focus on improvements in output and efficiency, in line with farmers' wishes. The research also examined the potential for a monitor farm approach to deliver wider benefits, but concluded that if group members did not see the need, benefit or purpose of learning about a wider agenda, attempts to impose this on the process could potentially undermine the business improvement benefits already achieved.

In England, a government funded project Forward Farming (2002-2004) established separate pilots to test different ways of using demonstration to encourage change at

[17] http://www.sruc.ac.uk/info/120200/climate_change_focus_farms

farm level. One of these pilots was a network of monitor farms; another was farms demonstrating integration between agriculture and the local community, landscape and markets. Evaluation of the pilots highlighted the different potential of the models:

- „On-farm demonstration activity' stimulates the process of learning. At a demonstration event, farmers can see particular technologies or management practices in operation on a working farm. If a specialist in that technology is present at the demonstration, the event brings together two complementary sources of information and ideas: the credible expert and the practical experience of farmers
- Monitor farms are based on the premise of ongoing interaction with and within a defined group of farmers. This makes it possible to demonstrate the application of a specific technology/combination of technologies over time, allowing monitoring and comparison in a specific context. They may not necessarily demonstrate best practice, but farmers, facilitators and the wider farming community have the opportunity to learn from the process and impact of change.

The evaluation found that the monitor farms were successful in attracting farm businesses that already access sources of advice and information, and in stimulating ideas for change. However, the authors concluded that, while there is a strong economic argument for public funding of demonstration, this does not necessarily require a permanent network of fixed farms. They suggested that funding to support demonstration activities from a wide range of providers, and to stimulate demand for them among farmers, would provide a more flexible option for the future (Bailey et al, 2006).

The parallels between monitor farms and focus farms might suggest that the latter approach will be similarly successful. However, monitor farms are commercially oriented and there is currently little evidence to indicate whether such an approach is equally effective in promoting environmental measures. Burton et al (2006) note that removing the direct business imperative of the scheme is likely to make it function very differently. They raise three important issues for consideration:

- The key to success is a combination of industry and community interests – all with a commercial imperative. When the commercial imperative is diminished, would the interest of the farming community remain?
- Systems are able to ride on established community structures which are likely to have existing informal networks. Focusing on environmental improvements is likely to appeal to a completely different group of farmers.
- If such an approach were to be based on financial payments for environmental work, the „bottom-up' drivers of the scheme might be threatened.

There has not yet been a comprehensive evaluation of the focus farms programme in Scotland. However, research was commissioned by the Scottish Government in 2011 to scope out the data needs for monitoring the implementation of Farming for a better climate more generally, in order to understand the extent to which farm management practices are changing in line with FFBC recommended actions. The research concluded that the ability of existing data to describe the uptake and GHG impact of the mitigation measures prescribed by the FFBC is reasonable, although attributing uptake and impact to the FFBC programme is likely to be more problematic (ADAS, 2011). Findings are discussed further in Chapter 6.

Farming for a Better Climate: messages from the opinion former interviews

Across the sectors, knowledge of the FFBC programme is „mixed'. Opinion formers reported that, while some farmers are very aware and enthusiastic, others have never heard of the initiative.

Those farmers who are familiar with FFBC feel it is relevant to them; however, their level of understanding varies considerably. For example, there is much better knowledge of how to use energy and fuels efficiently, develop renewable energy, and optimise application of fertiliser and manures, but substantially less awareness of other action areas such as locking carbon into the soil and vegetation, and optimising livestock management and storage of waste. In other words, there is greater knowledge of the aspects that are seen as immediately profitable.

It was reported that even farmers who adopt the measures recommended by FFBC do not necessarily agree with, or connect with, attempts to mitigate climate change. The five key actions are all seen as good practice, so farmers looking to increase their efficiency would be likely to implement them anyway.

Implications for policy development and delivery

Although the evidence relating to monitor farms is generally positive, the Forward Farming pilot evaluation highlighted a number of considerations relevant to using demonstration to encourage change at farm level. To be effective at a national level would require many host farms, connected by strong networks. The authors suggest that it would be more efficient and flexible to establish a regional capacity to allocate public funds for facilitating both the demand for, and supply of, demonstration and monitoring initiatives to meet both national policy goals and take account of regional gaps in provision to meet identified needs. In choosing host farms, the criteria and process will differ for one-off demonstration, a fixed site demonstration farm, and a monitor farm. For the latter two, the process should be bottom-up, with a facilitator working with the local industry to identify one of their number to be a host farm for either demonstration or monitoring or both. For one-off demonstrations, the main criterion is the appropriateness of the farm for demonstrating the particular practice or system. The authors also highlight the importance of:

- Setting clear objectives which are relevant to all stakeholders and which can be communicated clearly; and recruiting or selecting the right facilitators or co-ordinators
- Involving stakeholders in the setting up and management of demonstration farms
- Limiting the life of demonstration/monitor farms (possibly a maximum of five years)
- Within any project or scheme, there should be opportunity for groups to go to other farms for one-off events, if they can better demonstrate a particular issue
- Achieving a trade-off between the continuity of a consistent presence (host farmer or facilitator) and expertise specific to the issue being demonstrated (for example credible sources valued by farmers, such as independent consultants, other farmers with experience of the issues, veterinary surgeons and other professionals)

- Choosing issues to address on the farm that balance local demand and interests with the national interest implicit in a centrally-funded initiative that seeks to achieve public policy goals
- Using appropriate promotion and marketing. The target or minimum number of attendees will vary with the nature of the event. A demonstration that aims to spread awareness of a new practice or system should be able to cater for several hundred attendees; discussion-based activity should aim for an optimum 15-20, since farmers get more out of being in a small group.

Since the FFBC focus farms aim to improve the efficiency of farm businesses by adopting measures to reduce GHG emissions, the issues noted in relation to tensions between the commercial imperative and environmental measures may not all be relevant to the focus farm approach. In addition, as the reform of the CAP beyond 2013 is likely to include increased emphasis on environmental cross compliance measures, and the cost of fuel is likely to continue to rise, environmental measures may have financial implications that will be of increasing interest to farmers.

As noted earlier in this section, the FFBC focus farms initiative already uses all four types of policy levers. The above messages from the evidence base may be helpful in fine-tuning the instruments used.

5.8 Agri-Environment Schemes (AESs)

Introduction

The role of farmers in conserving the landscape and as protectors of natural resources has been officially recognised in the CAP since the beginning of the 1990s. Agri-environment schemes provide economic incentives for farmers to take up specific environmental measures, and compensate farmers financially for the associated loss of income. Farmers are not intended to profit directly from such schemes. However, if schemes increase efficiency/productivity or open up new markets, they should ultimately increase profits for the farm business.

A variety of agri-environment schemes have operated in Scotland since 1987. The Environmentally Sensitive Areas Scheme (ESA) was introduced to help conserve specially designated areas of the countryside where the landscape, wildlife or historic interest is of particular importance, and where these environmental features can be affected by farming operations. Although the scheme is still operating, it has been closed to new applicants since 2000. Other schemes have included three Farm Woodland Schemes, the Habitats Scheme, several schemes aimed at single-species protection, the Countryside Premium Scheme, the Rural Stewardship Scheme and the Organic Aid scheme[18]. The majority of the agri-environment schemes available in Scotland are currently contained within Rural Priorities, an integrated funding mechanism which is part of the Scotland Rural Development Programme (SRDP) 2007-2013[19]. Rural Priorities is intended to deliver targeted

[18] http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/Environment/Agrienvironment

[19] A complete list of the measures available under Rural Priorities can be seen at http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities/Options

environmental, social and economic benefits, and regional priorities have been established to aid the delivery of the five key outcomes of the SRDP: business viability and competitiveness; water quality; adaptations to mitigate climate change; biodiversity and landscapes; thriving rural communities.

Types of policy levers used
Policy levers being used at present in relation to AESs are primarily encouraging, through economic incentives, and enabling, through the provision of information.

Farmer attitudes and behaviours in relation to AESs
Entry into AESs has always been voluntary, and dependent on farmers' willingness to deliver the environmental benefits associated with a given option for a set payment. Understanding what motivates farmers to participate in AESs is therefore crucial to any investigation of the effectiveness of these schemes.

At the end of the 1990s, Wilson and Hart conducted a major study (including 1000 farm households in nine EU countries and Switzerland), to investigate factors influencing participation (and non-participation) in AESs.

The research found that, for most farmers in the EU, decisions whether to participate are driven by financial imperatives and, to a lesser extent, by the „goodness of fit' of schemes with farm management plans. Most EU farmers appear to be influenced by similar sets of factors in their decisions to join schemes. Key factors are:

- Farm size – farms larger than the regional average are often more likely to participate
- Tenure – freehold farmers are more likely participants
- Farm type – extensive grassland farms are more likely to participate than arable farms
- Level of education – farmers who completed their schooling are more likely to participate than those with no full time education
- Dependency on income – farmers who are largely, but not entirely dependent on the farm for income are more likely to participate
- Inter-scheme continuity – farmers who were in earlier schemes are more likely to participate in current AESs
- Information availability about schemes – farmers who have been well informed are more likely to participate.

The researchers applied statistical methods to the results of their survey, to develop a „participation typology.' This resulted in four distinct categories:

- Scheme enthusiasts – were likely to see scheme objectives as financial. They were strongly dependent on the farm for income, and saw „carrying on the family tradition' as important. Scheme participation had changed their attitude to farming towards more conservation-oriented beliefs
- Neutral adopters – were not interested in reducing farming activity and did not perceive schemes as a secure source of income. They were „neutral,' both about the financial imperative for entering AESs and about conservation more generally. Scheme membership did not fit well with their farm management plans, and had not changed their attitudes towards farm management

- Uninterested non-adopters – rated scheme-related factors as „unimportant' in their decision making process about joining schemes (for example, scheme payments were not a factor). They saw scheme objectives as conservation oriented (despite many schemes being „sold' as „income support' schemes). In general, they disagreed with legislative measures to control farmers' environmental management practices; and were not dependent on the farm for income. They often expressed more conservation-oriented attitudes than „scheme enthusiasts,' but felt they could contribute more to environmental conservation outside AESs
- Profit-maximising non-adopters – disagreed with regulatory mechanisms such as „maximum stocking rates.' They favoured market solutions for solving environmental problems in the countryside. They saw farmers as „stewards of the land.' They had a high dependency on the farm for income, and usually farmed economically successful farms. They felt that AESs could not compensate them for potential income losses.

The same research highlighted geographical differences in attitudes towards AESs, particularly between farmers in northern member states and farmers in Mediterranean countries. The authors suggested that this could be partly because of the longer experience of northern member states with AESs and partly because Mediterranean farmers are more focused upon increasing productivity and maximising profits, in order to catch up with their northern counterparts. Low uptake in Mediterranean countries could also be a result of lack of advice provided to farmers on AES schemes (Wilson and Hart, 2000).

What is known about the effectiveness of AESs

Measuring the effectiveness of AESs presents a number of challenges, due to the complexity of the interface between agricultural activities and the environment, the variability of environmental issues and their local/regional relevance, and the implementation approach selected by policy makers at the EU level (Christopoulos and Vlahos, 2011). Evidence available from the evaluation of UK schemes (Boatman et al, 2008) indicates that the strengths of the agri-environment scheme approach include:

- The ability to provide a positive management incentive through payment, and supporting advice and facilitation to encourage farmer learning and active management of valued environmental resources
- The ability, increasing over time, to negotiate and agree tailored management activities which are sensitive to individual needs and opportunities in each locality, and in respect of individual farm businesses
- A medium to long term commitment to sensitive management and the delivery of environmental benefits, between both parties to the contract, which is explicit and binding
- Compatibility with continuing commercial management of land, in the overwhelming majority of cases.

However, a voluntary, payment-based approach to environmental enhancement also has limitations, which include:

- Lack of funding for sufficiently high levels of uptake to achieve environmental goals

- Vulnerability to competitive pressures from other land management drivers, particularly agricultural prices.

Boatman et al concluded that the schemes operating in the UK appear best-suited to providing the detailed and positive aspects of environmental protection and enhancement which work comfortably alongside day-to-day commercial land management. The authors suggest that the key to maximising their effectiveness is to seek to work with their strengths by using them in an integrated way alongside other mechanisms, including regulatory protection and advice and information, supported by strong legislative back-up to protect features and resources of the highest importance (Boatman et al, 2008).

Given the widespread uptake of voluntary agreements, the length of time of their existence and their visible impact on some European landscapes, it would be reasonable to expect noticeable changes in farmer attitudes, and even farming cultures, from participation in AESs. However, this does not appear to be the case. The evidence relating to Austria, Finland, Ireland, Switzerland, the Netherlands and the UK is summarised by Burton et al (2008) in the introduction to a study which investigates cultural capital in agriculture.

The authors note that voluntary AESs are predicated on the „provider gets principle:' the underlying concept that society has to compensate farmers who produce positive externalities. This assumes that farmers have the right to carry out the most profit-maximising activity on their land, irrespective of the external costs and benefits of doing so, and assumes a like-for-like exchange of economic capital between farmers and the government. Following this assumption, it has been suggested that farmers experience more than financial losses when changing their farming activities. To investigate the non-economic rewards of farming, Burton et al consider the concept of cultural capital. This exists:

- In institutionalised forms, such as educational qualifications. By providing qualifications from formalised institutions, institutionalised cultural capital offers individuals a certification of cultural competence, which is consistent and thus directly comparable across a range of agents, such as breed societies
- In an objectified state, as in the possession of high status cultural goods (visible in conventional farming cultures largely through symbols of production, such as modern machinery or the presence of quality livestock or crops). A key aspect of objectified cultural capital is that its value is not in the object itself, but is instead dependent on its use in accordance with a specific purpose
- In an embodied state. This involves the labour of self-improvement on the part of the investor and cannot be transmitted instantaneously, as can property or money. Embodied cultural capital helps form the „habitus' of the individual.

The authors argue that three conditions are required if a farming activity is able to display embodied cultural capital to other farmers. First, the activity must require a skilled role performance capable of differentiating „poor' and „good' practice – that is, it must embody the level of cultural capital of the operator. Secondly, there must be outward signs that effective action has been performed – for example, straight plough lines in the landscape. Thirdly, these outward signs of skill must be visible or otherwise accessible to other members of the farming community (Burton et al, 2008).

Understanding how agri-environment schemes interact with farming culture therefore becomes a matter of exploring how the adoption of new practices alters the nature of capital generation within the farming field. If financial loss is compensated by agri-environmental payments, but new land uses and activities are unable to generate symbolic cultural capital, then the net results could be that farmers lose significant amounts of capital, despite generous financial compensation.

As the authors point out, the issue for AESs is clear. If environmental attitudes and behaviour are to become established in the culture of conventional agriculture, then AESs must also contribute towards the generation of cultural capital on the farm – that is, they must enable farmers to enact and display skilled behaviour. The analysis of the research, which included interviews with farmers in Aberdeenshire, identified several key components of voluntary AESs that can influence their integration into the farming culture.

The prescription of field management requirements. While schemes are voluntary, in that participation, management options and area entered are optional, the government is effectively contracting a service from farmers. Therefore specific management requirements, such as when fields are allowed to be mown, are generally codified and prescribed. Consequently, schemes do not promote any voluntary actions for environmental protection, or reward farmers for doing anything more than the minimum necessary to qualify for the subsidies. Skills are involved in the setting up of the AES – for example by erecting fences and determining how best to make use of the land – but, once the scheme is established, the farmer's ability to display skill through conservation work is limited. In terms of their ability to display „good farming' skills to other farmers, a conservation project thus becomes „a static display in the landscape – radically different from the renewable seasonal display possible with cropped land uses.'

The designation of specific areas of land for agri-environmental work. The designation of specific areas for AES work is a key component of many AESs. However, findings from the research suggest that, by effectively taking responsibility for part of the farm, AESs allow farmers to disown personal responsibility for scheme areas while concentrating on production in the remaining areas of the farm.

Other inherent features of conservation areas: viewing the quality. Within ordered, „tidy' landscapes, the practice of roadside farming of symbols is relatively easy, as farmers are able to drive past others' fields and assess (at a glance) basic patterns in the landscape, or healthy appearance of the livestock. For AESs, on the other hand, reading symbols in the landscape is exceptionally difficult. While the schemes themselves are highly visible, the quality of the scheme is often very hard to assess. Potential symbols of „good conservation,' such as the number of bird nesting sites, the diversity of species or the density of hedgerows, are not immediately obvious to other farmers (Burton et al, 2008).

Scotland Rural Development Programme: messages from the opinion former interviews

Awareness of SRDP measures is not widespread amongst farmers and few of the interviewees spoke in detail about the opportunities offered by SRDP schemes. It was noted by interviewees that schemes were considered to be promising at the outset, but there was a general view that they had not been as successful as they could have been, particularly now that less money is available. There is a perception that good ideas have been rejected, and this has led to a degree of cynicism amongst farmers.

A number of interviewees criticised SRDP measures as overly complicated and requiring guidance from consultants to fill in the forms properly. Another potential barrier was the transaction costs associated with time spent on paperwork and farm management changes etc (see Chapter 7).

It was noted that SRDP initiatives are not marketed as climate change mitigation measures. When farmers apply for funding, their interest is primarily in benefiting their own businesses, although a minority may select options because of their potential environmental impact.

