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Practical Delivery of Farm Conservation Management in England

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Practical Delivery of Farm Conservation Management in England

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Michael Winter, Jane Mills and Amanda Wragg

EXECUTIVE SUMMARY

The objectives of the research, as set out in Chapter 1, are to:

- establish an understanding of the dynamic nature of farm decision making, in the context of changing farm management structures, policies, markets and technologies;
- review and evaluate practical experience of information transfer to farmers with particular reference to sustainable farming and wildlife conservation;
- review and evaluate options for better delivery of conservation objectives.

The following methods were used:

- a literature review of farm policy, investment decisions, knowledge transfer and uptake, and differing organisational and national approaches to farm conservation advice;
- a modelling exercise to consider the likely impacts of Agenda 2000 reforms;
- discussions with farmers in three regional panels;
- interviews with farm conservation advisors and policy officials.

Chapter 2 examines the significance of knowledge in contemporary agriculture drawing on the sociology of the knowledge society. Modern knowledge systems do not involve a single one-off transfer of knowledge but a process of feedback and iterative learning. Thus knowledge is a crucial resource rather than a means to an end in continuing market development. Global information technology systems mean a potential technology convergence unparalleled in previous technology revolutions. Put alongside economic globalisation, this convergence means that farmers are potentially caught up in global information systems. There is a risk that sections of the farming community will be marginalised or excluded from knowledge systems.

Chapter 3 deals with the three drivers of agricultural change – technology, markets and policy (TMP) within the context of farm households as the location of decision making. Regarding technology, it is now widely accepted that sustainable agriculture is knowledge intensive involving the adoption of technologies that require a high level of management skills. Any analysis of markets requires attention to both outputs and inputs. The most obvious fact about commodity markets is that price trends are broadly downwards due to the strength of sterling, CAP reform and world market trends. Moreover, the BSE crisis and other scares have left consumers concerned about the impact of farming on the general environment and the safety and quality of food. As a consequence the agricultural industry is facing the challenge of rebuilding consumer confidence in British farm produce. Opportunities to buck, or reduce, the downward trend occur as a result of increasing interest in organic, environmentally friendly, animal welfare friendly and local produce. The market is becoming more differentiated and farmers require knowledge to comply with market requirements and opportunities. So too with policy, farmers require knowledge of price structures, market

regulations and potential future cross compliance rules relating to the production of a particular CAP commodity. The chapter outlines three contrasting approaches to decision-making within the farm household and considers how farm households might adjust to the changes currently affecting the industry.

Chapter 3 shows that opportunities to influence agri-environmental knowledge provision should not be pursued solely with regard to a separate policy sector labelled 'conservation advice'. While traditional conservation advice may remain a key to the effectiveness of various policy instruments, including regulation, mainstream agricultural payments and agri-environment incentives, it is likely that attention should be focused on other areas too across the spectrum of technology, market and policy development.

Market and policy developments are leading to radical change within the agricultural industry. A 'knowledge economy' in agriculture is required comprising a blend of traditional and novel expert advice, networked advice from a trusted peer group, and demonstration sites. Thus, knowledge is crucial to English farmers within the wider context of global restructuring and developments in communications technologies. It is important that sections of the farming community are not marginalised through lack of access to information relating to research findings and policy developments. The information age requires interaction and participation rather than a more traditional 'top-down' approach to advising farmers.

Overall, farmers' knowledge is to be understood within the context of decisions based on micro-economics and an understanding of market opportunities and technological possibilities; decisions which are influenced by policy initiatives and legal frameworks; and the more personal choices which occur at the level of the individual household. To aid the farmer in these decisions, is a variety of codified and tacit knowledge, available through education, training, advisory and informal channels. Farmers have valuable local knowledge that is often excluded from the formal R&D/advisory system. Ideally advice provision should be site specific and include local knowledge. Farmers need to be aware of policy as it affects price structures, agri-environmental schemes, their legal responsibilities and general land and conservation management issues.

Chapter 4 provides a description of the organisational structure of the agricultural knowledge system (AKS) operating in England. Each organisation or sector which makes a contribution to advisory provision is included with an attempt made to outline the quantity of advice offered. Thematically, the chapter considers the issues of vertical and horizontal fragmentation. Vertically, the relationship between the different levels in the English AKS is seen as weak: the technology transfer problem, with inadequate mechanisms for the delivery of research outputs (either as new knowledge or new technologies) to farmers through demonstration or via advisers, trainers and educationalists. During the 1970s and 1980s the state advisory service, ADAS, provided a partial solution to the vertical fragmentation problem through provision of free agricultural advice, technical bulletins based on R&D work, and an R&D programme linked to its own experimental husbandry farms. During this period, links between advisers and scientists were strong, and (partly due to the central funding role of MAFF) there was close communication between universities, research institutes (RIs) and MAFF.

The technology transfer problem arising from vertical fragmentation has been compounded by the changing nature of the technologies deriving from publicly funded research. R&D primarily oriented towards production techniques is likely to result in technologies that can

be developed and marketed within the commercial agricultural supply sector. New machines, agro-chemical products or plant breeds marketed by commercial companies provided a ready solution to the technology transfer problem under productivist agricultural conditions. However, there has been a substantial shift in publicly funded R&D away from production-oriented science and technology towards science designed to deal with concerns over environmental issues, animal welfare and food safety. Such issue-driven research does not always result in commercial applications. Moreover, even if the results of environmental research might have potential commercial benefits to farmers, this is now less likely to derive from the purchase of new products.

Horizontal fragmentation relates largely to the extension sector. There is differentiation in the operation of the AKS spatially by region and by sector. We find a plethora of organisations and initiatives devoted to some extent to providing agri-environmental information and advice to farmers. The situation in the 1970s and early 1980s saw ADAS, the front-line agricultural advisory service, joined by the Farming and Wildlife Advisory Group (FWAG) and local authorities (including National Parks) as providers of advice to farmers. This inevitably led to significant geographical discrepancies in the quantity and quality of advice available. Since then the situation has become considerably more geographically complex for two reasons. First, the emergence of geographically specific agri-environmental schemes, such as Environmentally Sensitive Areas (ESAs), introduced intensive systems of information provision in specific areas. Secondly, areas designated as 5b areas under the European structural programme have brought about a burgeoning of schemes with an environmental advice element. There is little evidence of any degree of co-ordination of these conservation schemes. Even the provision of agri-environmental advice with public funding appears to lack co-ordination.

Chapter 5 examines the different methods that are used within extension. A number of tools are used by organisations delivering conservation information - advisory publications; group meetings; face-to-face advice; and demonstration – and these are examined in turn in this section of the report. It is useful to identify opinion leaders within particular stratum on an extension scale so that messages may be diffused horizontally. For effective technology transfer, scientists must communicate with farmers. It is important to engender farmer participation through 'bottom-up' processes which are related to local economic, social and environmental conditions. Such collaboration can be achieved by making budgetary allowances for training provision (for advisers) within research grants. A drawback is that farmers can be inundated with such advice and tend to ignore publications through information overload.

Face-to-face advice through farm visits is the preferred advice delivery mechanism for many farmers. It allows participation by farmers and for attention to be given to farm plans on an individual basis. There is evidence that personal communication with advisers plays a significant role in convincing farmers to take-up agri-environment schemes. Presentations through conferences, meetings etc. is a cost-effective process in terms of influencing the most progressive farmers but there is no guarantee that the people who would most benefit will go along to such events.

Farmers also appreciate good demonstrations since 'seeing is believing'. Longer-term projects allow farmers to see some of the benefits of conservation schemes more fully. The farmer panels indicated that farmers do not generally go back to the same demonstration farm for

repeat visits, and there was a suggestion that it might be better to have a number of farms within a specific locality demonstrating different aspects of farm management.

There is a gradual uptake of Information Technology within the farming industry but currently it is skewed towards larger, arable areas in the east of the country (there was also evidence of this bias from the farmer panels). There is a view that IT will not become a substitute for face-to-face contact.

Training schemes under the RDR offer an important new way forward for the provision of information to farmers in the coming years.

Chapter 6 examines the issue of effectiveness in general terms and considers how reforms might improve effectiveness. One of the most important findings that emerged from the regional farmer panels is that conservation advice should be married with a demonstration of financial gain. Building an effective strategy to improve information provision for an environmentally sustainable agriculture requires a recognition of different types of knowledge and this should be an underlying principle at the heart of any strategic thinking on future provision. In devising any agri-environmental knowledge systems, it is necessary to identify both the kind of knowledge particular groups or categories of farmers require and how such knowledge should be provided. In addition, the investment of public money in knowledge provision requires the identification of criteria for success. The chapter identifies a number of suggestions for reform of the delivery systems so to improve effectiveness.

Chapter 7 provides a brief overview of global developments in Agricultural Knowledge Systems (AKS). It presents case studies of specific projects in Australia and the Netherlands and reports on the findings of an OECD conference on AKS. Three clusters of key concepts emerge around the themes of ‘interactive networks’ and ‘partnership’; ‘social learning’ and ‘participation’; and ‘monitoring’ and ‘evaluation’. It is concluded that the challenge facing policy makers is to facilitate networks and ensure that adequate partnerships are in place between actors to maximise the potential of interactive networks. In best practice cases around the world it is clear that social learning based on the participation of farmers in the knowledge process has replaced top-down information transmission. Finally, the need for evaluation and monitoring emerges strongly from the OECD conference.

The report’s recommendations are as follows:

English Nature should take the lead in stimulating informed debate on the issues contained in this report and appropriate policy responses. A joint departmental and agency working group be established to:

- consider the knowledge needs of a sustainable agriculture;
- consider how best to co-ordinate extension activities within the public sector;
- offer guidance, support and promote best practice to those undertaking extension activities outside the public;
- develop broad programmes of monitoring and evaluation;

- consider how best to target extension activities via local initiatives and innovation. This would encompass both geographical targeting in terms of the regional/local needs of the agricultural industry and priorities for particular habitats and Biodiversity Action Plan species.

- consider how best to establish suitable mechanisms to link agri-environmental science findings to various forms of extension. The interface between research and extension should be more open and direct, and in the funding of scientific research, account should be taken of the need for dissemination of research findings through advice provision/technology transfer. This may most usefully take the form of interactive dissemination through demonstration, discussion groups etc. Researchers need to be accessible to farmers allowing the opportunity to build relationships, e.g. by attending conferences, meetings, events and shows.

Subject to the findings and conclusions of such a working group, we anticipate the need for the following reforms to be put into place if effective farm conservation management is to be achieved in England:

- horizontal co-ordination and affiliation of information providers, preferably at a regional level;

- vertical co-ordination of AKS to ensure better technology transfer and dissemination of research findings;

- greater stimulus given to the participation of farmers in knowledge networks vertically with research organisations, horizontally with information providers and interactively with other farmers;

- much greater attention within constituent parts of the AKS to the emerging diversity of the agricultural industry. This should cover the needs of new entrants, contractors and consultants, and the implications of new land uses and developments in the agro-food sector;

- knowledge provision that fully integrates business and conservation advice.

1 INTRODUCTION

1.1 Background

1.1.1 Agriculture is one of the most important economic sectors to nature conservation covering the largest area of land of any industry. English Nature is concerned with agriculture as it affects the management of special sites and also as the main influence over landscapes outside of these sites. Trends in farming over many years have pushed farmers to intensify production resulting in further pressures on wildlife.

1.1.2 Government policy, market developments and the availability of new technology are factors driving agricultural change. The decisions made by farmers with regard to each of these have lasting impacts on wildlife and their habitats. English Nature has long recognised the importance of farm-scale decisions and has worked to influence farmers and land managers in a number of ways. Its current priorities are to:

- work with owners and occupiers to ensure that the many SSSIs which are not in favourable conservation status are brought up to the standards required of designated sites;

- build strategic links with land management partners, such as the CLA, NFU and FWAG to ensure that wildlife features have a high priority within their own services to farmer sand managers;

- develop practical ways of ensuring the conservation management of sites through the Forum for the Application of Conservation Technologies (FACT) and the Grazing Animals Project (GAP). FACT seeks to identify, and take action on, land management problems that are currently hindering or preventing the delivery of biodiversity targets (Small *et al* 1999). For example, it has worked with the Machinery Ring Association to promote machinery sharing of benefit for mangers of wildlife sites. GAP seeks to co-ordinate and integrate interested parties to secure sustainable grazing of nature conservation sites. Co-ordinating the use of grazing animals is now taking place through Regional Grazing Schemes co0ridnated nationally by English Nature (Small *et al* 1999).