Implications for policy development and delivery

The evidence suggests that there are changes to AESs which would help to strengthen farmers' support for environmental objectives. Farmers could be allowed more opportunity for innovation in their conservation practices, to determine how specific conservation goals should be obtained, and to learn through experience the connection between their management skills and environmental outcomes.

The designation of specific areas for AES work allows the protection of vulnerable sites. However, such designation encourages farmers to partition conservation work off from agricultural work. Farmers are currently able to indicate to others through, for example, the presence of encircling fences, that they have no responsibility for the management of this area of the farm. Setting species targets would allow farmers to be able to see (and measure) the tangible changes resulting from their management practices. They would also be able to compare these figures with those of other farmers to measure self improvement. Burton et al (2008) suggest that this would encourage farmers to learn more about each others' management practices and learn to value the skills required for managing diversity. They also note that, as more farmers become engaged in conservation provision, non-participating farmers would increasingly be seen as „free-loading off other members of the community and thus come under increasing social pressure to participate.'

The research by Wilson and Hart (2000) found that conservation-oriented motivations for AES participation were playing an increasingly important part in farmers' decision making processes. It was suggested that the findings had a number of implications for policy refinement, including the provision of:

- Higher payments for the first few hectares entered into a scheme (to avoid disadvantaging smaller farms)
- Improved targeting of environmentally damaging intensive farming in lowland areas (by providing higher payments for participation of intensive arable farms, for example)

- Better terms for tenant farmers, who may be reluctant to enter schemes because they are uncertain about long-term tenancy agreements, and because landlords may be unwilling to share agri-environment benefits with their tenants
- Encouraging „newcomers' into AESs, rather than relying on high uptake rates based on farms that already had previous AES agreements.

The suggestions from the research focus mainly on using levers that encourage environmental behaviours. For example:
- Setting species targets would send out signals to the industry and stimulate peer pressure
- Measures to improve targeting would allow a wider population of farmers to apply for entry to AESs.

Cultural capital is also a recurring theme. At present, once AESs are established, there is little opportunity for farmers to demonstrate „good farming practice' to their peers. This may be part of the reason why there has been no discernable shift in farmer attitudes to AESs, despite the length of time they have existed and despite widespread uptake. Better engagement to involve farmers in schemes, and considering opportunities for farmers to demonstrate their expertise within schemes might help farmers to take more pride in participation.

5.9 Renewables

Introduction
The above section on agri-environment schemes focuses on farmers being encouraged to take specific environmental actions that are not in themselves financially beneficial to those farmers. Naturally there is a range of agriculture and environment initiatives that **do** have the potential to generate income (wind turbines; anaerobic digestion; for example), and this possibility is likely to sharpen the financial incentive for farmers. Contribution to the initial capital investment required to establish renewable energy capacity is available through the Scotland Rural Development Programme, and the Feed-In Tariff Scheme (FiT) provides a financial subsidy for renewable energy generators.

Types of policy levers used
Renewables initiatives are primarily enabling, through giving information and removing barriers; and encouraging, through financial subsidies.

What is known about the effectiveness of renewables initiatives
Although there is a growing evidence base on community renewables initiatives, there is currently very little that relates specifically to farmers. One research project, carried out in 2011, investigated the potential for the development of anaerobic digestion (AD) on farms, as well as farmer attitudes to AD. A survey of 2,000 farmers in England, undertaken as part of the research, found that the two most important benefits of installing AD were seen by respondents as „improving farm profit' and „reducing pollution/contamination risk.' Potential barriers to adoption were seen as the high establishment costs, low returns, and the perceived difficulty of obtaining planning permission. The authors acknowledge that the response rate to the questionnaire was 20%, and was slightly biased towards larger farms and owner occupiers. However, findings relating to „possible adopters' of AD support the

established profile of an early adopter (from larger farms; more likely to be owner occupiers; younger; left full time education later) (RELU, 2011; Tranter et al, 2011). The researchers suggested a number of ways in which governments could support the development of more anaerobic digestion on farms. These included:

- Promoting AD as a „green technology' that makes use of farm and urban wastes
- Providing local planning authorities with better guidance and information to help in making planning decisions
- Committing themselves in the longer term to providing subsidy for capital investment in farm-based digestion
- Introducing incentives to specifically promote on-farm co-digestion of agricultural and urban wastes and reduce dependence, for economic viability, on the use of energy crops
- Designing systems and procedures to promote anaerobic digestion at a farm scale (RELU, 2011).

Recent research refining cost equations to estimate the costs of AD plants indicated that both capital and operating costs are likely to be higher in terms of power output than originally estimated (Macleod et al, 2010). This may make AD a less attractive proposition, although farmers do have the option of growing energy crops such as maize in order to improve the economics of the digester. However, as has been pointed out (Bywater, 2011), many smaller farms lack the capacity to use their land in this way.

No evidence relating to other types of renewables initiatives, in the context of agriculture, was identified during the literature review. However, the opinion former interviews indicated high rates of awareness of, and interest in, the FiT scheme in particular.

Feed in Tariffs: messages from the opinion former interviews

Of all the initiatives available which focus on climate change mitigation, those relating to renewables were by far the most commonly discussed amongst interviewees. In the main, renewables initiatives were referred to in very positive terms.

Opinion formers across the sectors stated that farmers have very high awareness of these schemes and that, over recent years, there has been a „sea change' in farmers' perceptions of them. Over a very short period, a „huge interest' has arisen in renewables and interest levels are continuing to rise. The FiT scheme was considered to be particularly well-publicised and well understood in the farming community.

Amongst the FiTs options, wind turbines were by far the most popular, with interest being described as „phenomenal.' There was also some interest in photo-voltaics, anaerobic digesters and hydro electricity. Farmers' enthusiasm for renewables initiatives was felt to be influenced by the potential to have a useful additional income stream, rather than helping to mitigate climate change. FiTs are thought of „in the same way as converting a cottage into a B & B rather than environmental terms.'

Some barriers to the adoption of renewables measures were also noted:

- Farmers feel that the planning system is a „hassle' and an „obstacle' and consider the levels of time/paperwork involved to be a deterrent
- Setting up renewables schemes requires a substantial capital outlay
- Individual farm factors such as location, elevation and size have an impact on a farm's suitability for renewables schemes. Farm size was considered the most influential of these factors, as owners of larger farms not only have more spare time to investigate such initiatives, but are also more likely to have the space to house them, and have a greater chance of successfully accessing funding.

Some implications for policy development and delivery

Renewable energy is one area where policy may be pushing against an open door as far as farmers are concerned. Although agriculture-specific evidence in relation to renewables is lacking, a clear messages from the opinion former interviews is that farmers are both aware and interested in renewables initiatives, mainly due to the potential additional income they provide. However, farmers face (or perceive that they face) substantial transaction costs in the adoption of renewables measures. In addition, farm size is a major consideration in the decision-making process. It may be that clearer information and better signposting to available support are required to increase uptake of renewables schemes. Another option may be to encourage farms to adopt a collaborative approach to adoption of initiatives, to make it easier for small farms and tenant farmers (for example) to participate.

5.10 Future Proofing Scotland's Farming

Introduction

This three year initiative (2011-2014) is delivered by Soil Association Scotland in partnership with Quality Meat Scotland (QMS), with support from the National Farmers Union of Scotland and SAOS Ltd. The programme was awarded funding through SRDP with an industry contribution from QMS. It is intended to engage practically with farmers and focus on increasing efficiencies, rather than explicitly seeking to mitigate climate change.

The aim is to boost producers' bottom lines through improving efficiency, productivity and performance at farm level, including the use of green technologies. Through a range of online resources and events, farmers are offered practical advice on how to raise the financial performance of their businesses and benefit the environment.

Types of policy levers used

Policy levers being used at present as part of this initiative are primarily enabling, through the practical advice offered to farmers; engaging, through events which give opportunities for interaction with other farmers and practical demonstrations; and exemplifying, through using farmer champions to demonstrate good practice.

5.11 Can Scotland learn from initiatives operating elsewhere in the UK?

As part of the evidence gathering process, information was collected about key programmes aiming to influence farmer behaviours which operate elsewhere in the UK. These were considered in terms of the types of policy levers they are using.

Programmes were identified in England and Wales. There is currently no dedicated programme in Northern Ireland, although there are plans to integrate climate change-related advice and guidance with existing efficiency advice messages.

Farming Futures (England)
Farming Futures is a major communication initiative aimed at influencing English farmers' behaviours in relation to climate change[20]. The programme was set up in 2007 to help the UK farming industry respond to the combined challenges of climate change and the sustainable efficient production of food, through the use of innovative communication methods to inform and inspire farmers, food producers and land managers about the risks and opportunities ahead. Currently, Farming Futures is a collaboration between a range of public and private sector organisations, and is managed by the Centre of Excellence for UK Farming.

Innovative media are used to personalise message delivery to farmers, as well as enabling them to participate in actions. There is a dedicated blog where farmers and industry can share ideas and debate the latest issues; an interactive map enables farmers to view events, case studies and short fact sheets specifically related to their region. More than 15 films are available on the Farming Futures website, to provide information and demonstrate best practice; and there is a free monthly newsletter designed to let farmers know about events and resources and keep them up to date with „all of the latest news about profitable farming in our changing environment.'

Events: a series of targeted on-farm events around England are intended to explore and find practical solutions to issues around climate change and the future of farming. Topics covered include renewable energy generation, precision farming, livestock emissions, nutrient management, water management. The Farming Futures website also advertises other industry events.

Case studies: good practice exemplars are interviewed on topics including their farming background, the benefits of particular approaches in terms of environmental and economic impact, and challenges faced. A wide variety of farming issues are covered, including anaerobic digestion, renewables and soil management. Over 30 of these case studies are available on the website.

Signposting and technical information are provided to farmers in relation to specific actions they can take, funding opportunities, news of recent events; latest „buzz words,' links to useful documents and reports.

In terms of policy levers, Farming Futures appears to use all four, since the initiative seeks to:

Enable	through raising awareness of viable alternatives to farmers' current practice; providing advice and information, on-farm training and demonstration of new technology
Engage	through providing online fora/networks for discussion; bringing farmers together to share best practice
Encourage	through recognition of best practice, particularly through case studies, and consequent exertion of social pressure to emulate the examples

[20] http://www.farmingfutures.org.uk.

Exemplify through demonstrations by innovators and leaders in the field.

Farming Connect (Wales)
Farming Connect is the Welsh Government's flagship support, guidance and skills development programme which helps farm businesses across Wales to be more efficient and reduce input costs. It is funded through the Rural Development Plan 2007-2013 which is financed by the European Agriculture Fund for Rural Development and the Welsh Assembly Government. Support, guidance and training are delivered by Menter a Busnes on behalf of the Welsh Government[21].

The programme offers a range of fully-funded services to all farmers who have registered with Farming Connect:

- Development programmes: to give farmers the opportunity to learn from others and share best practice by joining discussion groups, visiting demonstration farms and attending sector-specific open days
- Strategic awareness events: to keep people up to date with topical issues of key importance to farm and forestry businesses
- Planning surgeries to help farmers address on-farm planning issues and understand the processes
- An action learning programme to bring farming families together on a group basis to discuss and take forward business ideas.

Other services include a knowledge transfer programme to assist the agricultural industry to exploit the latest scientific knowledge to meet current and future challenges and to ensure that all farm businesses in Wales are supported to reach their potential. This also includes a specific service to provide women with the support and encouragement they need to capitalise on their role as key influencers and operators in many farm businesses. One-to-one support, demonstration farms and case studies, and information about relevant conferences are also provided.

Farming Connect appears to use at least three of the four policy levers, since it aims to:

Enable through provision of advice, information, guidance
Engage through bringing farmers together via demonstrations, discussion groups, workshops and other events to engage with advisers and share best practice
Exemplify through the use of farmer champions and demonstration farms.

Some implications for policy development and delivery in Scotland
It is clear that in the rest of the UK governments are seeking (either through directly delivered initiatives or through the agency of stakeholder organisations) to influence farmer behaviours. The Farming Connect approach, in particular, appears to focus specifically on farm profitability, with climate change messages well buried. The message from Farming Futures, on the other hand, may be summarised in the quote used earlier in relation to profitable farming „in our changing environment:' i.e. acknowledging the context but focusing on the business advantages.

[21] http://www.menterabusnes.co.uk/en/farmingconnect

Without specific, detailed, evaluative evidence from the initiatives, it is not possible to indicate whether and which elements are proving successful, with which types of farm and farmer. Many activities being carried out as part of the initiatives are already going on in Scotland, but it might be useful to look at how Farming Connect works with women and younger farmers. The Farming Futures fact sheets appear to be a useful resource. They are short and clearly written; use shaded boxes and bullet points to communicate key information; focus on the perspectives of „your customers' and „what the scientists say;' and include lists of challenges and opportunities.

5.12 Opportunities for change: CAP reform

Current proposals for the reform of the CAP beyond 2013 provide a number of opportunities for using additional policy levers, or strengthening levers already in use. Examples include:

- Potential for specific climate change mitigation measures, including some of those encouraged in FFBC, to be made mandatory through the cross compliance regime that links farming practices to subsidy payments
- Additional investment in research and innovation, and steps to translate research results into practice, potentially provide opportunities for more effective, targeted, communication with farmers, and for farmers to share their experience and expertise
- Measures to stimulate entrepreneurship in rural communities provide potential for more collaborative approaches between farms and groups of farmers
- Expansion of the Farm Advisory Service to offer advice on the activities farmers must undertake as part of the additional greening payment component of direct payments, as well as additional requirements relating to climate change mitigation

The ongoing debate on the future of the CAP, and the consultation process itself, provide a range of opportunities for farmer involvement in policy development and delivery.

CAP reform: messages from opinion former interviews

Interviewees suggested that:

- Amendments to the CAP, in relation to climate change, should be linked explicitly with the Farming for a Better Climate five key actions
- The CAP should have a greater focus on „sustainable intensification,' i.e. both increasing production and reducing negative environmental impacts, including those that have an impact on climate change mitigation efforts.

It was also suggested that both SRDP and CAP are currently overly focused on conservation, and should be rebalanced, to acknowledge the pressing nature of issues such as food security, diffuse pollution and climate change.

Plans to require permanent grassland as part of the CAP greening measures were highlighted as a less practical measure. Interviewees felt this approach „locks up land' and limits the flexibility a farmer might need.

Policy and economic mechanisms available to policy makers

A range of policy approaches is available to governments to encourage positive environmental behaviour among farmers:

- **Regulation** – placing restrictions on what farmers are legally allowed to do and prohibit undesirable management practices. This works best in situations where the target group is already, or can quickly be, persuaded that the regulated actions fall below an acceptable „reference level' of responsible farming practice
- **Economic incentives** – taxes and subsidies are the most widely used and analysed instruments
- **Market-led and 'voluntary' approaches** – promoting environmentally beneficial management practices to encourage higher standards of environmental behaviours among farmers. These have significant potential to encourage higher standards of management practice on farms and are attractive because they offer „win-win' options to motivated producers, but are likely to be insufficient to drive enhanced management of the countryside as a whole
- **Education/information provision** – raising awareness of environmental issues, what can be done to address them and why this could be beneficial to farmers. This works in tandem with any/all of the above mechanisms.

Each approach has different advantages and disadvantages in terms of cost, success at influencing behaviours, speed of implementation etc. Success almost always depends on a range of factors. Understanding the interplay between these different elements within a particular policy or commercially-driven approach can be crucial to understand how and why they succeed or fail in different situations.

The SG is currently using a range of policy mechanisms to influence farmers' environmental behaviours. However, only the focus farms which are part of Farming for a Better Climate use the four types of policy levers available to influence behaviours: making it easier to change; giving the right signals; getting people involved; and leading by example.

Key points from the literature

- **Cross compliance** – farmers need clear information about the rationale for cross compliance measures and why the rules are needed. It is important to make it as easy as possible for them to keep up to date with regulatory requirements
- **Nitrate vulnerable zones** – although there is resentment among farmers about NVZ designation, and a widespread feeling that others should share the costs, the evidence suggests that farmers who are disengaged present a greater challenge to policy than farmers who are resistant
- **Focus farms** – there is no evidence to date on the effectiveness of focus farms in Scotland, although they follow a model (monitor farms) which has been evaluated positively. Potential tensions between the commercial imperative and environmental measures may be alleviated if CAP reform includes increased emphasis on environmental cross compliance measures
- **Agri-environment schemes** – farmers' decisions to participate in AESs are influenced by factors such as farm type and size, tenure arrangements and previous experience of participation. Refining policy to improve targeting might help to encourage „newcomers,' small farms and tenant farmers. Giving farmers

more opportunity to innovate within schemes, and setting targets that would allow farmers to see, measure and communicate their conservation progress, would meet their needs to enact and display their skills to their peers

- **Renewables** – farmers are aware of and interested in renewables initiatives, and the potential additional income they provide. However, there are (or are perceived to be) substantial transaction costs involved in the adoption of renewables measures. Clearer information and better signposting to available support could help to increase uptake of schemes. Farmers could also be encouraged to collaborate with each other in the adoption of initiatives.

Opinion formers also wished to stress that:

- The more time and money farmers spend complying with regulations, the less they can spend on creating and selling produce (although regulation may also bring other benefits). Better regulations and clearer instructions would make it easier for farmers to comply
- Making mitigation measures mandatory does not persuade farmers of their merit, whereas voluntary measures are usually adopted because farmers have been convinced that they have value. However, if farmers can see why mandatory measures are necessary and/or beneficial, they are more likely to support them
- The five key actions encouraged through FFBC are all seen as good practice, so farmers looking to increase their efficiency would be likely to take them up anyway
- The process of applying for grant funding through SRDP is perceived to be over complicated
- Farmers are aware of, and interested in, renewables initiatives and the Feed-in Tariff Scheme, in particular.

Some implications for policy development and delivery

- Farmers need to be convinced by the science, particularly the science supporting cross compliance measures
- Farmers who do not engage present the greatest challenge to policy makers – using newer channels of information transfer may attract farmers who do not actively seek information
- Learning from initiatives elsewhere in the UK - many of the activities being carried out as part of Farming Futures (England) and Farming Connect (Wales) are already going on in Scotland, but it might be useful to look at how Farming Connect works with women and younger farmers. The short fact sheets produced as part of Farming Futures appear to be a useful resource, for their focus on a breadth of perspectives (including „what the scientists say'), and their lists of challenges and opportunities
- Current proposals for CAP reform beyond 2013 provide a number of opportunities for using additional policy levers, or strengthening levers already in use. Examples include expansion of farm advisory services; additional investment in research and innovation, and steps to translate research results into practice; and measures to stimulate entrepreneurship in rural communities.

6. EVIDENCE ON FARMER AWARENESS OF CLIMATE CHANGE ISSUES AND UPTAKE OF MITIGATION MEASURES

6.1 Introduction

Previous chapters have explored what is known about factors that influence farmers' uptake of environmental measures, in terms of both farmer attributes (internal/external/social/economic) and the characteristics of the policy measures themselves. As discussed earlier, sets of different factors influence uptake of measures that are mandatory and voluntary. Mandatory measures are more straightforward to implement, in many ways, although there are issues around trust, feelings of victimisation, flexibility of policies (see Chapter 7 for discussion of these), as well as monitoring and enforcement costs.

Measuring uptake of voluntary initiatives is a more complex business. The legally binding commitment to reduce GHG emissions by 80 per cent by 2050 has sharpened the need for better evidence on uptake of mitigation measures. This chapter focuses more specifically on what is known about uptake of Scottish farmers' uptake of climate change mitigation measures, and what transferable lessons may be learned from projects commissioned by Defra to improve uptake of individual measures in England.

6.2 Farmers' understanding and awareness of environmental issues and initiatives

Understanding and awareness of climate change issues

A suite of projects commissioned by Defra in recent years included work conducted by ADAS which aimed to evaluate and identify GHG mitigation measures with lowest costs/biggest potential impact in the agriculture sector; understand the current level of uptake of mitigation measures; and identify the main barriers/drivers for changing practice at a farm level (ADAS, 2010).

A combination of 751 telephone interviews, three focus groups and 10 in-depth interviews with farmers were conducted. Findings indicated a poor understanding of GHG emissions. The greatest awareness of GHG was for methane (42%), but only 11% were aware of nitrous oxide, and 42% were not aware of any of the GHGs from agriculture. Cereal and general cropping farmers were significantly more likely than livestock farmers to believe it was important to consider GHGs in decisions. Findings make it clear that there are major knowledge gaps and that, therefore, the role of information provision and guidance is of paramount importance. Farmers cannot act to mitigate environmental issues if they are not aware of their existence (ADAS, 2010).

In Scotland, survey work with 540 dairy farmers in 2009 found that only half of those in the sample agreed that temperatures would rise in the future. There was general uncertainty about a number of climate change related statements. Perhaps most worrying for policy initiatives relying on voluntary uptake was a small, but still important proportion of farmers actively disagreeing that temperatures would increase; and more than half agreeing that their input costs would increase due to climate change (Barnes and Toma, 2011). The research also included cluster

analysis to indicate how themes were distributed across participating farmers. Key findings from this work were that 23% of the sample were disengaged, with no strong feelings about climate change, and 22% were negativists, agreeing with profit maximisation attitudes, but disagreeing that climate change will impact them negatively in the future. These findings are particularly important because dairy farming is an industry which could potentially mitigate a large amount of GHGs.

Awareness of climate change issues: messages from the opinion former interviews

Opinion formers felt that awareness of climate change issues has substantially increased amongst farmers in recent years, and the use of mitigation options is becoming much more widespread. This change has taken place over a very short timescale. This is significant, because farmers generally take/need much more time to alter management practices.

Although there is increasing awareness of climate change issues, interviewees felt there is still a good deal of uncertainty about particular mitigation initiatives. It was noted that, although Farming for a Better Climate is the only Scottish initiative explicitly designed to help mitigate the impact of climate change, a range of other initiatives and measures exist and are relevant to mitigation (for example, initiatives such as the FiT scheme – see Chapter 5 – and private and voluntary sector initiatives – see Chapter 7).

Interviewees noted that, while increasing awareness of climate change is important, this on its own will not be enough to „galvanise action.'

Farmers' self reported actions in relation to climate change

In England, Farming Futures is working with Defra and a range of agencies to stimulate on-farm action to mitigate and adapt to climate change. Five surveys have now been undertaken as part of this work; the most recent, in February 2011, involving 400 farmers across England. Just one third of the sample (34%) felt that climate change was currently having an effect on their farm/land (compared with 38% in the survey conducted in March 2010). However, 59% predicted that climate change will have an effect on their farm/land in the next 10 years.

Less than a third (29%) of the farmers surveyed reported that they were taking action to adapt to the impacts of climate change on the farm. The percentage was lowest in beef farms (17%) and highest in poultry (34%) and horticulture (41%). Of the 285 respondents who reported they were **not** taking actions, 26% did not see climate change affecting their land, and 21% did not know what they could do to adapt. Of the 188 farmers who reported they were not currently taking action to mitigate climate change or reduce GHGs from their farms, 25% did not believe there was much that farmers could do, and 14% cited „lack of information.'

Of those who reported that they were taking action to adapt to the impacts of climate change on the farm, 25% were improving water management, 13% were improving buildings and 10% were improving machinery/fuel efficiency. Fifty three percent of the farmers surveyed reported that they were currently taking action to specifically

mitigate climate change or reduce GHG emissions. Percentages were lowest among beef and sheep farmers (41% and 45%) and highest among vegetable or potato farmers and pig farmers (both 63%). Improving energy efficiency was the main action being taken (by 47% of farmers). Reducing fuel use/using new vehicles or machinery was the next most popular action (17%).

Of particular interest to policy makers, 90% reported that rising input prices had made them more careful about using resources efficiently. Rates of agreement with this statement were highest among beef farmers (95%) and lowest among sheep farmers (85%).

Farmers were asked whether there were any topics, relating to their farm and climate change, that they would like further advice on. The majority (84%) felt that they did not require any further advice. Sixty two respondents did have requests for advice on a wide range of topics, principally renewable/alternative energy; the production of solar energy; installing wind turbines; and anaerobic digestion.

Farmers were also asked when they expected investment in climate change action to pay off. Of those who had made such investments, 28% estimated that it would be longer than 10 years before their investment paid off; and 14% believed it would never be paid off.

Although the Farming Futures surveys cover English farmers only, there is no reason to suppose that the picture would be very different in Scotland. Work by Dick et al, 2010, included a range of methods to investigate how best to achieve sustained GHG reduction from agriculture in Scotland. This research included a survey of 433 farmers from Scotland and England, which revealed that 93% were taking measures to reduce their GHG emissions, although most did not necessarily recognise their actions in relation to climate change and were simply following good farming practice. Among farmers who reported taking some mitigation action, maintaining or integrating new trees and hedge planting into the farm was the most commonly reported option (28%); while growing leguminous crops (primarily clover swards) and consequently reducing the need for the manufacture of synthetic fertiliser, was a very close second (26%). Increased efficiency of energy, fertilisers and animal husbandry were also rated highly.

The high percentage of farmers in the survey by Dick et al who reported taking action to reduce GHG emissions is very different from, and appears more encouraging than, findings from the Farming Futures survey. However, recruitment to the survey conducted by Dick et al involved approaching farmers at two major agricultural shows (the Royal Highland Show 2010 in Edinburgh and the Great Yorkshire Show 2010 in Harrogate). It could perhaps be argued that farmers attending these events would be more likely to be innovators in relation to emissions reduction, and so may not be representative of the wider farming population. However, findings indicate there is at least a substantial cohort of farmers who are taking actions (whatever their reasons for doing so) and who may be in a position to influence their peers.

Uptake of mitigation measures: messages from the opinion former interviews

Opinion formers were specifically asked why farmers are not taking up mitigation measures which, on paper, would seem to cost them little or nothing, as well as benefiting their businesses. The main issue raised were :

- Transaction costs (perceived or actual – see Chapter 7).
- Scepticism about the reliability of the science on climate change, especially that relating to livestock and methane emissions; whether the impact of climate change on the farm will be positive or negative; and what one farm, one region, or even Scotland can do to make a difference (see Chapter 8).

Some interviewees felt that mitigation measures are already being taken up in large numbers. It was generally agreed that renewables initiatives, in particular, are of great interest to farmers. The point was also made that many farmers are taking up measures, but do not connect with climate change mitigation; they are simply adopting good practice principles that make business sense.

Farmer awareness of the Monitor Farm Project

Part of research into the effectiveness of the Monitor Farm Project in Scotland (ADAS, 2008) considered whether farmers who were not directly involved in the project were aware of it and, if so, what were the most influential sources of disseminating knowledge. There were 514 responses to a postal survey of farmers **not** in the monitor farm group, 78% of whom were aware of the project. However, understanding was much less, with 40% saying their knowledge was good or very good. The most influential source of information was the farming press: 91% of those who had heard of the programme cited this. Other sources were word of mouth (19%); industry news letters, such as SAC, NFU Scotland and Scottish Farmer (19%); and farm advisers/consultants (15%).

6.3 Evidence on uptake of climate change mitigation measures in Scotland

As yet, there is little evidence available that allows uptake of mitigation measures in Scotland to be monitored. However, two recent projects have set out to improve the evidence base. They are both briefly described below.

Analysis of uptake of climate change measures within SRDP Rural Priorities

A recent project conducted by a PhD student during an internship with the Scottish Government report investigated the uptake of climate change options within the Rural Priorities funding mechanism, which is part of the SRDP[22]. The study also explored potential links between applications for funding for climate options and observable characteristics of farms and farmers including in the Scottish Agricultural Census.

Rural Priorities is an integrated funding initiative intended to deliver targeted environmental, social and economic benefits. It is a competitive mechanism to ensure that contracts are awarded for the proposals which are best able to deliver agreed regional priorities. Regional priorities have been established to aid the delivery of the five key outcomes of the SRDP:

[22] http://www.scotland.gov.uk/Topics/farmingrural/SRDP/RuralPriorities

- Business viability and competitiveness
- Water quality
- Adaptations to mitigate climate change
- Biodiversity and landscapes
- Thriving rural communities.

Applicants have a choice of 132 different options. Options are grouped into packages, and these in turn are assigned to different categories based on their expected outcome. For four of these packages, including a total of 70 options, the outcome is defined as „climate change.' The packages are:

- Promoting carbon capture and storage
- Sustainable flood management
- Development of renewable energy provision
- Reducing GHG emissions.

A dataset contains information on all applications from the beginning of the programme (2009). As part of the research, these data were merged with data from the Scottish Agricultural Census in order to investigate links between the (potential) uptake of climate change options and observable farmer characteristics.

At the time the research was conducted (mid-2011) 5,373 farm businesses had applied for funding since the beginning of the programme, (this total relates to all 132 different funding options) and 4,469 of these applications had been accepted. For the purposes of this study, unsuccessful applications were included in the analysis, because the applications in themselves were indicative of farmers' intention to uptake these options.

In relation to climate change, the most popular options included:

- „water margins – enhance biodiversity'
- „management of wetland'
- „management of species rich grassland'
- „restructuring agricultural businesses'
- „woodland creation – native woodland planting.'

All of these options had received more than 1,000 applications, and the „water margins' option had received 2,500 applications (many farms applied for a number of different options, from a mix of available packages).

The analysis revealed a relationship between the size of the holding and intention to uptake climate change options: farmers managing larger and more profitable holdings chose to apply for a higher proportion of climate change options. The group of farmers who applied for funding, but did not apply for any climate change options, was characterised by smaller farm size and lower profitability per hectare. This is in line with previous studies which showed that larger farms are more likely to adopt environmental measures (for example, Willock et al, 1999a).

Comparison across sectors revealed that dairy farms had a higher uptake and livestock grazing farms had a lower uptake of climate change options. The farm types „specialist poultry' and „other' applied for a higher than average proportion of

climate change options. This pattern is similar to that reported in the Farming Futures survey discussed earlier the chapter.

The analysis also made comparisons across regions, which indicated that farm businesses in Argyll, Grampian, Northern Isles and Outer Hebrides applied for fewer climate change options. Farm holdings in Borders, Clyde Valley, Forth, Highlands, Ayrshire and Dumfries and Galloway, on the other hand, had a relatively high uptake of climate change options. A good deal more information would be required to allow meaningful interpretation of the range of factors affecting uptake, but it is likely that the type of land restricts the number and type of climate change options that are open to farmers.

Although this small study has made some interesting observations by analysing uptake of climate change options through the Rural Priorities initiative, a number of caveats need to be borne in mind. First, it cannot be assumed that farmers adopt „climate change' options because they are concerned about climate change, or even oriented towards environmental stewardship. On average, the „climate change' options are more profitable than the other options. Therefore, it is likely that many farmers wished to take up these options for financial reasons, with little or no specific consideration of the environment. Second, it was difficult to make a decision about which options to include in the analysis. Although just four packages have an outcome defined as „climate change,' there are many other packages that would be likely to contribute towards climate change mitigation (such as „reducing diffuse pollution' and „reducing losses of nitrates').

The main strength of the research was its attempt to link the Rural Priorities dataset with data from the Scottish Agricultural Census. The analysis did reveal that some external factors such as size of farm, sector and region all have an influence on farms' uptake of climate change options. Collection of more detailed data would allow the issue to be explored more thoroughly and firmer conclusions to be drawn about the wider range of variables the literature suggests will be linked with adoption of environmental measures.

Monitoring the implementation of Farming for a Better Climate and associated greenhouse gas emissions reductions

To assess progress towards emissions targets at a national level, the SG needs to be able to monitor the implementation of GHG mitigation measures and anticipate the extent to which emissions from agriculture are being reduced. In 2011, work was commissioned by the SG to scope out the data needs for monitoring the implementation of FFBC and associated GHG emissions reductions, in order to understand the extent to which management practices are changing in line with FFBC recommended actions (ADAS, 2011).

The specific requirements of the study suggested a method base upon:

- Identifying pathways to GHG emissions reductions, linking specific actions to emissions reductions
- Identifying indicators capturing key elements of the logic chain from inputs (such as uptake of specific measures or actions) to outcomes

- Assessing data requirements for the indicators and how data might be captured (availability and reporting frequency) including identification of data gaps and solutions.

The authors noted that the mitigation measures incorporated in the FFBC programme are, in general, designed to optimise production (i.e. reduce GHG emissions per unit of production). However, a small number of the measures could have negative impacts on food production and simply lead to GHG emissions being exported elsewhere. Other measures, that target livestock emissions, would be expected to improve productivity and potentially expand food production. The research assumed that farms would only be expected to take forward measures where they make sense in terms of the business objectives of the farm.

The ability of existing data sources to provide sufficient information to monitor both uptake of the measure and the major GHG abatement were classified into Green (wholly sufficient); Amber (available data go some way towards providing all the necessary information); and Red (available data are not thought to be at all sufficient). The research concluded that the ability of existing data to describe the uptake and GHG impact of the mitigation measures prescribed by the FFBC programme is reasonable, in that the majority of traffic lights are amber. Three ways of improving the capacity to monitor the impact of the FFBC programme were suggested:

- Tracking farm practice activity – through a more regular farm practice survey, covering a multitude of requirements from different policy areas to ensure value for money and limit the burden on farmers
- Improving the robustness of the emissions factors related to such activity – work is already underway to improve the UK Agricultural GHG Inventory data, with a number of projects due to report over the next two to four years
- Attribution of the emissions changes to FFBC – there are multiple drivers to changes in farm practice, including uptake of GHG-reducing mitigation measures, and it is difficult to isolate impacts from single drivers. Given that the FFBC programme is focusing on the most cost effective of mitigation measures (i.e. those expected to contribute to the financial viability of a farm that implements them) such measures might be expected to be implemented by those seeking to improve profitability. ADAS suggested that one way of assessing the FFBC programme contribution to changes in agricultural emissions could be to survey a group of farmers who have been exposed to the scheme, and a group who have not; in order to tease out differences in uptake between the two groups over time (ADAS, 2011).

The SG is currently considering the findings from the work carried out by ADAS, and the suggestions made by the researchers for improving the capacity to monitor the impact of the FFBC programme. The complexities associated with attribution mean that it is likely that the focus of ongoing work will be on improving data on farm practice activity.