1.1.3 The purpose of the report is to provide information and analysis to English Nature to assist it in its deliberations about whether these priorities should be added to or amended. In particular the research team set out to examine the importance of advice and information to farmers and land holders making decisions in the wider countryside.

1.1.4 The importance of advice and information for farmers has long been recognised. For the first forty years after the Second World War, the state (MAFF) offered free agricultural information to farmers in England, particularly through the National Agricultural Advisory Service (NAAS), its successor ADAS and the Agricultural Training Board. Alongside this production oriented advice there arose in the 1970s a number of environmental advisory initiatives, especially the Farming and Wildlife Advisory Group. Free agricultural advice on demand was ended in 1986. The provision of environmental advice has grown but it is a diverse sector with much variation across the country in the nature and extent of provision.

1.1.5 Notwithstanding the importance of advice and information, it is fair to say that this aspect of agriculture has often been neglected in both research and policy making. It has a cinderella status alongside the emphasis given to the analysis of markets and the Common Agricultural Policy. And yet, as we discuss in Chapter 2 of this report, information is at the heart of contemporary economy and society.

1.1.6 It is therefore timely that English Nature should commission research to examine the role of knowledge in the practical delivery of conservation management on farms in England.

1.1.7 This project has been undertaken during a period of sustained crisis in agriculture. Total Income From Farming (TIFF)[1] fell by over 60% between 1995 and 1999 (Table 1.1, Figure 1.1). The general trends associated with the crisis are well known but it is difficult to predict with any certainty how far some of these developments will go. Some of them provide a continuation of well-established trends; others are relatively new. Key points of continuity are a further shedding of agricultural labour and a trend towards enlargement of enterprise. MAFF Census figures show that the total number of full-time employed workers employed in UK agriculture fell from 130,000 in 1988-90 to 95,000 in 1999. As an example of increasing enterprise size, the number of UK dairy holdings with less than 50 cows fell from 18,100 in 1994 to 13,300 to 1999. The average dairy herd size increased from 66.9 to 73. During the same period the average sheep flock size increased from 222.9 to 246.4 and the average pig-breeding herd from 70.7 to 91.5. The average size of farm holdings, on an upward trend since the 1960s, seems to have stabilised with a slight decline from an average of 70 hectares in 1994 to 66.6 in 1999. This reflects the increased importance of hobby holdings.

1.1.8 Declining commodity returns have prompted a continuation of the cost cutting associated with attempts to target inputs that could first be identified in the late 1980s. Sales of new machinery and buildings have been affected by the crisis. In the land market, there is a surprising degree of buoyancy in short term letting of grassland due to stocking rate rules but the long term trend must be open to question given the difficulties in the livestock sector. Farms sold with vacant possession are increasingly bought by non-farmers for residential purposes and the nature of land occupants is consequently undergoing a slow transformation. Increasing publicity is being given to new market outlets for food and even those farmers with no desire to take part in organic farming or farmers markets are likely to find themselves caught up in quality assurance and traceability schemes as an everyday part of their farming activity.

Table 1.1 Total Income from Farming in UK

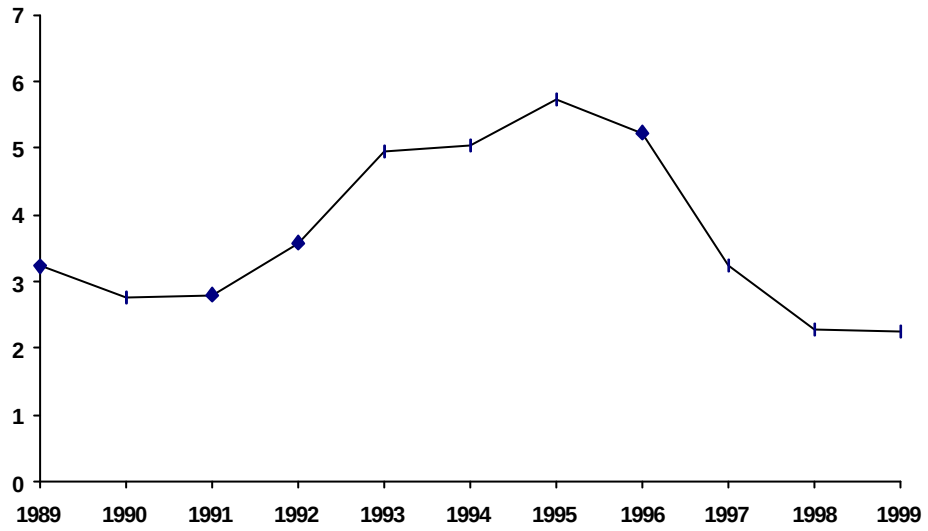
	89	90	91	92	93	94	95	96	97	98	99 est
TIFF £billion	3.23	2.77	2.80	3.58	4.95	5.03	5.72	5.23	3.25	2.28	2.25
TIFF/head £'000	12.4	10.9	11.1	14.3	19.8	20.5	23.7	22.0	13.8	9.8	9.9

Source: MAFF Press Release

2.1.1

[1] Total Income From Farming is business profits plus income to workers with an entrepreneurial interest (farmers, partners, family workers).

Figure 1.1 Total Income from Farming in UK (£billion – real terms)



Source: MAFF Press Release

1.1.9 It has not been our purpose to examine the crisis in any greater detail than this but it is important to recognise the dramatic changes that may yet engulf the agricultural industry if the crisis deepens still further. We have striven to take these factors into account in undertaking this research. In discussing environmental advice and information for farmers it is no longer adequate merely to assert its importance and make pleas for expanded provision. Environmental management can no longer be a bolt-on to a flourishing farm sector. Some would argue that it will either be integral to farmers' responses to crisis or it will be insignificant in their decision making.