Key points from the literature

- **Awareness of climate change issues** – recent research conducted in Scotland and England has indicated a poor understanding of climate change issues. The

role of effective information provision and guidance is of paramount importance, as farmers cannot act to mitigate environmental issues if they are not aware of their existence

- **Farmers' self reported actions in relation to climate change** – farmers who said they were taking action reported that it was rising input prices that had made them more careful about using resources efficiently. The most common reasons for **not** taking actions were that farmers did not see climate change affecting their land, and did not believe that there was much they, personally, could do to mitigate the effects of climate change
- **Analysis of uptake of climate change measures within SRDP Rural Priorities** revealed that external factors such as size of farm, sector and region all have an influence on farms' uptake of climate change options
- **Monitoring the implementation of GHG mitigation measures** – a scoping study in 2011 concluded that the ability of existing data to describe the uptake and GHG impact of the mitigation measures prescribed by the FFBC programme is reasonable, although it could be improved by tracking farm practice activity, improving the robustness of the emissions factors related to such activity, and attribution of the emissions changes to FFBC.

Opinion formers also wished to stress that:

- Awareness of climate change issues has substantially increased amongst farmers in recent years, but awareness will not be enough to „galvanise action'
- Mitigation measures are already being taken up in large numbers, and renewables initiatives are particularly popular with farmers
- Many farmers adopt mitigation measures because they are seen as good practice, or because they make business sense, rather than because they connect them with climate change
- Where farmers are not taking up measures which, on paper, would seem to cost them little and benefit their businesses, this could be partly due to transaction costs (perceived or actual), and scepticism (both about the reliability of the science in relation to climate change, and the difference that one farm, or even one country is able to make).

7. FACTORS INFLUENCING FARMERS' UPTAKE OF POLICY MEASURES

7.1 Introduction

The literature indicates that, in addition to personal and farm characteristics, factors such as cost issues, the relationship between farmers and policy makers and retail pressure have an impact on farmers' uptake of environmental policy measures. These issues are discussed in the sections that follow and the perspectives of opinion formers are brought in where relevant to provide a current, Scottish focus. The chapter then considers collaborative approaches to the implementation of mitigation measures, on the basis that policy designed for the single farm is not always the most effective approach for achieving wider environmental targets.

7.2 Cost issues

Many mitigation options entail additional costs to farmers, both in terms of capital outlay and in the time taken to acquire new skills, new equipment, new practices etc.

Investment costs
Some mitigation options carry large investment costs (in particular for new animal housing and manure management systems). Obtaining finance for this may be difficult, if the revenue obtained is uncertain (Smith and Oleson, 2010).

While the installation costs of on-farm anaerobic digesters (for example) may be offset by grants and low interest loans, operating costs must be covered by income generation. Smaller farms are likely to be less willing to tolerate these costs than larger businesses, so adoption rates could be influenced by the size of the farm (RELU, 2011).

The evidence also highlights issues of uncertainty. For example, the improved efficiency of a new grain drier may take several years to justify the expense, and meanwhile the new technology often becomes cheaper. So it is a balance of risks depending both on financial circumstances and the uncertainty of future weather patterns. Similarly, the payback time for investing in renewable energy is not guaranteed because of factors like bank interest rates, realised wind speed and future government policy to further incentivise such actions (Dick et al, 2010).

Transaction costs
Transaction costs are an important element of the implementation of agricultural policy measures. A useful paper (Ridier et al, 2008) summarises the issues in relation to cross compliance and agri-environmental schemes (AESs). Transaction costs fall both to farmers (private) and to the state and public service agencies (public). Public transaction costs may be classified into two categories:

- Fixed costs, linked to the system's design, implementation and evaluation
- Variable costs, linked to the system's running, such as the examination, supervising, monitoring and payment of contracts.

Fixed costs arise only once per programme, and economies of scale as well as learning effects might be realised, due to information and knowledge gathering. Variable costs depend on the number of hectares or the number of sites.

Private transaction costs (borne by the farmers themselves) may be broadly defined as relating to:

- Information costs: time and expenses necessary to gather information regarding contracts proposed; or new regulations and modes of enforcement of cross compliance measures
- Administrative costs: time spent in recording practices, filling in CAP forms and other administrative tasks; hardware costs; possible time spent on software training
- Organisational costs: time and expenses entailed to comply with new measures (change in practices, need for technical support, organisation of „in-farm' administrative tasks, monitoring tasks etc).

There are several reasons why measuring transaction costs is difficult:

- There is no standard terminology on transaction costs
- It is difficult to separate transaction costs from production costs
- If transaction costs are high, most transactions would not even take place
- Different actors may face different transaction costs.

Few studies have assessed farmers' attitudes towards the mechanisms of scheme implementation. Research by Falconer (2000) reported findings from a pan-Europe survey to determine the causes of participation and non-participation of farmers in the agri-environmental programme in eight EU member states. Responses in relation to non-participation covered a range of issues, but the three main reasons were:

- „didn't know enough about scheme'
- „compensation is too low„
- „application is too costly.'

More recently, Manley and Smith (2007) surveyed participants and non-participants in agri-environment schemes in Scotland, to explore views and reasons for joining/not joining. The survey was carried out in 2004, and related to environmental schemes operating at the time, but the issues are likely to remain relevant. A total of 353 non-participants responded to the survey, offering a range of reasons for their non-participation. A general antipathy and concern was expressed in relation to paperwork and general interference, as well as perceptions of hidden costs and lack of certainty whether payments would cover costs.

Research by Weber (2011) investigated why farmers spend different amounts of transaction costs in different agri-environment schemes. Although the research itself relates to schemes operating in Germany, and so specific findings may not be useful to policy makers in Scotland, results are interesting because they relate to actual behaviours in relation to transaction costs, rather than perceptions about their nature and burden. Findings show that the decision by farmers to commit to activities incurring transaction costs stems from several motives and varies along the transaction process. For example, farmers who participate due to an interest in nature conservation tend to spend more on transaction costs at every stage of scheme delivery. Farmers who manage large farms, organic farms, and/or run their farms full-time, and those who have a long-term business horizon, spend more effort

on information gathering. Willingness to spend money on information is also connected with the amount of schooling and training farmers have received: people who are more educated are likely to be more interested in information on further management options. Farmers who participate due to financial interest tend to spend more effort on contract implementation.

Consequently, variation in private transaction costs may be the result of a range of different underlying factors, including famers' motives, and different motives may be prevalent at the various stages of scheme participation. Results also show that the actual amount of transaction costs may not be the most important factor in deciding scheme participation, as a large part of transaction costs may be spent voluntarily in order to realise gains from transaction (Weber, 2011).

Transaction costs: messages from the opinion former interviews:

Opinion formers highlighted a range of perceptions of transaction costs across the various climate change mitigation initiatives operating in Scotland:

- The Farming For a Better Climate five key actions were not seen to be associated with much paperwork. However, preparing to adopt the actions was considered to require quite a bit of time (assessing the quality of the soil, for example), and the assistance of an agricultural consultant, which costs money.
- In relation to renewables, bureaucracy associated with the planning process was repeatedly highlighted as an issue.
- Paperwork was seen to be an issue when applying for funding through SRDP schemes. The forms were said (by interviewees) to be so complicated that filling them in required an agricultural consultant. However, one person suggested that those who have actually taken up Rural Priorities measures consider the transaction costs to be minimal.

7.3 Relationship between farmers and policy makers

This section discusses two major areas where the evidence highlights tensions in the relationship between farmers and policy makers, which may have wider implications for the uptake of climate change mitigation measures.

Farmer perspectives on environmental responsibility

A theme throughout the literature is that virtually all farmers identify their first priority as the profitability of the farm business, rather than maintaining the environment per se. Research by Davies et al (2004) which included interviews with a small number of Scottish farmers and other stakeholders involved in land management policies, confirmed that farmers are focused on the „bottom line,' rather than providing public goods such as biodiversity, water quality and landscape amenity. This has already been noted in several previous chapters, as it underpins the evidence base in relation to attitudes and culture, as well as uptake of policy measures. Naturally it also has implications for how environmental policies are „sold' to farmers. However, the research by Davies et al also identified that some innovative farmers were keen to make a strong case for their role as stewards of the landscape. They pointed out that the very landscape that agencies and NGOs seek to protect has

been created and nurtured through their tradition of farming practices. They felt frustrated that, in their view, many of the conservation lobby did not recognise or respect the crucial relationship between responsible farming and the provision of public goods.

The research also investigated farmers' perceptions of their role in tackling environmental problems. Findings indicated that farmers often felt unfairly singled out as the culprits. Where problems were recognised, farmers argued that other factors (such as septic tanks and water treatment plants) often contributed to water pollution, but that this was not acknowledged. Other farmers interviewed felt the emphasis on farmers having to provide public goods at their own private cost was unfair. They contrasted their situation with other industry sectors, such as tourism, which they perceived as „focusing on profitability without an expectation of maintaining the landscape and environmental quality.' The authors suggested that sharing the responsibility more widely would give positive impetus to more partnership-based approaches for management that look to forge greater links between these diverse stakeholders (Davies et al, 2004).

In other relatively recent work in Scotland, Macgregor and Warren (2006) undertook face-to-face semi-structured interviews with 30 farmers in the Eden catchment of Fife. The research was undertaken prior to the introduction of NVZ measures, in an attempt to ascertain how farmers regard environmental legislation as well as what motivates them to adopt environmentally sustainable practices. As the sample was specifically drawn from farmers who would be subject to NVZ measures, it is not necessarily comparable to the farmers who participated in the research by Davies et al. None of the Eden catchment farmers felt responsible for environmental problems either on or off their farms, and when questioned about potential environmental issues, the focus was on on-farm issues such as soil erosion, sub-soil compaction, soil structure decline and wind erosion. Rather than accepting the connection between their farm practices and river nutrient levels, they blamed point source polluters. Although some off-farm concerns were mentioned, the authors argued that most farmers were merely „paying lip-service.' For example, none of the interview participants mentioned the health of the estuary as a concern despite the fact it was specifically mentioned in multiple questions (Macgregor and Warren, 2006).

Farmers' disassociation from the impacts of their behaviour does not necessarily prevent them from adopting environmental measures. In Macgregor and Warrens' work, although farmers did not accept responsibility for the off-site environmental problems, they made it clear that they would change their practices if they had to (although the implication was that this would require regulation rather than voluntary measures).

In addition to general feelings of victimisation, some farmers feel that specific policies discriminate against particular groups of farmers. For example, as noted earlier (Chapter 5) many farmers in Scottish NVZ areas feel a sense of injustice. This is particularly acute because in other European member states (such as Denmark), a nation-wide approach has spread the regulations across all farmers equally, regardless of the nitrate pollution in specific regions, whereas in Scotland, a regional approach focuses on the most affected areas. There is resentment about farmers who do not face the same legislation and a widespread feeling that other industries

and consumers should share these costs. Such feelings of resentment are likely to spill over and influence farmer attitudes in other areas.

Farmer endorsement of agricultural policy

Policy endorsement is important in three main respects. Davies and Hodge (2006) summarised previous research which shows that:

- People are more likely to abide by regulation when they believe it to be appropriate, fair, equitable in implementation, efficient/effective in process, proportionate, relevant and necessary. The introduction of regulation when these factors are absent may lead to widespread transgressions, entailing high monitoring and enforcement costs
- The imposition of regulations which do not coincide with commonly held values among the target population can have „spillover' effects on the attitudes of people towards governance in related areas. These spillover effects can entail a withdrawal of goodwill, the development of an adversarial rather than cooperative approach to the achievement of other objectives, and exacerbate regulatory problems in other areas.

At present, there is scepticism regarding the evidential basis of policies such as NVZ regulations. Macgregor and Warren (2006) found that most, if not all, the farmers they interviewed exhibited „strong antipathy' towards government-associated initiatives, whether regulations or funding opportunities, which may relate to their feelings of victimisation in relation to NVZ designation.

Davies and Hodge (2006) noted that a key issue in developing appropriate agri-environmental polices, is understanding the extent to which the principles of policy are endorsed by farmers, and which factors may contribute to that endorsement. They highlighted that past studies on adoption of environmental management practices have identified three broad factors as important:

- Opportunity – a farm structural issue
- Inclination – a farmer attitudinal issue
- Incentive – a scheme design issue.

From their review of the literature and a small primary research project, Davies and Hodge concluded that farmers may endorse a policy that is not strictly speaking in their own economic interest, if they feel it is „appropriate;' and, likewise, not support a policy even if it is in their interests, if it runs contrary to a normative standard.

The importance of developing policy in consultation and cooperation with the farming industry is widely recognised by government agencies. Furthermore, as Davies and Hodge point out, a key issue in developing appropriate agri-environmental policies is understanding the extent to which the principles of policy are endorsed by farmers, and which factors contribute to that endorsement.

The burden that particular policy measures place on farmers is also an important factor in whether policies are endorsed. Recent work that looked at regulatory burdens noted that farmers can feel constant pressure to keep up to date with a broad range of changing regulatory requirements. This can be a cause of stress, particularly for those who manage alone and struggle to find time to read and understand each new or changed regulatory requirement. They worry that they „will

miss something important' which could result in a reduction in payments or even prosecution. This anxiety, and feeling of „guilt' can be compounded by heavy-handed or insensitive enforcement (Report of the Independent Farming Regulation Task Force, 2011).

Increasing uptake of policy measures: messages from the opinion formers interviews

Interviewees highlighted a number of potential levers in relation to uptake. Some of these related to specific initiatives, or farmer characteristics, and are discussed in other parts of the report. However, a number of levers mentioned had broader potential impacts and are included here.

Ease of implementation
This was seen to a particularly influential lever. Interviewees emphasised that for substantial numbers of farmers to adopt a measure, it must work and not require too much disruption to existing farm management systems. It was suggested that farmers do not mind making minor adjustments to their management practices, if these are „low-hanging fruit'. However. even those measures that are considered to be „win/win,' i.e. good for the environment and for profitability, will not necessarily be adopted if they are seen to be too difficult to implement. The importance of ease of implementation was particularly highlighted by SAC interviewees, from their experience as hosts of Farming for a Better Climate.

A number of interviewees stated that seeding clover in grazing pastures to enrich soil and feed livestock is an example of a measure that is practical, easy to implement and help reduce fertiliser costs.

Incentivising measures
Providing greater financial incentives was considered to play an important role in increasing farmers' uptake of mitigation measures. Without the possibility of a new or increased revenue stream, most farmers do not have the time/money to implement new methods. Opinion formers felt that there was a particular need for capital incentives for measures such as renewables, which require large initial costs to be recouped before profits can be made.

Although financial incentives were one of the most commonly mentioned suggestions to improve uptake of mitigation measures, interviewees acknowledged that this was just one option amongst many and „we can't incentivise everything'. Furthermore, it was suggested that, if methods are simply utilised because of the monetary rewards and there is no „buy-in', farmers may revert to their previous behaviours when the initiatives end. Consequently, it is important to convince farmers that climate change mitigation measures are beneficial in their own right.

Simplifying processes
The importance of simplifying existing processes was noted, as well as ensuring legislation and funding are joined up. The planning system in particular was seen to be a major obstacle to more widespread use of wind turbines. There is a strong desire amongst farmers for more consistent planning processes that are easier and

less time-consuming to negotiate. The view was also expressed that regulations get in the way of hydro power generation, and that there is a need for joined-up environmental legislation.

One interviewee noted that if a farmer installs a crossing on a burn to reduce pollution by speeding transit of cattle, this requires controlled activities regulations (because you are creating a ford) when such behaviour should be encouraged. It was suggested that the Land Use Strategy could, potentially, help to address these issues.

Setting Clear Targets

Many of the opinion formers felt that farmers need clearer information about what is expected of them. If there is a target to aim for, it is much easier for them to work towards it, especially if penalties for failing to do so are well advertised and consistently enforced. It was suggested that, if the agriculture industry was to be told: „if you haven't reduced your emissions by x in five years' time, the voluntary measures will become compulsory,' farmers would give more consideration to the measures.

„Councils have targets and face sanctions if they do not deliver, why should the agricultural industry be any different?„

Greater flexibility

In general, opinion formers considered that farmers would be more likely to adopt mitigation measures if the rules and processes were less rigid and could be „tweaked' to meet their unique circumstances. This was particularly seen to be the case with the less flexible requirements of SRDP initiatives. Farmers know their own land better than anyone else so policy makers should take advantage of this expertise. If farmers were set a goal and allowed to meet it in the manner that they felt was most appropriate for their farm, it would encourage innovation and could become something that they take pride in. Farmers would be more likely to think of something „workable' and „practical' which could be adopted by others.

Currently, farmers may have no choice but to act in a way that they believe has negative effects in terms of production and/or environmental impact. Being compelled to implement sub-optimal impacts is likely to have negative effects on farmers' attitudes towards agricultural policy more generally.

Although greater flexibility was widely considered to be positive, a few reservations were highlighted:

- If farmers reduce emissions by using a variety of different processes, it could be very difficult to monitor and assess whether they are getting the results that they claim
- Giving farmers more flexibility to use their initiative increases the likelihood of unintended consequences and, possibly, swapping one form of pollution for another.
- Not all farmers appreciate flexibility. Some would rather receive clear instructions. Thus, farmers should be given the option, not the obligation, to innovate.

Other suggestions to increase uptake of mitigation measures

- Establishment of a climate change award to promote the practice of high achievers
- Greater cooperation between farmers encouraged in the raising of capital and locating of wind farms
- A tractor scrapage scheme to encourage the purchase of newer, more fuel efficient machines and/or putting a meter on existing fuel tanks to ensure that farmers are aware of their fuel consumption.