1.2 Research Objectives

1.2.1 The objectives of this research are to:

- establish a conceptual and applied understanding of the dynamic nature of farm decision making, especially in the context of changing farm management structures, policies, markets and technologies;

- review and evaluate practical experience of information transfer to farmers with particular reference to sustainable farming and wildlife conservation, drawing on experience in the UK and abroad.

- review and evaluate options for better delivery of conservation objectives, both at a conceptual and practical level. Evaluate existing structures and recommend changes to existing delivery networks and structures in England (which may include options for the development of a pilot approach to practical farm management advice either through English Nature directly or working through defined partner organisations).

1.3 Research Methods

1.3.1 The following methods have been deployed in the production of this report:

- an extensive literature review of farm policy, investment decisions, knowledge transfer and uptake, and differing organisational and national approaches to farm conservation advice;
- a modelling exercise to consider the likely impacts of Agenda 2000 reforms;
- discussions with farmers in three regional panels based in hill farming, mainly cereals and mixed arable/dairy areas;
- key interviews with farm conservation advisors and policy officials at the CLA, NFU, FWAG, FRCA and ADAS. (see Appendix 1 for copy of Questionnaire).

1.3.2 It is important to note that much of the report draws on secondary sources and some of its limitations are a direct consequence of the paucity of material on many aspects of this topic. The research was based on a time budget of just 40 person days to conduct an extensive literature search, farmer panels and a modelling exercise. In the event the budget was exceeded, at the consultant's own cost. It is clear that considerably more work is required in this area especially empirical work that will inform future policy making.

1.4 Report Structure

1.4.1 The research objectives are reflected in two main sections to this report. In the first we present an account of the context for farm management decision making. We suggest that technology, markets and policy (TMP) provide the key external context in which decisions take place within the farm household. The second section examines current knowledge provision. This is a long and rather laborious section because it is necessary to establish a factual account of advice and information provision if English Nature is to consider its own potential role.

2 AGRICULTURE AND KNOWLEDGE

2.1 The Knowledge Revolution

2.1.1 We live in a knowledge or information society, and as citizens of such a society are inevitably caught up in a process of 'lifelong learning'. That is a message that has emerged powerfully in public discourse during the past decade. Whilst it might be easy to caricature such bold claims as hyperbole, not least because of the patent unevenness of knowledge provision, it is clear that global processes of restructuring are taking place and, within these processes, issues of education and information are crucial. Agriculture is part of the wider economy and, consequently it is caught up in these processes of transformation. Indeed, given the recent advances in genetic science, some would argue that agriculture is well to the fore in the new information age.

2.1.2 This is not the place for a detailed discussion of the sociology and economics of the information revolution (but see Stehr 1994; Webster 1995). Of the innumerable published works on the subject, Manuel Castells magisterial trilogy, *The Information Age*, provides one of the most persuasive accounts of current trends:

> ..... the core of the transformation we are experiencing in the current revolution refers to technologies of information processing and communication. Information technology is to this revolution what new sources of energy were to the successive Industrial Revolutions, from the steam engine to electricity, to fossil fuels, and even to nuclear power, since the generation and distribution of energy was the key element underlying the industrial society. However, this statement on the pre-eminent role of information technology is often confused with the characterisation of the current revolution as essentially dependent on new knowledge and information. This is true of the current process of technological change, but so it is of preceding technological revolutions ..... What characterises the current technological revolution is not the centrality of knowledge and information, but the application of such knowledge and information, to knowledge generation and information processing / communication devices, in a cumulative feedback loop between innovation and the uses of innovation. (Castells 1996: 31-32)

2.1.3 A number of implications for agriculture may be drawn from the work of Castells:

- There is no single one-off transfer of knowledge, as with the promotion of a specific new technology, but rather a process of feedback and iterative learning. This has implications for learning processes in agriculture.

- Knowledge itself becomes a crucial resource rather than merely a means to an end. It is no longer enough to *apply* a specific knowledge, but rather to investigate new knowledges in terms of market developments and new technologies. The new technologies act on information and do not merely provide information to act on technology.

- Global information technology systems mean a potential technology convergence unparalleled in previous technology revolutions. Put alongside economic globalisation,

itself largely facilitated by the information revolution, this convergence means that farmers are potentially caught up not just in national but also global information systems.

- Uneven access to knowledge becomes a key factor in determining levels of social inclusion. There is a risk that sections of the farming community will be marginalised or excluded from knowledge systems with detrimental consequences not only for their own businesses but for the sustainability of rural systems.

2.1.4 The basic message that emerges from this brief reference to the work of Castells is that our approach to agricultural knowledge provision must inevitably be more radical and far-reaching than in the past. No longer is it sufficient to characterise provision in terms of a top-down extension system in which knowledge is merely seen as a technology to be transferred. The information age requires interaction and participation.

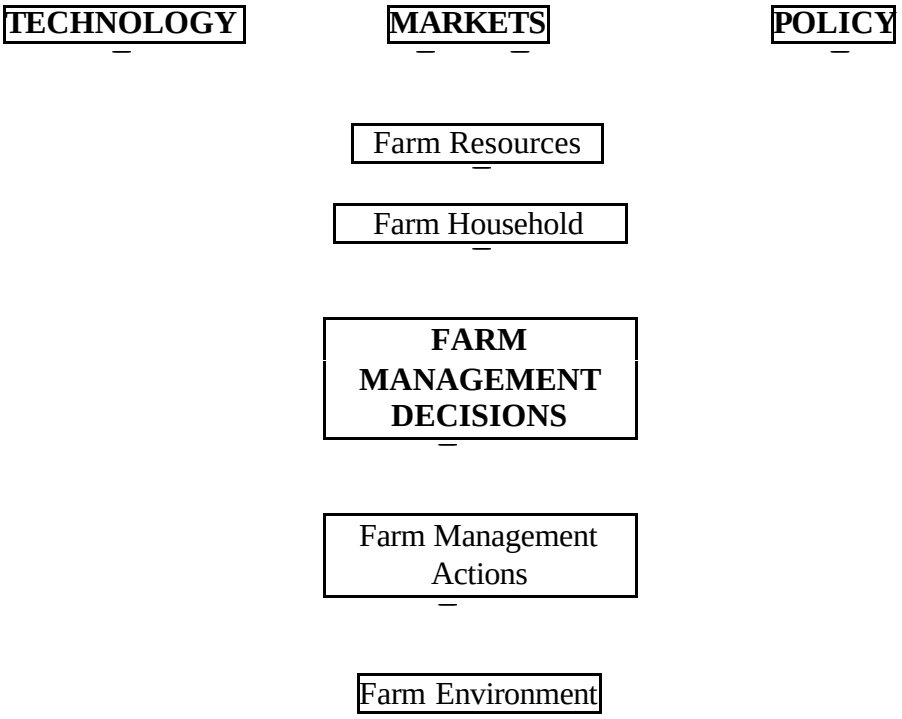
2.2 The Role of Knowledge in Farm Management Decisions

2.2.1 The purpose of this section is to develop an understanding of the factors that impinge on farmers in their decision making in order to provide an adequate conceptualisation of contemporary farm decision making. This is to help us to identify factors which may inhibit or encourage the adoption of environmentally benign management on farms in England. It is important to emphasise that it is not the aim of this project to provide equal treatment of all factors, nor comprehensively to assess their relative importance, as this will vary by issue and across farm types. The project is concerned with one key factor, *knowledge*, and most of the remainder of the report involves an assessment of knowledge provision for farmers. However, we do not wish to imply that knowledge is necessarily the most important, still less the only, factor of importance in determining environmental outcomes in English agriculture. Moreover knowledge is important in so much as it pervades and underpins other factors, rather than acting as a separate free-standing factor of production.

2.2.2 The knowledge a farmer possesses hugely influences his or her farm management decisions and practices. Figure 2.1 provides a schematic presentation of the farm management decision making process. Knowledge pertaining to technology, markets (covering both inputs and outputs) and policy (TMP) impacts upon farm resources. These *resources* include farm size, type, topography and edaphic conditions, as well as capital and occupancy characteristics, including debt and rent commitments. Increasingly too, farm resources include the benefits and disbenefits of earlier policies, particularly the presence or absence of quota. This resource richness or otherwise may also be linked to locational factors vis-a-vis environmental designations and eligibility for agri-environmental or structural fund schemes.

2.2.3 The impact of TMP on farm resources should not be understood as a deterministic process. Farmers' actions cannot be pre-determined by an algebraic formula coupling TMP and farm resources for two reasons. First, farm household characteristics are of importance. The size and age profile of the family, its stage in the family life cycle, levels of integration into other economic sectors, all serve as feed-back factors into farm management decision making processes.

Figure 2.1 The Farm Management Decision Process



2.2.4 Secondly, knowledge pervades the decision making sequence throughout. It is the farmer's knowledge which determines how the signals from TMP are interpreted and acted upon. The farmer's understanding of, and ability to manipulate, the on-farm resources of land, labour and capital is dependent on such knowledge. Within the farm household, too, the knowledge, skills and abilities of all individuals will be crucial in the decision making process. Levels of educational attainment will influence not only on-farm decisions but also opportunities for off-farm income, which will feed back into on-farm decisions.

2.2.5 One thing should be immediately apparent from the discussion so far. It is that the totality of a farm system and the decision making processes within that system need to be understood if the link between knowledge and environmental outcome is fully to be appreciated. Thus we are not concerned here solely with environmental knowledge pertaining to environmental management, other than in relation to use of specific technologies, albeit this is the conventional pattern of conservation advice. Equally important are farmers' responses to commodity markets and policies, as these also predicate environmental actions. Moreover, we have tended to assume that knowledge requirements regarding TMP were largely uniform, segmented only by commodity sector, so that extension advice reflected a pattern of farmers producing a small range of homogeneous commodities for undifferentiated, supported markets. Whilst the adoption of new techniques might require certain new skills and, on occasions, significant capital investment, they did not present farmers with a huge array of choice. Farmers were on a technological treadmill (Dexter 1977), but at least so were nearly all other farmers and they knew where they were going and how to get there! Even environmental advice in those days was easier to categorise, being confined to marginal habitats and spaces on farms with a relatively limited impact on the main business of farming.

2.2.6 All this began to change in the 1990s with policy reform and as markets started to become more differentiated. For example, Table 2.1 illustrates the increasingly complex and changing context for decision making within the dairy sector based on a combination of market differentiation, policy deregulation and environmental regulation, whilst Table 2.2 illustrates the situation in the arable sector. Clearly, the knowledge requirements associated with the different phases of development outlined in Tables 2.1 and 2.2 are different.

2.3 Conclusions

2.3.1 This chapter has attempted to do two things. First it has suggested highlighted the increasingly important role assumed by knowledge and information in wider society and economy, a point that has been picked up in a number of recent social scientific studies of agricultural issues (Morgan and Murdoch 2000, Winter 1997). Secondly, we have set out a framework for analysing the role of knowledge within farm management decision making.

2.3.2 In our framework we have identified four crucial elements which now need to be considered in the next chapter of this report: technology, markets, policy and the role of the farm household. We need to look in turn at the three components of TMP. It is vital that we develop a strong sense of what it is that farmers need to have knowledge about. Not only will this inform our thinking of what information provision is required but it will also help us to identify sites of potential influence and activity for information providers. In Chapter 4 we focus on the farm household. It is our contention that the farm household provides the key to this research project. It is within the farm household, as a decision-making unit, that changes in TMP are discussed, interpreted and responded to. It is within the farm household too that advice and information enters. Thus this chapter provides the main link to the remainder of the report.