7.4 Retail standards

The potential role of supermarkets to influence farmer behaviours was a recurrent theme of the interviews with opinion formers (see below). However, there appears to be little in the literature about that role, a finding that was endorsed by the peer reviewers of this report. One study which reviewed the pressures and drivers encouraging and hindering reduction in net GHG emission in agriculture (Dick et al, 2010) noted that all major UK supermarkets are currently promoting low carbon products and encouraging producers to calculate the GHG emissions of their products. Naturally this sends out a strong message to farmers about how their businesses should be structured and monitored. The research noted that retailers in the UK commonly report using PAS2050 (Publicly Available Specification 2050: Specification for the assessment of life cycle greenhouse gas emissions of goods and services: http://www.bsi-global.com. However, the researchers found that data availability and transparency are major issues with implementing PAS2050. Commonly in the UK, the data provider is the farmer, who is not explicitly paid for providing these data. Instead of direct payments, secondary benefits are used to persuade the data provider to deliver data; for example: marketing advantage, protection of existing markets, identification of cost saving or efficiency improvement opportunities. The researchers could find no evidence that the sources and data used were verified in a robust manner.

Increasing uptake of policy measures – the role of supermarkets and the private sector more generally: messages from the opinion formers interviews

Opinion formers suggested that supermarkets have the potential to be a major influence on farmer behaviours. They are in a position to work with suppliers to raise environmental standards, as well as being well placed to influence consumer behaviour. However, interviewees raised several concerns about the prospect of greater supermarket influence:

- It will be harder to influence the behaviour of the many smaller farms who get less business from supermarkets, and have less to gain from changing their practices, especially if they do not feel connected to the issue.
- If supermarkets insist on more stringent environmental targets in the future, will the additional financial burden fall on farmers, consumers or the supermarkets?
- There was concern about the likelihood of supermarkets insisting on carbon footprinting in future. The science behind carbon footprinting was not felt to be sufficiently robust and many farmers consider it to be simply „box-ticking'.

Interviewees felt that there is currently little awareness of private sector schemes amongst farmers and, although there has been talk about the greater role that supermarkets (in particular)could play, this has rarely led to tangible actions on the ground. They did, however, provide two examples of relevant private initiatives.

- Morrisons launched a farming programme in June 2009, focused on research to help improve the efficiency and sustainability of British farming, in partnership with agricultural colleges and the National Farmers Union. The programme comprises three key elements: driving efficiency, by helping farmers to access best practice; supply chain dialogue, to encourage working across the supply chain, with the launch of Farmer Groups for dairy, beef, poultry and egg farmers; investment in applied farm research organised through Morrisons Farmer Groups.

  Morrisons also established a research farm on the Dumfries House Estate in East Ayrshire. The aim is to be become a leading centre of excellence for farming research, working in partnership with the Scottish Agricultural College to drive research into sustainable farming models and share best practice throughout the industry, with the support of the National Farmers Union Scotland (NFUS): http://www.morrisons.co.uk/Corporate-Old2/Press-office/Corporate-releases/Morrisons-launches-farming-programme/

- The Cadbury Dairy Guide to Low Carbon Dairy Farming was launched in February 2009, working in partnership with farmers to reduce the environmental impact of dairy farming. The Guide provides an overview of the factors that contribute to carbon emissions from dairy farming and provides practical suggestions that farmers can implement to reduce the carbon footprint of milk production.

7.5 Relationships between farmers

Although it is important to influence the behaviour of individual farmers, there is now widespread recognition that emphasis on policy designed for the single farm is not always the most effective approach for achieving desired environmental quality targets. Engagement in collaborative activities can be defined along a spectrum from individual to collective. At the individualistic end of the spectrum, farm actions are focused within a single farm boundary and without reference to wider objectives. At the other end of the spectrum lies full community land ownership, under which the entire decision-making process involves collective action. In between, joint boundary management; coordinated timing of operations; machinery and labour exchange; landscape scale planning; cooperative marketing; co-investment and financing; and joint business ownership provide a range of opportunities and challenges (Davies, 2006).

Interviews with a small sample of farmers in the Grampian region of Scotland investigated the relationship between labour and resource exchange and social capital (Sutherland and Burton, 2011). The study noted that farm equipment is potentially a key area of exchange in farming communities. As the price of machinery increases, the likelihood that smaller farms have the economies of scale

to support expensive machinery declines, providing an opportunity for potential savings through cooperative action. The study found that farmers would usually only loan out expensive machinery to other family members, or to neighbours in an emergency (as long as there was a history of positive interactions with those neighbours). In addition, and interestingly from a cultural capital perspective, farmers in the study identified neighbours with whom they would not share machinery, on the basis of an observed lack of farming skills, even when such skills were apparently unrelated to machinery use (Sutherland and Burton, 2011).

Farmers who participated in the Sutherland and Burton research also commonly employed formalised machinery sharing systems: „Machinery Rings,' whereby access to contractors (equipment and labour) is centrally organised by an administrative body. In these arrangements, there are no benefits to be gained from possessing higher levels of social or cultural capital, because transactions are reduced completely to economic capital. However, larger farmers were seen to be receiving favourable treatment, and it was perceived that smaller scale farmers might not have sufficient acreage for it to be worthwhile for Machinery Ring contractors to travel. The research concluded that, although small-scale farmers could be expected to benefit the most from the machinery ring, owing to their inability to afford large pieces of machinery, they are not best placed to draw on the service, particularly if they are located in a remote area (Sutherland and Burton, 2011).

A review of the literature carried out as part of a major study in Scotland (Davies et al, 2004) noted that a number of environmental goods and services demanded of agriculture are very difficult to provide without collective action on the part of farmers and other stakeholders. Key reasons why cooperation is needed for the provision of environmental benefits include the following:

- Solve dilemmas caused by the positive or negative externalities associated with public goods
- Allow management at an ecologically appropriate scale, across legal and administrative boundaries
- Increase the cost-effectiveness and economic feasibility of providing environmental goods and services
- Facilitate the harmonisation of multiple objectives for resources
- Share knowledge and information – it is rare for one party to hold all the necessary information and expertise for solving an environmental problem
- Share and mobilise resources
- Increase credibility and legitimacy in decision making
- Allow greater flexibility, responsiveness and local relevance
- Build understanding and capacity to cope with future changes.

Farmers are generally considered to strongly value their independence. This would imply that they are unlikely to be in favour of collective actions. However, there have been a number of successful instances of farmer cooperation such as the spread of formal Machinery Rings and numerous marketing and buying cooperatives in Scotland. Members of some farming traditions, such as crofting, generally view collective action more favourably and there is some regional variation as well, with stronger traditions of cooperation in hill farming areas as opposed to lowland areas where farmers are arguably more individualistic (Davies et al, 2004).

Farmer perspectives, gathered during a series of interviews and focus groups as part of the research by Davies et al, indicated that spontaneous, farmer-led, cooperation for purely environmental outcomes is extremely unlikely. However, farmers are prepared to cooperate in certain situations, given sufficient incentives and the removal of barriers to collective action. The incentives and barriers for cooperation, as defined by farmers, are summarised below.

Incentives	**Barriers**
• Income generation • Cost-reduction or sharing • Risk mitigation • Access to advice and grants • Gaining a voice in the policy process • Improved ease of management • Solving of perceived problems (such as diffuse pollution)	• Complex bureaucracy for funding and advice • Policies disadvantaging groups over individuals • Conflicting messages and inability to plan reliably given shifting policies • Inflexible and constraining conditions for schemes • Lack of time • Lack of knowledge or awareness of extension personnel • Suspicion of partner organisations' agendas • Poor relationships or lack of access to facilitator/project officer • Preference to work independently where possible

The report made 21 specific recommendations, based on key findings. These related to:

- Broadening the role of farm advisory services to enable them to address collective action initiatives; and the employment of dedicated, locally-embedded „coordinators' to assist in the promotion and implementation of collective initiatives
- Reviewing the scope for funding sources to reward collaborative environmental ventures; and for a funding mechanism which can draw funding streams from different sources to provide a single application point for collaborative projects that can achieve multi-functional benefits
- Emphasising the economic benefits of good environmental management in farm environmental advice; disseminating best practice through peer groups (through monitor farms, for example)
- More provision for training for agency and project-related staff involved in supporting collaborative action; establishment (or strengthening) of local farmer advisory panels to consult on proposals for local area initiatives and create a link between farmers and other stakeholders
- Strengthening existing farmer networks, with the possibility of establishing a formally recognised group structure for collaborating farmers, as in the Australian Landcare Model, that would provide the vehicle for funding bids, networking and information flow
- Building in post-project appraisal and information exchange; using networks to disseminate findings re: best practice
- Developing a programme of local „futures' exercises to explore diverse opportunities for local areas in different regions; ensuring that both funding and advice are adaptable and appropriate to local conditions.

The authors noted that the changing policy environment at the time created a series of challenges and opportunities for rural land management. Of particular importance were:

- The introduction of cross compliance conditions on agricultural payments raising awareness among farmers of the importance of the environmental dimension
- The combination of national and compulsory modulation from 2005 presented a number of challenges in relation to agriculture's contribution to a multifunctional rural environment, providing a range of social and environmental benefits in addition to traditional food and fibre production
- Changes to the design of agri-environmental schemes in Scotland to include options for collaborative agreements, enabling groups of farmers to join together in a single application (Davies et al, 2004).

The National Landcare Programme, Australia – example of collective action

The National Landcare Programme was initiated by the Australian government in 1988 to encourage people to form Landcare groups, with the aim of addressing local environmental problems in a cooperative and coordinated manner. This was to be done through implementation of experimental and demonstration projects, with a focus for Landcare group activities on education, farm and catchment planning, tree planting, and demonstrations and trials of new practices (Dwyer et al, 2007). Landcare groups may be said to provide three services:

- An enhanced social learning environment in which farmers and other land users can be exposed to new ideas and experiment with their application
- The opportunity to scale up individual property planning exercises to a sub-catchment level, where consideration of the inter-relationships between individual farms could be used to develop more effective plans
- A set of peers to whom individual farmers could be held accountable for inaction in addressing the off-site impacts of farming practices identified through the planning process.

As reported by Dwyer et al, the success of the Landcare approach has been well documented. Participants were found to be significantly more aware of land degradation issues, and reported greater levels of knowledge of resource management, with the Landcare groups being an important influence on their management practices. However, several caveats have been noted in relation to the usefulness and transferability of the model:

- It is not clear whether increased awareness has translated into behaviour change. Evidence for environmental benefits is not conclusive and, although relationships between Landcare membership and higher levels of adoption have been noted, these may not necessarily be causal
- The independence of the groups can create problems. It has been suggested that more integration at a regional level is required to provide effective management
- The stewardship promoted in Landcare is already an established part of UK farming culture, so the main link between environmental management and farm profitability has already been made.

Macgregor and Warren (2006) note that one of the major success areas of Landcare has been in providing information and stimulating attitude change. Importantly, local community Landcare groups are central to decision making processes and most of

the environmental issues tackled by the groups are identified at the local level with input and assistance from agri-environmental government agencies. Land management initiatives are therefore „learner led,' with the agencies providing support. This provides groups with a feeling of „control' over their physical and socio-political environments, leading to an increased demand for information, which can easily be diffused by the involved agri-environmental agencies.

7.6 Some implications for policy development and delivery

A variety of ways to ease transaction costs are suggested in the literature (Falconer, 2000; Defrancesco et al, 2008; Barnes et al 2011). Barriers to scheme participation might be reduced or removed by additional reimbursement to farmers for carrying out transactional activities, such as farm conservation audits and management plans, self reporting etc. However, the recent study by Weber (2011) concluded that a general reimbursement of farmers' transaction costs by the public may not be appropriate, since higher transaction costs may be associated with larger farm businesses, and willingness to spend more. Other suggestions for easing transaction costs include:

- Considering options to simplify record-keeping, to reduce duplication, make attempts to capitalise upon farmers' existing records and raise awareness of computer software that could aid with record-keeping
- Increased targeting of schemes (in terms of both land and activities), with clearer objectives and more effective channelling of information; i.e. passing high-quality messages though existing networks and informing the audience
- One stop shops for management agreements would save farmers' time on claim applications and processing payments
- Targeting assistance with transaction costs on smaller farms
- Third party involvement to facilitate agri-environmental policy transactions, in particular regarding the provision of advice to farmers on the costs and benefits of schemes
- Development of farmer networks and collective options for scheme entry
- An engagement strategy which offers support for administration and emphasises the resource saving aspects of the regulation.

In relation to strengthening the relationship between farmers and policy makers, there is a need to acknowledge farmers' stewardship of the environment and the relationship between responsible farming and the maintenance of landscape, biodiversity and water quality. Given that many farmers do not consider environmental issues to be their responsibility, the current emphasis of policy measures on business benefit appears to be the most effective way to influence behaviours in the short term, although it is not clear whether this will be enough to sustain behaviour change. An increasing body of evidence stresses the importance of using intrinsic values (concern about bigger-than-self problems) in a consistent and systematic way, as a priming mechanism to drive culture change. Appealing to extrinsic (or self-enhancing) values can motivate behaviour change, but such strategies reinforce the perceived importance of extrinsic values, undermining the basis for systemic concern about bigger-than-self problems (Crompton, 2010).

Developing agricultural policy in consultation with the farming industry includes building trusting relationships, and being aware of the specific constraints that

farmers face. It is also important to set clear targets, so that farmers know what is expected of them; simplify processes (such as the planning system) where possible; and consider where more flexibility could be introduced to policy measures.

A number of mechanisms have been suggested for increasing the likelihood of effective collective action:

- Monitoring – improving audit systems can make benefits more apparent to participants
- Knowledge provision – raising awareness of the benefits of coordinated behaviours is likely to increase the number of instances of collaborative action.
- Customising policy measures to local circumstances will make collaborative working more feasible
- Developing incentives for cooperative action will inevitably make such behaviours more attractive to farmers
- Collective initiatives will be more appealing if they also serve as gateways to other services such as group training (Davies et al, 2004).

A collective approach is not cost-free. Identifying and realising benefits has its own transaction costs. The size of these costs will be affected by many factors such as how developed social networks are and how informed farmers are on these matters. Collaboration can also be risky, since it can slow down decision-making and the goals are not always clear or shared by all participants (Davies, 2006; Blackstock et al, 2009). However, the issues are worth exploring further, especially in relation to environmental issues that cover areas larger than individual farms, and as ways to encourage farmers to consider the wider implications of their actions.

Key points from the literature

Cost issues. Many mitigation options entail additional costs to farmers, and smaller farms may be less willing or able to tolerate these costs. Farmers are also required to assess risk in relation to the uncertainty of return on investment. The additional paperwork and administration associated with individual schemes are particularly unpopular with farmers.

Relationships between farmers and policy makers

- **Farmer perspectives on environmental responsibility** – farmers' first priority is the farm business. However, they may also see themselves as stewards of the landscape, and feel frustrated when this role is not acknowledged. Where environmental problems are recognised, farmers often feel unfairly singled out as the culprits. Farmers also feel that particular policy measures (such as NVZ areas) discriminate against particular groups of farmers
- **Farmer endorsement of agricultural policy** – if farmers believe that government policy is unjust, or unscientific, they are less likely to support it. This has implications for the costs of enforcing regulations, as well as damaging relationships between government and farmers.

Opportunities for retailers to help drive up standards. All major UK supermarkets are currently promoting low carbon products and encouraging producers to calculate the GHG emissions of their products. However, data availability and transparency are major issues in relation to assessment of life cycle GHG emissions of goods and

services.

Relationships between farmers. A number of environmental goods and services demanded of agriculture are difficult to provide without collective action. Farmers are generally considered to value their independence, but there have been successful instances of farmer cooperation in Scotland: marketing and buying cooperatives, for example. There is also a tradition of collective action in some areas, such as crofting communities. Broadening the role of farm advisory services and the scope of funding sources, and strengthening existing farmer networks, would help to foster a culture of collaboration and cooperation.

Opinion formers also wished to stress that uptake of policy measures could be increased by:

- **Ease of implementation** – farmers do not mind making minor adjustments to their management practices, but even measures that appear to be „win/wins' will not necessarily be adopted if they are perceived to be difficult to implement
- **Incentivising measures** – without the possibility of a new, or increased, revenue stream, most farmers do not have the time/money to implement new methods. However, it is important to convince farmers (through provision of appropriate advice) that measures are beneficial in their own right, or farmers may revert to their previous practices when the initiatives end
- **The role of supermarkets** – supermarkets have the potential to be a major influence on farmer behaviours, as they are in a position to work with suppliers to raise environmental standards, as well as being well placed to influence consumer behaviour. However, interviewees raised concerns about where the additional financial burden would fall if supermarkets should insist on more stringent environmental standards for products in the future.

Some implications for policy development and delivery

- **Transaction costs** - a variety of ways to ease transaction costs are suggested in the literature, including reimbursement of some costs, particularly for smaller farms; increased targeting of schemes, with clearer objectives and use of existing networks to channel information; development of farmer networks and collective options for scheme entry; an engagement strategy which offers support for administration and emphasises the resource saving aspects of the regulation
- **Farmers' responsibility for public goods** – it is important to acknowledge the role of farmers as stewards of the environment
- **Continue to develop agricultural policy in consultation with the farming industry** – this includes building trusting relationships and being aware of the constraints that farmers face, as well as setting clear targets, simplifying processes where possible and considering the flexibility of measures
- **Consider whether, where and how collective action might be encouraged** – this includes making benefits more apparent to participants; raising awareness of the benefits of cooperation; customising policy measures to local circumstances; collective initiatives serving as gateways to other services, such as group training.

8. IMPROVING COMMUNICATION AND KNOWLEDGE EXCHANGE

8.1 Introduction

The importance of good communication (between policy makers and farmers, between farmers and a range of stakeholders, and within the farming community) is a consistent theme in the literature. Types of information and knowledge that farming communities typically require, create, exchange and share include: market information (prices, buyers, retailers, demand, quality of products required for markets); location, availability and price of farm inputs; diagnostic information about plant and animal diseases and soil related problems; new agricultural technologies (iNARS e-conference, 2006); as well as the latest information on government policies and relevant research findings from scientists.

This chapter draws primarily on four, main, interlinked published sources, funded by Defra, as they are all recent and relevant:

- A literature review which examined the current state of understanding of knowledge transfer, effective communications and advice-behaviour change linkages relating to farmers in England (Dwyer et al, 2007)
- Fieldwork carried out as part of the same project, which involved identifying and examining a number of advisory initiatives in England. This included interviews and focus groups with a range of farmers and farm families; scheme promoters and key stakeholders
- A literature review relating to the provision of information and advice as a mechanism to encourage farmers to mitigate diffuse pollution (Blackstock et al, 2010)
- A good practice guide on influencing environmental behaviour using advice, which was produced by both sets of authors as an output from the research (Blackstock et al, 2007).

Communication issues also dominated the interviews with opinion formers, so the chapter also reflects this major focus. Opinion formers also focused on the quality, topics, and presentation of the science underpinning the information and guidance provided to farmers.

Providing farmers with appropriate, timely information and guidance is vital to ensure that they are kept up to date with scientific developments, news of regulations and incentives, funding opportunities. In the context of climate change mitigation, it is also important that information can persuade, or at least help farmers to overcome the real or perceived barriers they face. The following sections explore the range of communication mechanisms that exist; what is known about how to make messages more effective; and the impact of advice on uptake of environmental measures.

8.2 Communication mechanisms

The research by Dwyer et al (2007) investigated the means by which the advice provided by Defra and its agencies can best be implemented to promote long-term positive behaviour change in land managers. Dwyer et al considered the evidence on six key communication mechanisms; and findings relating to each of these are

summarised briefly below. (Where other research has been included, this is clearly indicated).

Mass media
This is the main vehicle for making farmers aware of new technology or schemes. The farming press is a particularly important source of information for farmers. Television, radio and audio/visual materials may have advantages as awareness raising vehicles, but are not so commonly used. However, other mechanisms are more effective in encouraging farmers to respond to the information they are given.

One-to-one advice
Farm visits from agricultural advisers have always been highly valued by farmers for keeping them abreast of the diverse range of factors affecting their businesses. Farmers particularly appreciate the fact that advice can be tailored to their specific farm situation. They value the opportunity to walk the farm with an adviser to talk things through: this is where they are most likely to feel relaxed and able to enter into a two-way communication. To be most effective, the one-to-one advice must be impartial and from a trusted and credible source.

Demonstration farms
These are particularly useful for showing how technologies and ideas can be applied in the unique local circumstances of particular farms. They also provide opportunities to interact with other farmers. To be effective, they must be widely promoted and marketed. However, often they only attract farmers with larger businesses.

Group learning
Discussion groups can encourage interchange of ideas and experiences and are often highly valued by farmers. Their success, or otherwise, is often related to the character of group members and the facilitator.

Collective events (seminars, demonstrations) are popular with the farmers who attend, but tend to self-select the most interested and innovative farmers: ie „preaching to the converted.' Messages from the case studies included in the research by Dwyer et al included the following messages in relation to good practice for events:

- Timing – maximum two hours
- Subject matter – relevant, understandable, focused, with a clear pay-off (helping farmers understand legislation, fill in forms, get a preview of business opportunities etc)
- Careful targeting to ensure the subject matter is relevant
- Some practical or applied element (such as a field walk, or case presentation by a real farmer)
- Good quality catering.

Information Technology (IT)
At the time the research by Dwyer et al was carried out, the available evidence indicated that few farmers would respond to information and advice provided through IT, although research carried out in 2006 had indicated that the situation was changing rapidly. With much greater use of internet / social media etc, farmers may be becoming more receptive to such methods of communication. More recent

research, which focused specifically on the advice available to farmers across England, reported a growing trend for farmers to use the internet to source in formation and advice. In particular, it was suggested that use of the internet for discussion forums set up alongside podcasts is ideal to overcome time and money constraints faced by farmers (AEA, 2010).

Formal or structured education or learning

Few organisations target agricultural students or provide training materials for in-farm conservation. Farmers who attend training courses are already predisposed to farm conservation activities.

Any approach to information provision will have to recognise that adoption of new practices requires both time and the capacity to interpret new information. Information is classified by farmers depending on its accessibility and relevance. Demonstration events must be deemed to add value before farmers commit time. This may be why workshops run by initiatives that provide economic incentives as well as environmental benefits (win-wins) have been particularly successful. Smaller farms, with less labour supply, have less time available to attend such events.

Dwyer et al noted that advice is moving from supply to demand driven, and advisers must become proficient and develop new skills in line with farmers' changing requirements. They also highlighted that an increasing emphasis on facilitation requires advisers to develop new skills. They recommended that a combination of communication methods is required to move farmers from a level of initial awareness to a change in actual behaviour (Dwyer et al, 2007).

Messages from opinion formers on communication mechanisms

One clear message to come from the interviews was that face-to-face events are the best way to engage farmers, although interviewees acknowledged that this option is expensive, particularly if advice is provided on a one-to-one basis. A suggestion made by many of the opinion formers related to the usefulness of facilitating face-to-face discussion through monitor/focus farms. They pointed out that farmers like to look around their neighbours' businesses to see the approaches that they are taking. If they can visit other farms and see the „win/wins' for themselves, they are more likely to be convinced of the benefits.

However, it can be difficult to persuade farmers to attend events. Even if they are keen to find out more on a particular topic, many cannot spare a day away from their farm, particularly if they are running a one-person business. Interviewees noted that farmers are more likely to have the time to consider changes to their management practices at certain times of the year: during winter months, for example. It is a good idea to target them before September, as after this point they are likely to have made their decisions for the upcoming year. It is not advisable to make contact during lambing or harvesting, and weather can also play a role. For example, 2011 was a long, wet harvest, so farmers had less spare time to consider making changes to their management practices.

Interviewees also made the point that, if farmers have too far to travel to an event,

they are unlikely to attend. In addition, only those who actually attend events will benefit from them. Although minutes/key documents can be distributed, even if non-attending farmers read these, they will miss out on many of the advantages of seeing the farm first hand.

It was also noted that, if farmers attend events and feel that those demonstrating their learning are too far ahead, it can have a de-motivating effect and attendees think „this isn't for me'. It is important that typical farms are used, so that farmers feel they can realistically follow the example of those demonstrating their learning.

To maximise the effectiveness of farming events, opinion formers suggested that they should:

- Combine multiple events to make best use of farmers' time
- Include question and answer sessions so attendees can ask the questions that make the information relevant to them
- Contain practical information that farmers can use in their businesses
- Be led by respected advocates who are good communicators and have „done it themselves,' rather than written a book about it.

Interviewees also noted the importance of using major national events, such as the Royal Highland Show. Farmers attending such events are away from the busy, hectic environment of their farms, and may be more open to considering new farming methods.

Articles in the farming press were thought to be a good way of providing information to most farmers, as reading agricultural news is already part of most farmers' routine. This is likely to be much more effective than official documents or links to websites. However, even a well placed advert is still a one-way process. Interviewees were clear that the best way to influence farmers is through interaction.

8.3 The message

The research by Dwyer et al also focused on message content, message communicators and working with farmers and their social networks. The key findings (from the fieldwork and the review) are summarised below.

Producing and presenting credible messages

Measures should be aimed at encouraging what psychologists call „central route-processing. The likelihood of success and achieving long-term attitude change is strongly linked to the ability to encourage people to think about the quality of the message. Key considerations are as follows:

- Written materials should be topical, snappy and able to be read in 20 minutes over breakfast. It is helpful to use colour and a font type and size that can be read in fairly dim lighting, as in the farm kitchen
- Messages need to be as personally relevant as possible, (for example, using „you' rather than „he' or „she' in promotional literature)
- Information should be simple, clear, and of practical use to farmers' particular situations

- Questions should be produced within arguments, to encourage people to think things through
- Messages should aim to convince the receiver that the problem is serious, it affects them, the recommendations will solve the problem, and that they are capable of performing the recommendations
- Advice is most likely to be well received and acted upon if it offers a clear financial dividend and/or is fully compatible with running a successful business
- Farmers do not want to be patronised with simplistic messages, but their time is limited, so messages that are too complex may also fail to hit home
- Messages should contain specific recommendations for action, arguments should be measured and not too forcefully phrased and, if a counter-argument is referred to, its points should be addressed directly
- Farmers appreciate advice which helps them to address current concerns (for example in relation to new legislation, new grant schemes, time-saving techniques or innovations in business management)
- Messages should target as wide a range of people as possible, using a variety of approaches and a combination of different mechanisms. Market segmentation is desirable: farmers are a very heterogeneous group
- Farmers receive a lot of „junk mail' and may only have time to scan their post for details of regulation and/or financial incentives. They feel that they receive a lot of duplicated information from multiple sources and that this wasted effort affects the senders' credibility
- Better coordination of advice would prevent duplication, and also prevent messages being undermined by conflicting statements.

Opinion Formers' views on the message

There was widespread agreement amongst the opinion formers that messages are much more effective when „climate change' is not mentioned, since many farmers do not necessarily see the relevance of the climate change agenda to their businesses. The emphasis should be on „efficiency.' For example, calling an event „grassland & livestock management' rather than a „low carbon event.'

„You need to „grab' their attention. Don't beat them over the head with climate issues – get their attention with relevant messages, and once you have attracted them to your meeting, then you can incorporate climate change topics.'

„The only way you will sell measures is by focusing on their influence on profitability.'

Interviewees had a number of suggestions for improving written materials. Many of these suggestions echo findings from the research by Dwyer et al: materials should be written by people with an understanding of farming; should be short, punchy and eye catching, using pictures where possible; should address one issue at a time, with tangible actions for farmers to take. They were also anxious to point out that:

- Most farmers already have some understanding of the issues so, rather than focusing on the basics, more technical information would be useful
- Plain English is vital. For example, focus on „tree planting' rather than „locking up carbon;' and „dredging' rather than „sediment management.' Farmers generally

prefer to be called „farmers' than „land managers.'
- If paper documents are made available at events, farmers can pick up those that they feel are relevant to them
- Laminated materials are ideal, as they last longer and survive „grubby' farming environments
- Contact details should be included on written information, so that anyone with an interest can get in touch.

Better information to help farmers to save money
Many of the suggestions for increasing the uptake of climate change mitigation measures related to raising awareness and improving the quality of advice given to farmers. Despite general awareness of mitigation measures – especially renewables – opinion formers suggested that there are still several areas where more effective provision of advice is required. It is important that farmers are made aware that they are not currently maximising their resource use and that there is „money to be made'. There is still a lot of uncertainty about exactly what the financial returns of mitigation measures will be and whether these will remain constant in the future. It was also highlighted that there is a need for more details in the press. For example, the Scottish Farmer should contain case studies and real world examples that farmers can relate to.

Opinion formers also highlighted a lack of awareness at the farm level of issues such as soil quality and the amount of fuel used for specific tasks. The latter point in particular was highlighted repeatedly as an area where greater awareness could enable farmers to save money through making more cost-effective choices. Interviewees suggested that this could be achieved relatively easily by installing meters on fuel tanks.

8.4 The messenger

The literature review and the fieldwork carried out by Dwyer et al produced consistent messages about the qualities required in those who communicate with farmers:

- Experience and practical knowledge are key factors that convince people of the reliability of a source
- Good listening skills, adaptability and resourcefulness/good networking with other experts are all essential qualities for effective advisers
- The trustworthiness of the source can be enhanced through the fluency of the speaker (and diminished through hesitancy)
- Regardless of organisation or circumstances, farmers evaluate individuals on a mix of factors, including affability, energy, enthusiasm and humour; familiarity and expertise with farming systems, common sense and ability to relate technical information to the particular farm setting
- Farmers are more willing to engage with advice when they perceive the process to be one of mutual respect and negotiation, rather than being told what to do by an external entity. The reputation of the organisations employing advisers is also important

- The ability of a message to persuade may be higher where staff with a farming background are used, although there are specific situations where non-farmers such as bank managers or academics are needed (financial/research presentations)
- The use of experienced farmers who have left agriculture prematurely may imply a failure to manage the farm properly – and the quality of the message may be diminished
- Farmers need to perceive that the organisation supplying the advice does not have its own agenda, or that , if it does, that the agenda has a good fit with the farmer's own agenda. For example, farmers are suspicious of „advice' from consultants and commercial reps that may be advertising their own services; environmental organisations may be seen to be pursuing particular objectives in ways that do not relate to, or conflict with, the core farming business.

Who do farmers trust to communicate with them? Messages from the opinion former interviews.

There was widespread agreement among interviewees across the sectors that it is very important „who does the telling'. It is vital that farmers trust the message deliverers and are sure that they „know what they are talking about.' It is also preferable that message deliverers are perceived by farmers to share their interests. For example, farmers tend to be wary of the intentions of businesses who may be seen as promoting their own interests.

Organisations that are trusted include SAC, NFUS, agricultural advisers, vets, and other farmers. As noted in Chapter 3, messages about mitigation measures that come from within the farming community are likely to be more effective than messages coming from government or NDPBs.

It can take a long time to earn farmers' trust and, once it has been lost, it is not easily regained. One interviewee spoke of his own experience as an adviser. He said it took years before his opinions were valued and, once he left, his successor had to earn this trust all over again. Although agricultural advisers are generally trusted, ultimately they are being paid to do their job, and sometimes potential conflicts of interest can lead to mistrust.

Interviewees suggested that the relationship between farmers and Scottish Government and other regulators could be improved, particularly if regulators are innovative and communicate well, with the intention of building and maintaining good relationships.

It was noted that when the single farm payment was introduced, every government office had open evenings to explain the issues and NFUS, SAC also „did their bit'. Relatively senior government officers attended and a big effort was put into explaining the change in subsidies, which was appreciated by farmers.

8.5 Working with farmers and their social networks

Provision of skills and trying new methods

- Even where the advice provided is sufficient to induce a change in people's attitudes (or knowledge beliefs), this, in itself, is not sufficient to change behaviour. Farmers must be convinced that the suggested alternative course of action is effective and that they, personally, have the ability to bring about a solution. They should have opportunities to try things out and reformulate them through direct experience. Fostering the development of skills on-farm should be seen as an essential part of any advisory initiative
- Farmers must be involved in identifying problems and solutions – effective knowledge transfer is a two-way exchange.

Localising understandings of knowledge

- Many farmers place a premium on information from locally known and credible sources, and personally relevant advice – all of which can be enhanced through localised programmes. There is strong evidence of a need to consider localising all aspects of the policy, from formulating the problem with the local community, to providing local examples for farmers to learn from, and ensuring that scientists whose research underpins advice have direct local experience.

Acknowledging the role of agri-cultures or farming styles

- Considering „farmers' as a single cultural group fails to recognise that, within any community, there are a multitude of different „agri-cultures,' each with their own concept of „good farming.' Dwyer et al note that changing behaviours, therefore, involved targeting more than individual farmers – it involves targeting whole cultures of farming. Currently productivist symbols, such as yields or the tidiness of fields continue to provide the main source of farmers' cultural capital – they are what represents „good farming' within much of the farming community. Changing the farming culture implies changing this system so that environmental assets or acts are able to generate cultural capital (generating status and self-esteem within the community through the approval of the peer group).

Developing solutions with farmers

- There is a need to involve farming culture in the process of problem framing and resolution. One potential problem with developing solutions to environmental issues with farmers is that farmers' understanding of environmental problems can be limited, and they may restrict feasible actions to those that fit with the existing farm system. In this case, collectively developing solutions with farmers may involve an iterative process of informing farmers about the issue and contextualising it within local farming, followed by a reassessment of potential solutions. Dwyer et al acknowledge that such an approach to problem solving is likely to be lengthy but may also be more likely to succeed where farmers develop a sense of both personal relevance and self-efficacy.

Connecting with social processes and networks/collective responses

Dwyer et al note that understanding how cultural groups construct and interpret knowledge is likely to be a key component in the success of any strategy to encourage behavioural change:

- Messages passed through a group are likely to have higher „in-group' status and create a positive social norm (if most farmers in the group are participating)
- In the case of environmental change, it is likely to increase the perceived efficacy of action if all are working towards resolving the issue
- If the topic becomes widely discussed within the community, it provides an opportunity for repeated attitude expression which may again increase the consistency between intended and actual behaviour
- Collective responses can lead to farmers developing solutions from within their own knowledge cultures, thus making use of local intellectual capital. This type of approach may be particularly useful in cases where there are pre-established heterogeneous groups (agri-cultures, farming styles etc) as these groups may have pre-established networks along which information (and social pressure) may pass, as well as strong sub-cultural beliefs.