Table 2.1. The Decision Making Framework for Dairy Farmers in England

	1980	1990	2000	2010?
Technology	Bulk tank collection of all milk recently made mandatory; heavy dependence on bought in concentrates and applications of N to grassland; some hay still grown.	More careful use of concentrates; increased use of grass silage instead of hay.	Maize silage increasingly important; much greater use of computer technology for determining levels of concentrate feed.	Most farms adopting IFS or organic principles within whole-farm environment plans provided by FWAG and other organisations. Computer-based decision support systems universally used.
Markets	Prices standard within MMB regions. All prices agreed nationally between Government and MMB.	Prices standard within MMB regions. All prices agreed nationally between Government and MMB.	MMB abolished in 1994. Partial deregulation of the market led to price differentials between companies; but with Milk Marque holding c45% of market not yet a truly competitive market. Some differentials emerging as a result of organic sector and conditions imposed by some buyers.	Milk Marque's monopolistic position curtailed resulting in fierce competition between buyers and downward pressure on producer prices; increasingly differentiated market according to organic, environmental and animal welfare criteria.
Policy 1: CAP Price Support	Prices supported within CAP primarily by tariffs and export refunds (largely invisible to producers).	Prices supported within CAP primarily by tariffs and export refunds. Introduction of milk quotas in 1984 led to greater transparency of policy intervention. Quotas present additional barrier to new entrants to industry and dealing with complexities of quota management and of quota trading become new requirement of dairy management	Price support within CAP (tariffs and export refunds) continues but modest price reductions under Agenda 2000 and compensatory payments leads to greater policy transparency. Future of MMB under threat as result of Monopolies and Mergers Commission report to DTI. Quota given stay of execution under Agenda 2000 until 2006.	Prices reduced to world market levels with compensatory payments still continuing at a diminishing level. Quotas abolished.
Policy 2: Environmental Regulation and Incentives	Limited in extent Worst pollution incidents subject to legislation. Farmers encouraged to seek advice from FWAG and others re marginal habitats but not a whole-farm approach.	Tougher pollution controls and intensive advisory campaigns on pollution control. FWAG beginning to adopt whole-farm approach.	Alongside pollution regulation, greater emphasis on nutrient management. FWAG committed to whole farm approach. Some participation in agri-environment schemes such as CSS and Organic Farming Scheme.	All farms required to implement nutrient management plans. Greater number of agri-environment schemes relevant to dairy farms. Tighter animal welfare regulations.

Table 2.2 The Decision Making Framework for Cereal Farmers in England

	1980	1990	2000	2010?
Technology	High dependence on fertilizer and pesticide applications.	High dependence on fertilizer and pesticide applications but with some signs of greater targeting of inputs.	Increasing use of computer–based in cab precision farming technologies for determining rates of fertilizer and pesticide application.	Most farms adopting IFS or organic principles within whole-farm environment plans provided by FWAG and other organisations. Computer-based decision support systems universally used.
Markets	Prices fluctuate from farm to farm according to quality, market demand, etc.	Prices fluctuate from farm to farm according to quality, market demand, etc.	Increasing evidence of market segmentation due to emergence of organic sector, Quality Assurance Schemes and traceability.	Further segmentation with realistic prices dependent on participation in QAS. Farmers increasingly looking to niche and local markets.
Policy 1: CAP Price Support	Prices supported above world prices primarily by intervention buying. Target prices set by EU.	Prices supported above world prices primarily by intervention buying. Target prices set by EU. Producer liable to some of the costs of support through co-responsibility levy.	Support prices considerably reduced as a result of 1992 MacSharry reforms and Agenda 2000 reforms	Prices reduced to world market levels and compensatory payments and compulsory set-aside abolished.
Policy 2: Environmental Regulation and Incentives	Limited in extent. Some farmers subject to restrictions within Nitrate Sensitive Areas (NSAs). Farmers encouraged to seek advice from FWAG and others re marginal habitats but not a whole-farm approach. LEAF's promotion of ICM showing the way forward for whole-farm approach within arable systems.	Some farmers subject to restrictions within Nitrate Sensitive Areas (NSAs). FWAG beginning to adopt whole-farm approach. ICM widely canvassed. Voluntary set-aside available.	FWAG and other advisory organisations committed to whole farm approach with increasing emphasis on ICM, headland management, etc. Some participation in agri-environment schemes such as NSA, CSS and Organic Farming Scheme. Compulsory set-aside and modest cross-compliance rules within Arable Area Payments Scheme offer some environmental benefits.	All farms required to produce and implement nutrient management plans. Greater number of agri-environment schemes relevant to arable farms.

3 DRIVERS OF CHANGE: TECHNOLOGY, MARKETS AND POLICY

3.1 Introduction

3.1.1 This chapter considers the key drivers of agricultural change: technology, markets and policy. It then goes on to consider the role of the farm household in responding to these changes. The chapter draws on the results from the regional panels that we undertook as well as a general review of the relevant literature.

3.2 Technology

3.2.1 Technology has long been a major driver of change on farms and the current debate on GMOs can leave no one in doubt of the potential of technological developments. However, our focus here is on the changing nature of technology and, in particular, on the knowledge requirements likely to be associated with technologies appropriate to sustainable agriculture.

3.2.2 A number of commentators have developed the notion that sustainable agriculture is knowledge intensive involving the adoption of technologies that require a high level of management skills (Röling 1998). Morris and Winter (1999) in overviewing the potential of integrated farming systems (IFS), for example, point out that many IFS practices require husbandry and management skills that not all farmers possess. For example, careful assessment of disease thresholds in crops is required to reduce dependence on spraying. Nutrients in soils and run-off need to be monitored and management strategies adopted to limit pollution. Furthermore, in a survey of farmers the same authors identify a perceived skills deficit in IFS techniques as inhibiting farmers from adopting this form of farming. The same has been discovered in studies of farmers attitudes to conversion to organic farming

3.2.3 As Morris & Winter (1999) point out integrated farming production techniques represent a radical change for many farmers, requiring new skills and knowledge. Röling and Jiggins (1998, p.288) explain that ecologically sound agriculture is *knowledge intensive,* relying on the ability of the land user and his/her support networks to anticipate, i.e. to infer from observation and to take appropriate measures. It is not only the amount, but also the type, of knowledge needed by farmers that is likely to be important to the successful implementation of IFS. Murdoch (1998) has distinguished between two types of knowledge - standardized / codified knowledge which is explicit and easily transferable, and tacit / local knowledge which is personal and context dependent, transferred through personal interaction in a context of shared experiences. He argues that in the process of agricultural modernisation, standardized knowledge (in the form of science based R&D) has become the dominant knowledge form, displacing farmers' local knowledge in the process. Both organic and IFS are highly dependent upon traditional local and 'ecosystem sensitive' knowledge as their general principles need to be applied in a site-specific way. This is not part of the formal R&D advisory system and many farmers may no longer possess such knowledge (Morris & Winter, 1999).