The fieldwork conducted as part of the research by Dwyer et al revealed a complex picture on collective farmer-to-farmer networks:

- Some farmers reported attending farmer discussion groups and making an effort to spend time with like-minded farmers or farm-related friends. These settings allow individual farmers to both provide advice and seek advice from their peers
- Others felt they did not have time to take part in such networks, and many contrasted their current lack of a local farmer-centred social network to times past, when they would have regularly attended the mart, or agricultural shows.

Overall, larger farm business (particularly arable ones) appear to create a certain amount of „space' for their farmers to reflect and take time out to attend events and maintain social and business networks. Smaller livestock enterprises and small to medium-sized dairy farms suffer particularly from a lack of time to do anything more than cope with the day-to day business of running the farm. As a result, both business and community networking suffer, and these people can easily become isolated and depressed.

Dwyer et al noted that the key for Defra to establish long-term behavioural change is to try to ensure that the message is picked up and discussed positively within the farming community/ies. The most effective way to achieve this social learning is to ensure that certain social processes are operating within the community. For example, this includes making sure that different interest groups have the capacity to participate, and creating a favourable social environment for the use of information to underpin constructive change. Although the research found that traditional social networks have become increasingly fragmented, data suggested that farmers take a close interest in the activities of their neighbours „over the hedge,' and react to visible management change (Dwyer et al, 2007).

Working with farmers and their social networks: messages from the opinion former interviews:

Sources of advice
Interviewees acknowledged that there is a wide variety of advice available, and many farmers take advantage of multiple sources. This range is important to meet the needs of different groups. There is no one optimum method for advising farmers.

Although there is a diverse amount of information available, some interviewees questioned its quality, labelling it „vague'. Others suggested that farmers are a fairly conservative group so „a few seminars and the odd leaflet is not going to cause widespread change'.

There was general agreement that messages from different sources in agriculture are broadly consistent about the main climate change issues. The main message is consistently „Efficient use of resources will help reduce carbon footprints and save money.'

A number of the interviewees from environmental NDPBs pointed out that although the overarching goals are often aligned, different organisations may have different ways of getting there. For example, SNH focus particularly on preserving ecosystems, while NFUS are more concerned with improving efficiency of fuel use. Farmers recognise that these messages are underpinned by the politics of their parent organisation or, in the case of supermarkets and private enterprise, their marketing strategies and commercial ideologies.

It was also pointed out that farmers receive messages from a wide range of different sources that are not directly related to agriculture, and over which the Scottish Government and its agencies have no (or little) control. The outputs of tabloid newspapers, in particular, are often hostile to climate science.

Social factors and personal motivation
Farmers are influenced by the activities of their peer group and, if they see neighbours carrying out mitigation activities, they are more inclined to try new practices themselves, particularly if they can see that these actions are having positive consequences. Internal competition between farmers also plays a role here, as people do not want to be „shown up' by their peers.

Messages about mitigation measures can be much more effective coming from neighbours, peers, farming community, machinery rings etc than from government or NDPBs. Once messages begin circling amongst peer groups there is a snowball effect and they can have a much greater impact.

It was also suggested that personal motivations and attitudes influence farmers' views of mitigation measures. There is a wide range of definitions of what it means to be a good farmer. Some farmers consider the impact of their behaviour on the climate to be a real concern and would strive to reduce these effects, even if this was not a profitable strategy. However, other farmers consider climate change to be nothing to do with them. This latter group are unlikely to take any actions to lessen their emissions unless they cannot afford not to (due to either generous incentives or punitive regulations).

8.6 Knowledge exchange

Understanding, and practical implementation of, the provision of advice have both seen a paradigm shift in response to a changing agricultural context. As explored by

Blackstock et al, 2009, this shift has been from knowledge transfer approaches to human development or knowledge exchange approaches.

Knowledge transfer approaches promote, through dissemination of information and technical solutions, the adoption of predetermined practices. Criticisms can be grouped under three main concerns:

- The approach is no longer appropriate for modern multifunctional agriculture
- It does not reflect the empirical evidence of how farmers use information
- It takes no account of other influences upon the uptake of information and advice, including the knowledge generated by farmers themselves

Knowledge exchange approaches are based on the principles of „participation, empowerment and ownership of the problem.' These approaches argue for validity to be given to non-expert forms of knowledge, including local farmer knowledge, and recognise the significance of social interaction. Communication within a social system or group is regarded as an important process in articulating, sharing and exchanging ideas amongst farmers. However, as reported by Blackstock et al, there have also been criticisms:

- The approach lacks a coherent theoretical foundation
- It fails to recognise the difficulties and dangers in working with multiple forms of knowledge
- It fails to recognise problems with issues of legitimacy, accountability and representation.

The authors conclude that no single approach to influencing farmer behaviour is likely to be sufficient, and that modern agriculture requires both top-down knowledge transfer and bottom-up knowledge exchange, with the middle ground between them providing most flexibility for future extension approaches.

Communicating good quality science to farmers to meet their needs: messages from the opinion former interviews

Many of the interviewees felt that farmers do not always receive the information they need from scientists, and that an important way to improve uptake would be to focus good quality research on areas where farmer understanding is lacking, and communicating the science in ways that are meaningful for farmers. Agricultural lobby groups, in particular, emphasised this.

Interviewees noted that, although there is still some doubt among farmers about whether climate change is happening, they are primarily concerned about three main issues.

The nature of the impact of climate change
Interviewees reported that there is a widespread view amongst farmers that the effects of climate change may not be totally negative, and could even be beneficial for Scotland, due to potentially longer growing seasons. There is less understanding of the likely negative impacts such as less predictable weather, as well as increased weed and pest proliferation. Opinion formers suggested that it is important to raise awareness of these issues: „why are there not rainfall charts being actively published

in accessible form that show „this Oct we had X inches, last Oct we had x inches'.'

How can the behaviour of individual farmers make any difference?
Interviewees highlighted a degree of scepticism amongst farmers about what difference they, or even Scotland, can make. Even if they accept that climate change is a serious issue that needs to be addressed, they may be doubtful as to what impact they personally could have –„If I go from 100 to 80 cows am I really going to change the climate?'

Good quality science that meets farmers' needs
At the farm level, the science is considered to be too „hazy' and „not well-enough understood' to guide what needs to be done. It is not sufficient to say „all farms should be doing X', as in reality one farmer's optimal plan could be substantially different from his/her neighbour's based on many factors including the nature of his land, elevation or farm type.

This feeling is particularly strong in the livestock sector where farmers complain that there are no robust answers to a number of key questions such as: which types of cattle emit more/less methane? Is it better for farming to become more intensive or extensive? Should cattle be farmed indoors or outdoors? Interviewees emphasised that farmers require this kind of fine-grained data, and they need to know what works at the level of individual farms. The averages on the marginal abatement cost curves are not helpful for determining what specific businesses should do.

Although it is inevitable that the science evolves, and policy initiatives and guidance change to accommodate developments in research, farmers may be confused by what they perceive as a lack of consistency in the actions they are being encouraged to take. For example, in the recent past, anaerobic digestion was not promoted as a viable option, then it was encouraged through the FiT scheme, and now the emphasis appears to have shifted towards wind turbines and hydroelectricity.

Targeting messages
Dwyer et al note that, as receiver characteristics differ (which may influence the uptake of a message), any promotional strategy should use a variety of message approaches. Personal factors that can influence the persuasiveness of arguments, include:

- Levels of self-esteem and ability to comprehend
- Ability to recall relative beliefs and experiences
- As personally relevant as possible, as people are more likely to respond where self-interest is involved.

As discussed in earlier chapters, a good deal of research has looked at the characteristics of particular sections of the farmer population, in order to improve targeting. More sophisticated segmentation work allows such approaches to be further refined.

The segmentation model developed by Defra has been analysed in terms of the communication strategies required for different farmer categories (Pike, 2011; AEA, 2010). As described in Chapter 4, the segments may be summarised as follows:

- Custodians – farming is a way of life
- Lifestyle choice – farming is not the main source of income
- Pragmatists – a balanced approach to make a living
- Modern family business – ensuring succession to a viable family business
- Challenged enterprises – isolation is an issue

Famers in the Custodians and Lifestyle Choice segments (and Pragmatists, to some extent) favour engagement in terms of respect, partnership working towards mutual benefits, and protecting the future. People in these segments are more likely to be emotive and sensitive to needs, and appreciate an inclusive, rather than a directive approach. Modern Family Businesses and Challenged Enterprises (and Pragmatists, to some extent) are focused on business, productivity and input costs. They are more rational and pragmatic, and need hard facts and concrete reasons in order to pay attention.

Non-adopters may be farmers who are currently unaware of schemes but, if provided with relevant advice, could be persuaded to adopt them, or farmers who are aware of such schemes and resistant to them. Clearly, the messages sent to these two groups should be different. Clear and succinct information might be enough to persuade the first group, but policy makers need to have a good idea of the nature of farmers' resistance in order to engage effectively with the second group.

Barnes et al (2011) note the importance of appropriate targeting of policy intervention. However, the distinct group of farmers classified as „apathists' in their research in Scottish NVZ areas highlight the problems involved in communicating with farmers who are averse to information seeking and, potentially, disengaged from agricultural policy in general. The authors suggest that, in times of dwindling resources, it may be more cost-effective to direct group level information transfer at groups that are already taking action, and those that are resistant, allowing an increased share of the budget to be spent on an individualistic approach to the needs and concerns of members of the „apathist' group (Barnes et al, 2011).

Targeting communication: messages from the opinion former interviews

As noted earlier, opinion formers wanted to make it clear that many factors dictate what is possible on individual farms, and advice needs to be tailored accordingly. Most interviewees suggested a number of reasons why some kind of targeting of messages is likely to be helpful to improve the uptake of mitigation measures. Customising messages reflects the reality that there are many different situations facing farmers, as well as a range of potential solutions.

Targeting farm types
One suggestion was to focus on farm type. For example, arable farms would be likely to have certain characteristics in common, that are different from livestock farms. This method would be practical and easy to administer, as farm type would be easy to identify. However, it does not take into consideration the characteristics of the farmers themselves.

Prioritising the targeting of farmers

Interviewees focused on targeting farmers based on their potential willingness to adopt mitigation measures. Two possible approaches were suggested:

- Targeting early adopters: if the most influential farmers are convinced to adopt mitigation measures, this would influence the behaviour of other farmers. Those who are less interested will still receive information by „looking over the fence'. Also, if early adopters demonstrate their practice, in focus farms or discussion groups, for example, farmers who are more cautious may be reached (as long as they can be persuaded to attend)
- Targeting the majority: „early adopters' are likely to be proactive and seek out the advice and guidance they need to maximise resource efficiency on the farm. Focusing resources on reaching those who are neither particularly enthusiastic, nor too reluctant, might be more effective in the short term than targeting the most resistant farmers

Suggestions for reaching farmers who are more cautious about adopting new methods

A few interviewees noted that the messages themselves are already good, and the challenge is getting farmers to hear them. It was acknowledged that there is a „long tail' of disbelievers who are unlikely to be convinced regardless of how they are approached.

Farmers who are most resistant are unlikely to be affiliated with SAC or NFUS, so they cannot be accessed using the usual communication channels. Several suggestions for reaching these farmers were made by opinion formers:

- The SG could take advantage of RPID's records to contact these farmers, if this was handled sensitively.
- Use the farming press. Even if farmers have no contact with the SG and SAC, they probably still read Farming News.
- Provide information at livestock markets/the Royal Highland Show/local events etc. It was noted that stalls should not just contain leaflets: they need something attention-grabbing or practical to pull farmers in.

Another consideration in relation to targeting is how farmers view themselves. For example, they may not even believe that what they are doing is farming if they are not dependent on farming activities for a living.

8.7 Using a range of mechanisms to influence behaviours

There is no specific focus in the literature on the limitations of communicating with farmers using written material alone, although the emphasis is on tailoring a range of communication approaches. However, the literature on influencing behaviour in the general population is more explicit about the need for effective written materials to be supported specifically with one-to-one (or group) interaction, and with some kind of social prompt (to demonstrate that behaving in a particular way is a new social norm, for example). In an international review of behaviour change initiatives, Southerton et al (2011) introduce an „individual/social/material' framework of contexts which represent a good starting point for isolating behaviour change mechanisms and better understanding the rationale that underpins them.

- **The individual context** – covers initiatives that seek to change the attitudes and choices of consumers in ways that encourage more sustainable behaviours. Economic incentives - increasing the monetary cost of environmentally damaging activities, or offering financial incentives to undertake less environmentally damaging behaviours, are the most prominent. Such incentives do not necessarily foster long term changes in behaviour; and monetary penalties or disincentives can work to legitimate the behaviour being discouraged if people feel they have paid for the right to carry out the activity. Offering and promoting environmentally friendly alternatives to unsustainable practices is another mechanism that addresses individual choice. Such incentives make it easier for people to make the decisions that will bring about change. Informing the consumer relates to changing attitudes through education. Information campaigns are most effective when targeted at particular groups. Targeted marketing also opens the opportunity to developed campaigns attached to values that are not necessarily pro-environmental but which, nevertheless, foster more sustainable behaviours.
- **The social context**– addressing the social contexts of consumer behaviour involves attempting to shift the cultural conventions and social norms that underpin different activities. This is both difficult and problematic, as it requires shifting the foci of initiatives away from individual decisions and toward shaping and intervening in the shared behaviours of social groups. Social institutions represent social contexts through which people learn, come to understand and habituate certain behaviours. Households and families can be influenced, particularly at moments of life-course transition. A second mechanism is cultural tastes, which by definition are shared. Here the focus is less on influencing the decision making of the individual, but generating shared cultural understandings of what is fashionable and appropriate. Often, early adopters can set the trend. Community-based initiatives can aim to influence social norms by focusing on the importance of social networks for circulating information and expectations regarding appropriate behaviours.
- **The material context** – refers to the objects, technologies and infrastructures that both enable and constrain ways of behaving. Interventions in material infrastructures not only create the conditions for new habits to emerge, but have the potential to lock people into sustained environmentally friendly behaviours. Southerton et al give the example of a city's investment in a bus and cycle network – an expensive, but (it appears) effective way of providing a quick and reliable alternative to car travel.

8.8 Messages for policy development and delivery

This chapter has focused on a large body of research conducted for Defra in 2007 by researchers in England and in Scotland. A Good Practice Guide, Influencing environmental behaviour using advice, was produced as an output from that work (Blackstock et al, 2007)[23]. The Guide includes 16 good practice principles for its target audiences: „policy makers who design such initiatives and their colleagues who manage such initiatives:'

- Farmers need to believe environmental protection is their responsibility, is serious, and they can make a difference

[23]http://www.programme3.net/water/P345GoodPracticeGuide.pdf

- Farmers need to be convinced of the utility of the advice for them, and understand why there is a need to change
- Messages should be specific, targeted and encourage a response by the receiver
- Different modes of advice provision work in different ways, so it is important to use more than one approach, recognising the limitations of each
- The credibility of the source is based on the reputation of the source organisation
- The credibility of the source is based on the reputation of the individual and their relationship with the farmer
- Harness existing knowledge networks, but be aware of the complexities involved
- Recognise other professionals also give advice to farmers (for example, vets, supermarket reps, crop consultants)
- Different farmers have different motivations for seeking, thinking about and acting on advice
- The same message will be received differently by different farmers depending on their own experiences and views
- Decisions, especially strategic decisions, are normally made collectively by the farm partners or the family; and management is often carried out by others (such as labourers and contractors)
- Behavioural change is long term and may be prevented, or delayed, by constraints and/or shifting evaluations of the costs versus benefits of change
- Advice is interpreted as part of a wider set of influences on behaviour, including economic incentives and/or regulatory sanctions
- The interpretation of advice is influenced by perceptions of the changing role of farming in society and by social changes affecting the „family farm'
- The relationship between advice and behaviour changes through time
- Change occurs at several levels, from practices in an individual field to changes in society; and is affected both by „top down' messages from Europe and „bottom up' activities by local farmers.

The Guide also includes a useful checklist for the provision of effective advice:

Relevance:	Is the advice relevant to the receiver?
Credible:	Does the receiver believe the advice to be true? Do they trust the source of the advice?
Importance:	Does the receiver recognise that something has to be done?
Responsibility:	Does the receiver believe that **they** ought to do something?
Capacity:	Does the receiver believe that they **can** do something about it?
Effectiveness:	Does the receiver perceive a difference when they change behaviour?
Visibility:	Is it obvious that something is being done?

All the mechanisms included in the contexts framework (Southerton et al, 2011) have been discussed in other parts of this report. The types of initiative included in the individual context are already part of agricultural policy in Scotland; the types of levers may be categorised using the Defra „4 Es' approach; and the Defra segmentation approach is helpful in relation to targeting. The evidence on farmer behaviours has emphasised the importance of focusing on the social context, working with social networks, using moments of transition in the lives of farm businesses and looking to early adopters to set trends. The material context is also key to influencing farmer behaviours, particularly by supporting uptake of

technological innovation. However, it may be useful to consider whether and how all three contexts are relevant when developing and implementing initiatives to influence farmer behaviours.

The literature is clear that farmers are more receptive to messages which focus on efficiency and profitability of the farm business than on environmental sustainability (whether or not climate change is mentioned). However, as noted in Chapter 7, the „values' literature emphasises the importance of targeting intrinsic values to achieve sustained behaviour change. Values can be both activated (for example, by encouraging people to think about the importance of particular things) and can be further strengthened, so that they become easier to activate. One way in which values become strengthened is through their repeated activation, for example through exposure to these values through influential peers and the media (Crompton, 2010). It may be that, in the longer term, emphasising and reinforcing farmers' roles as custodians of the environment will be the most effective tool to encourage farming in more sustainable ways.

Key points from the literature – communication mechanisms

- **Mass media** – this is the main vehicle for making farmers aware of new technology and schemes. The farming press is a particularly important source of information for farmers. However, other mechanisms are more effective in encouraging farmers to respond to the information they are given
- **One-to-one advice** – farm visits from agricultural advisers are highly valued by farmers, as advice can be tailored to specific farm situations, and farmers encouraged to take up actions appropriate to their farms. To be most effective, the one-to-one advice must be impartial and from a trusted and credible source
- **Demonstration farms** are particularly useful for showing how technologies and ideas can be applied in the circumstances of particular farms, and provide opportunities for farmers to meet and exchange ideas. To be effective, they must be widely promoted and marketed
- **Group learning** – discussion groups can encourage exchange of ideas and experiences. Events should be no longer than two hours; subject matter should be relevant and focused and include a practical or applied element
- **Information technology** – with much greater use of the internet/social media etc, farmers may be becoming more receptive to these methods of communication.
- **Formal or structured education or learning** – farmers who attend training courses are already predisposed to farm conservation activities. However, workshops run by initiatives that provide economic incentives as well as environmental benefits have been particularly successful.

Opinion formers also wished to stress that:

- Farmers like to see the approaches that their neighbours are taking. If they witness the „win/wins' for themselves, they are able to assess the benefits
- It can be difficult to persuade farmers to attend events but, during winter months, farmers have more time to consider changes to their management practices
- Only farmers who actually attend events will benefit from them
- It is important that typical farms are used, so that farmers feel they can realistically follow the example of those demonstrating their learning.

- Major national events, such as the Royal Highland Show, can engage farmers away from the hectic environment of their own farms, when they may be more open to ideas and suggestions.

Key points from the literature – the message

- Written materials should be topical, snappy, colourful and personally relevant. Information should be clear and practical
- Messages should aim to convince the receiver that the problem is serious, it affects them, the recommended actions will solve the problem, and that they are capable of performing the actions
- Advice is most likely to be well received and acted upon if it offers a clear financial dividend and/or is compatible with running a successful business
- Farmers appreciate advice which helps them to address current concerns
- Better coordination of advice to farmers would prevent duplication, and prevent messages from being undermined by conflicting statements.

Opinion formers also wished to stress that:

- Messages are more effective when „climate change' is not mentioned
- Materials should be written in plain English, by people who understand farming
- There is a lack of awareness at the farm level of issues such as soil quality and the amount of fuel used for specific tasks. Better information would allow farmers to save money through making more cost-effective choices.

Key points from the literature – the messenger

- Those who communicate with farmers should combine experience, practical knowledge, good listening skills, good networking with other experts, fluency, energy and enthusiasm, common sense and the ability to relate technical information to the farm setting
- Farmers are more willing to engage with advice when they see the process to be one of mutual respect. The reputation of the organisation employing advisers is also important
- Farmers need to be sure that the organisation supplying the advice does not have its own agenda or, if it does, that the agenda fits with the farmer's own agenda.

Opinion formers also wished to stress that:

- It can take a long time to earn farmers' trust and, once it has been lost, it is not easily regained.

Key points from the literature - working with farmers and their social networks

- Farmers place a premium on information from locally known and credible sources. It is important that scientists whose research underpins advice have (or gain) direct local experience
- Within any community there is a multitude of different „agri-cultures,' each with their own concept of „good farming.' Influencing behaviours involves targeting more than individual farmers – it involves targeting whole cultures of farming
- There is a need to involve farming culture in the process of problem framing and resolution. Developing solutions with farmers should involve an iterative process of informing farmers about the issue and contextualising it within local farming circumstances

- Messages passed through a group are likely to have higher „in-group' status and create a positive social norm.

Opinion formers also wished to stress that:
- Farmers receive messages about climate change from a range of sources over which the Scottish Government and its agencies have no (or little) control. Tabloid newspapers, in particular, are often hostile to climate science
- Messages about mitigation measures can be more effective coming from within the farming community.

Key points from the literature – knowledge exchange
- Understanding, and practical implementation of, the provision of advice have both seen a shift in response to a changing agricultural context
- Modern agriculture requires both top-down knowledge transfer and bottom-up knowledge exchange (using local farmer knowledge, for example).

Opinion formers also wished to stress that:
- Farmers need a better understanding of both the likely benefits and negative impacts of climate change
- There is a degree of scepticism amongst farmers about what difference they, or even Scotland, can make, as the climate changes
- Although it is inevitable that science evolves, and policy initiatives and guidance change to accommodate developments in research, farmers may be confused by what they perceive as a lack of consistency in the actions they are being encouraged to take.

Key points from the literature - targeting messages
- A range of receiver characteristics may influence the uptake of a message, so any promotional strategy should use a variety of message approaches
- Defra's segmentation model has been analysed in terms of the communication strategies required for different farmer categories. Farmers in the Custodians and Lifestyle Choice segments favour engagement in terms of respect, partnership working towards mutual benefits, and protecting the future. Modern Family Businesses and Challenged Enterprises are focused primarily on business, productivity and input costs. They value hard facts and concrete reasons
- Non-adopters may be currently unaware of schemes, or aware of schemes and resistant to them. Different messages are required for each of these groups
- Farmers who are averse to information seeking and disengaged from agricultural policy in general are likely to prove the most difficult to influence.

Opinion formers also wished to stress that:
- Farmers who are most resistant are unlikely to be accessed via the usual communication channels. Suggestions for reaching this group include using the farming press and providing attention-grabbing, practical information at livestock markets, the Royal Highland Show and local events.

Using a range of mechanisms to influence behaviours
The literature on influencing behaviour in the general population is more explicit about the need for effective written materials to be supported with one-to-one (or

group) interaction, and with some kind of social prompt. A framework of contexts has been developed as one way to isolate behaviour change mechanisms and better understand the rationale that underpins them:

- **The individual context** – referring to initiatives that seek to change the attitudes and choices of consumers in ways that encourage more sustainable behaviours
- **The social context** – attempting to shift the cultural conventions and social norms that underpin different activities
- **The material context** – the objects, technologies and infrastructures that enable and constrain ways of behaving.

Messages for policy development and delivery

- In addition to the key messages summarised above, a Good Practice Guide, Influencing environmental behaviour using advice, includes 16 good practice principles for „policy makers who design such initiatives and their colleagues who manage such initiatives.' The Guide also provides a useful checklist for the provision of effective advice
- Although farmers are more receptive to messages about increasing the efficiency and profitability of their farm businesses, the „values' literature emphasises the importance of targeting intrinsic values (such as environmental stewardship) to achieve sustained behaviour change.

9. CONCLUSIONS

9.1 Why this programme is important

Given Scotland's ambitious greenhouse gas (GHG) emissions targets, farmers have a key role to play in mitigating climate change. There is a large and growing evidence base in relation to influencing environmental behaviours, and much of this has relevance to the farming population. Nevertheless, farmers, as managers of a biophysical resource, operate in circumstances that are distinct from other industries. Climate variability has a strong influence on yield, productivity and, ultimately, farm income. The history of subsidisation is another unique factor within this industry, especially when adaptation to changing circumstances has to be considered. So it is important to have a good understanding of factors influencing farmer behaviours, as well as what is known about the effectiveness of the policy measures available to, and in use by, the Scottish Government.

A good deal of literature has emerged within this field, and many of the findings from these studies are relevant to Scotland. Within the context of climate change related behaviours, a need was recognised to collate the available evidence to understand: factors influencing farmer behaviours; the effectiveness of approaches taken by governments to influence farmer behaviours; factors influencing uptake of policy measures and how uptake might be improved. This report has also provided the opportunity to look at the types of policy levers which are, and are not, at present being used by the SG.

The perspectives of a range of „opinion formers' who are familiar with Scotland's farmers' current experiences and views add value to the work of the evidence gathering programme.

The work is timely because of the need to meet the interim target of a 42% reduction in GHG emissions by 2020. There is also the opportunity to influence measures which could be implemented under CAP reform after 2013, and the next phase of the SRDP, as well as feeding into the ongoing development of agricultural and climate change policy more generally. Accordingly, we seek to answer a number of pertinent questions related to farming behaviours and meeting GHG emissions targets.

9.2 Is change practical and possible?

It is important to acknowledge the need for a range of policy measures, and to take account of regional and farm-specific circumstances. Farmers may be constrained by their ability to make changes to their businesses; for example because of the size, type, and geography of the farm; tenancy arrangements etc. Where relevant, the issue of climate change needs to be contextualised to local farming circumstances.

Although farmers are influenced by a complex mixture of factors, uptake of measures is improved by allowing greater ease to adopt newer, or change present, practices, through flexibility within regulation, access to finance, or by appealing to the farmer's underlying values and motivations. There are also particular times and

circumstances when farmers are more receptive to change – it is important to capitalise on these.

The segmentation approach, adopted and promoted by Defra, provides a means for targeting initiatives or for engagement: i.e. to represent different farming styles. Although there are limitations to the approach, there is a real opportunity to use Scotland's Farm Accounts Survey (FAS) to begin to relate performance to values and attitudes which infer farmers' approach to their businesses. SAC have confirmed that there are plans to add a short questionnaire to the FAS in 2013 to gather information that will facilitate segmentation, although the farmer types developed for Scotland may be different from the Defra typology. This should also allow more accurate forecasts to be made regarding uptake of different measures and, in turn, allow better targeted initiatives which are sensitive to farmers' value systems, as well as their circumstances.

9.3 How can uptake of measures be encouraged?

A range of different climate change mitigation measures already exist in Scotland for farmers. It is important to be aware of the initiatives available, the interplay (and possible dissonance) between different policy approaches, and whether evidence exists to assess their effectiveness. This programme has identified a number of key issues that need to be addressed:

- Cultural capital issues. It is important to farmers that they are able to demonstrate their expertise, and that signs of their skills are visible to others. Productivist symbols are easy to demonstrate; environmental stewardship ones are less so
- Encouraging innovation. There are many good reasons why farmers tend towards caution, but there will always be potential innovators who can be encouraged. Since farmers are influenced by their peer group, it is important to ensure that innovative farmers are supported as exemplars. Allowing farmers more innovation in conservation practices, through providing more flexibility about how they meet defined goals, may encourage a sense of pride in their expertise
- Demonstrating new farming techniques/technologies. Farmers appreciate the opportunity to try things out for themselves, but they have limited time to travel to events, and need to be sure that techniques/technologies will work on their type and size of farm, in their geographical region and with their soil conditions etc. Demonstration activity does not necessarily require a permanent network of fixed farms. Using a wider range of farms for specific activities might be a more flexible option and make it more convenient and relevant for farmers to attend demonstration events
- Mandatory and voluntary issues. Mandatory policy measures will have higher levels of uptake but, if farmers resent them, there are implications for the cost of monitoring and enforcement, as well as breakdowns in trust between farmers and policy makers/regulators, and possible spillover in terms of lack of uptake of voluntary measures. In particular, farmers need to understand the rationale for cross compliance measures, and be convinced by the science behind these measures. If farmers are encouraged to adopt actions voluntarily, long-term behaviour change is more likely, as actions become embedded within individual

habits, and may contribute to changing social norms within the farmer peer-group

- Collective action. Climate change, like many environmental challenges, has many impacts which are difficult to address at the level of the individual farm. In addition, major renewables initiatives may only be feasible if farmers collaborate. There is mixed evidence in relation to collective action, however. Further research (to examine models operating in other OECD countries, for example) may provide useful lessons for Scotland
- Considering all available policy levers and obtaining a mix of measures working in tandem. Focus farms use all four types of levers. It is not always necessary to bring in all four, depending on the circumstance and desired outcome, but it may be useful to consider which are not being used at present, and whether/how they could be, within the context of climate change
- Working with farmers. It is important to consider the farming industry when building agricultural policy, in order to build trust and for policy makers to benefit from the experience and expertise of farmers.

9.4 What do farmers need to know about the impact of climate change, and what they can do to mitigate its effects?

Evidence suggests that it is important to focus on „the message,' whether that is information about regulations; actual and potential impacts of climate change; initiatives/funding available to farmers; news of opportunities to try out new technology, or any other issue about which the SG and its agencies communicate with farmers. The nature of the message; how it is expressed and presented; who communicates it and how; are all important issues that need to be considered. It is also important to consider wider knowledge exchange activities that acknowledge farmer experience and expertise; and involve farmers in discussion and direction setting. In tandem with this, the development of scientific goals and research, and how results are communicated should be considered to help both parties understand and respect each other's needs.

Policy makers are already aware of many of the issues relating to effective communication and a range of communicators (such as agricultural advisers, NFUS, SEPA) are already taking them into consideration. However, there are always opportunities for improvement. The Defra good practice guide, Influencing environmental behaviour using advice, provides a useful range of principles and a checklist for the provision of effective advice. A Rural Advisory Service working group, convened by the SG, is currently tasked with identifying a shortlist of viable options for the provision of rural advice under the new SRDP, and there are opportunities to take into consideration the key messages from this evidence gathering exercise in relation to improving uptake, communication and knowledge exchange.

The interviews with a range of opinion formers in the agricultural community, carried out as part of this programme of work, highlighted a number of issues where there are specific information needs, as well as misperceptions and misunderstandings in the farming community. For example:

- There appears to be confusion among farmers about the potential impact of climate change on agriculture in Scotland. Farmers need to be fully aware of the

implications of more unpredictable/severe weather; and the likely increase in the number, type and virulence of disease and pest outbreaks, as well as the potential benefits (such as longer growing seasons). If farmers are more aware of what climate change is likely to mean to them, they are more likely to engage with, and be receptive to, actions intended to mitigate climate change

- Farmers have limited time to spend on knowledge exchange activities. The interviewees suggested that, for example, clear and accessible charts of past rainfall would allow farmers to monitor changes from year to year. However, changes in weather over a short period will not necessarily be indicative of a longer term trend. Given the demands for reducing uncertainties, communicating predicted patterns in rainfall and temperature should perhaps be investigated further
- Uncertainty exists at the planning stage, through possible regulatory strictures related to target setting. Some farmers appear to be expecting emissions targets to be introduced at the level of the individual farm, and are planning to wait for targets to be introduced before implementing their „quick hit.' It is important to make it clear to farmers that targets will relate to broad management practices, rather than to individual farms, and that farmers will not be penalised if they adopt technologies and practices that anticipate targets
- Whatever farmers believe about the impacts of climate change, it appears that many feel there is nothing they, as individuals, can do to affect the climate („it's just a drop in the ocean'). There are similar views emerging from work related to the general public, and a number of sociological and psychological theories are directed at stimulating a greater awareness of an individual's contribution to creating change
- There appears to be a feeling within farming that supermarkets demonstrate inconsistent practice by expecting particular environmental standards from farmers, and then shipping, flying and driving goods in from around the world. Better information about the actual impact of food miles travelled and specific agricultural techniques would be helpful
- Farmers' trust can be damaged when the messages they receive at different times appear to be inconsistent. When communicating with farmers, it is important to acknowledge that science evolves, and that actions encouraged at one time will not necessarily be the same as those promoted two or three years later. Future guidance should make this clear.

9.5 How do we achieve sustainable farmer behaviours in relation to climate change mitigation?

It is important to support and promote the activities of farmers who are innovators and early adopters of technology and practices which will mitigate GHG emissions, since many farmers are influenced by the activities of their peers. Accordingly, the role of changing social norms is important in achieving sustainable farming behaviours. Farmers who will not engage present a significant challenge to policy makers, and the social norm route is worthy of investigation to help capture and influence those who are disengaged. Furthermore, it has been suggested that new channels of information transfer may be more attractive to farmers in this group, but more research is needed to explore engagement techniques.

Many farmers respond to messages about business benefit rather than to public concerns related to climate change. Although economic incentives can induce positive environmental behaviour among farmers, it is questionable whether there is necessarily any corresponding attitudinal change. Where behaviours are changed without corresponding changes in attitudes, they are potentially unsustainable without continued support and intervention. However, once farmers have engaged in an environmental project, this may impact positively upon their management of other areas on the farm, or their likelihood of engaging in other or more ambitious environmental projects.

There is an increasing body of evidence on the importance of using intrinsic values (concern about bigger-than-self problems) in a consistent and systematic way to drive long-term culture change. Values can be both activated (by encouraging people to think about the importance of particular things) and further strengthened, for example through exposure to these values through influential peers and the media, so that they become easier to activate. Promoting farmers' environmental stewardship role, in addition to extrinsic (business benefit) motives in farming would be likely to encourage a balance of business and environmentally oriented behaviours, stimulating sustained behaviour change.

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