3.2.4 There is clearly a need to 'enlist' farmers in the development of new technologies where they might interact with researchers and policy makers and where local and lay expertise might be put alongside expert knowledge in a creative and participative process.

One example of a technology development that would benefit from farmer expertise is precision farming (Tsouvalis *et al* 2000). The basic principle of precision farming is to target inputs precisely to match in-field variations. Most precision farming technologies make use of global positioning systems to produce yield or soil maps. Farmers adopting precision farming technologies need not only knowledge in how to operate the technology, but as Leiva et al (1997) state, they require new managerial skills to cope with an improved understanding of on-farm variability. Advice is given to farmers, by manufacturers, agronomists and others on how to operate the system. Currently, however, even the agronomists are unsure as to how to interpret this new knowledge and alter management strategies on the farm in response to the information provided by the yield maps. Experts acknowledge that they cannot provide the full answer to problems, such as in-field yield variability, without drawing on local or lay-knowledge (Tsouvalis et al, 1999).

3.2.5 However, it appears that few farmers have been involved in the development of the yield mapping approach. Tsouvalis et al, 1999 in a survey of 20 yield mapping users found that only one had been consulted about their experience with the system. Most farmers interviewed expressed the wish to be consulted about their views and the development of the technology.

3.2.6 Winter and Murray (1998) have highlighted the development of new technologies relevant to sustainable farming in the context of the technology transfer problem in agriculture. They highlight a number of cases where scientific developments lack the follow-up extension work required for farmers to be able to consider adoption. Two boxed examples are given below.

Clover: Cereal bi-cropping

This system has been developed at the Institute of Grassland & Environmental Research and the Institute of Arable Crops Research. The system is well suited to the production of whole-crop silage. Yields are lower than for conventional or intensive cereal production, but inputs are also greatly reduced making the system equally profitable for silage production and potentially so for cereal grain production. Initially a sward of pure white clover is established and in the autumn this is defoliated either by machine and ensiled, or grazed by sheep. The cereal is direct drilled into the clover. There are several environmental benefits, including considerably reduced fertilizer applications, low aphid populations and low levels of septoria leading to reduced pesticide applications, reduced soil erosion, soil structure benefits and wildlife benefits. The research has been completed but there are inadequate mechanisms for on-farm trials and technology transfer.

Using Information Technology in Decision-making

The Silsoe Research Institute examined operations on a farm and how the cropping and labour and machinery use interact. The researchers have developed a computer programme based whole-farm analysis to determine the best cropping for any given situation. The whole farm analysis looks at two different aspects to each operation. One is to be maximised - the yield or profitability - and the other is to be minimised - the environmental impact. Measures of both are associated with each operation.

The Silsoe Whole Farm analysis needs to be demonstrated on a number of different farms to show that it does indeed provide a valid extrapolation of the impact of alternatives. This will then be a tool, which can be used accurately to inform other farmers of the impact on their profits and the environment of adopting different practices in the specific situation. This will show which of the alternative practices can be adopted with no, or at least minimal, loss of profit. The analysis may even indicate ways in which the farmer can make more profit with his/her current system and thus provide a win-win situation for both the farmer and the environment.

3.3 Markets

3.3.1 Any analysis of markets requires attention to both outputs and inputs. The most obvious fact about commodity markets is that price trends are broadly downwards due to the strength of sterling, CAP reform and world market trends. Moreover, the BSE crisis and other scares have left consumers concerned about the impact of farming on the general environment and the safety and quality of food. As a consequence the agricultural industry is facing the challenge of rebuilding consumer confidence in British farm produce. Opportunities to buck, or reduce, the downward trend occur as a result of increasing interest in organic, environmentally friendly, animal welfare friendly and local produce. The market is becoming more differentiated and farmers require knowledge to comply with market requirements and opportunities. The organic dairy sector is one of the fastest growing organic sectors in Europe, with sales expected to triple in value between 1998 and 2005, particularly as a result of a growth in the market for organic liquid milk (Frost & Sullivan 1999). However, the UK lags behind Germany, Austria, Denmark, and Sweden in the development of these markets (Frost & Sullivan 1999).

3.3.2 As price support is reduced, farmers will need to make gains through better marketing by adding value to their products and through further improvements in efficiency and quality standards. Increasingly farmers will also need to improve their knowledge of the production chain. As they strive for added value on their products they must have a thorough understanding of the market they are seeking to supply. Hitherto this knowledge of output markets has been of limited environmental significance, but with increasing demands for food traceability, organic food and the development of Quality Assurance Schemes (QAS) this is now changing. QAS independently verify participating producers' achievement of set standards. This requires recording and justifying what has happened at all stages of the production system. This necessitates good whole farm record keeping, something that does not feature highly in many farm businesses. Moreover, in order for farmers and growers to

make an informed decision about whether to join a farm assurance scheme, they need knowledge regarding the different market requirements for each scheme.

3.3.3 The knowledge professionals associated with conversion to organic farming and QAS provide important opportunities for ensuring the inclusion of adequate environmental sustainability criteria in advice and information. But it is important to note that we are dealing here with a combination of the public sector, for example the Organic Conversion Information Service, and the private sector, such as QAS schemes initiated by supermarkets.

3.3.4 Pressure on market prices may also lead to attempts to reduce input costs and this lies at the heart of the moves towards IFS as discussed above. It is important to note that price pressure and a focus on inputs does not necessarily mean extensification and contraction. Recent research in the south west of England reveals that some farmers continue to contemplate expansionist policies in response to market pressures (Lobley *et al* 2000).

3.4 Policy

3.4.1 Farmers require knowledge of price structures, market regulations and potential future cross compliance rules relating to the production of a particular cap commodity. There is a need for individual businesses, and indeed the UK agricultural industry as a whole, to develop and maintain its competitiveness. The political commitment to reform the Common Agricultural Policy and the likely further development of World Trade Organisation agreements will in time bring European farm prices more in line with world prices (Angell *et al*, 1997; Redclift *et al* 1999). Knowledge of commodity policy will be important as farmers seek to adapt to the increasing uncertainty of the market environment through restructuring and adopting new enterprises (Angell *et al*, 1997).

3.4.2 Knowledge is also required by farmers to implement and comply with agri-environment schemes. Increasingly compliance with certain environmental standards will become a condition of agricultural support. The government announced in December 1999 that it is allocating £1 billion for agri-environment schemes and that by 2006/07, spending on agri-environment will be double the current level. Of this, around £500 million will be allocated for the Countryside Stewardship Scheme and around £140 million for organic farm conversion. It will be important for farmers to have knowledge of the schemes that are available and relevant to their businesses in order to access this money. Farmers will also require specific land management knowledge in order to implement the schemes. Some schemes will require more knowledge than others. For example, ESAs are less situation-specific compared to CSS, requiring the farmer to comply with fixed management agreements. In contrast, agreements for the CSS or SSSIs are negotiated individually for each site, with a consequent increase in the need for conservation advice.

3.4.3 Knowledge is required by farmers to comply with the law. The agricultural industry is becoming increasingly regulated and enforcement policy tougher. Farmers need to be made aware of their legal responsibilities. For example, under the new Groundwater Regulation introduced in 1999, the Environment Agency has a duty to make farmers who dispose of pesticides and sheep dips on their land aware of the need to apply for a licence. In the future increasing emphasis will be placed on pollution regulations and animal welfare standards. In light of tougher enforcement policy the need for advice to farmers will be high.

3.4.4 Farmers require knowledge on more general land and conservation management issues. This may include advice on the management of certain features on the farm, such as hedges and ponds. The traditional approach to date has been to see conservation as separate from land management with its own special activities and sources of information. Much of the advice has been confined to marginal habitats on farms with relatively limited impact on the main business of farming.

3.4.5 These knowledge requirements are also, of course, opportunities. Table 3.1 identifies areas in which public policy interventions provide opportunities for knowledge provision through a range of public and private sector organisations.

Table 3.1 Public policy intervention

Output markets	Agenda 2000 reduction in price support leading to niche markets and added value products.
Input markets	Direct intervention limited.
Commodity Policy	Price support through the Common Agricultural policy and LFA policy. Agenda 2000 reduction in price support
Environmental incentives	Under Regulation 2078/92 Member States obliged to introduced a zonal programme of agri-environmental measures. Agenda 2000 switch from headage payments to hectarage payment for environmental reasons.
Environmental regulations	Tougher pollution controls, such as Groundwater regulations. Greater food safety regulations, such as EC egg marketing standards regulations.
General land and conservation management	Agriculture Act 1986 MAFF given statutory responsibility to promote conservation Agri-environment policy

3.5 Likely Market and Policy Developments

3.5.1 In its Agenda 2000 communication published in July 1997, the European Commission proposed major reforms of both agricultural policy and structural policy (Winter 2000a). The background to the Agenda 2000 reform can be traced to the perceived weaknesses of the 1992 CAP reforms in terms both of meeting WTO requirements and preparing the European Union for the accession of central and eastern European countries. In the autumn of 1996 the Agriculture Commissioner Franz Fischler convened the Cork conference on rural development. This was part of a strategy to establish support for Fischler's programme of radically reforming the CAP by driving a middle course between member states keen to embrace trade liberalisation and those committed to the protectionist status quo (Lowe *et al* 1996). What Fischler was offering was liberalisation of agriculture alongside support for fragile rural economies and environments with the CAP becoming a rural development policy to sustain the quality and amenity of Europe's rural landscapes (Winter and Gaskell 1998).

3.5.2 However, the Declaration was not even 'noted' in the conclusions of the Dublin Summit just a few weeks later, when the German and French governments, in particular, sidelined the rural development issue and put the reform process back onto a more traditional footing (Lowe *et al* 1996). Thus, when President Santer at the European Parliament launched the Agenda 2000 proposals in July 1997, the sectoral measures seem extraordinarily tame. Nonetheless, the original Agenda 2000 proposals highlighted some of the inherent problems of the post-1992 framework, characterising EU rural policy as "a juxtaposition of agricultural market policy, structural policy and environmental policy with rather complex instruments and lacking overall coherence." But the specific proposals suggested:

- a continuation of existing mechanisms with a further shift towards direct payments;
- the introduction of an individual ceiling covering all direct income payments (modulation);
- further expansion of agri-environmental measures under Regulation 2078/92;
- the possible transformation of the support schemes in Less Favoured Areas (LFA) into a basic instrument to maintain and promote low-input farming system.

3.5.3 It was these proposals which provided the basis for the lengthy discussions and debates that took place during the period. The Commission has explicitly committed itself to maintaining "the European model of agriculture", with a new policy seeking to promote:

- a competitive agricultural sector which is capable of exploiting the opportunities existing on world markets without excessive subsidy, while at the same time ensuring a fair standard of living for the agricultural community;
- production methods which are safe, capable of supplying quality products that meet consumer demand;
- diversity, reflecting the rich tradition of European food production;

- the maintenance of vibrant rural communities, capable of generating employment opportunities for the rural population;

- an agricultural sector that is sustainable in environmental terms, contributes to the preservation of natural resources and the natural heritage and maintains the visual amenity of the countryside;

- a simpler, more comprehensible policy which establishes clear dividing lines between the decisions that have to be taken jointly at Community level and those which should remain in the hands of the Member States;

- an agricultural policy that establishes a clear connection between public support and the range of services which society as a whole receives from the farming community.

(Source: http://www.europa.eu.int/comm/dg06/publi/fact/policy/index_en.htm)

3.5.4 In short, the new policy seeks to support the maintenance of the specific model of agriculture which is a key part of Europe's heritage, one that recognises the multifunctional nature of European agriculture and the wide range of benefits it produces. The key elements of this are: lower institutional prices to encourage competitiveness; a fair standard of living for the farming community; strengthening the European Union's international trade position; focus on quality; an integration of environmental goals into the CAP; a new rural development framework – a second pillar of the CAP. Some significant issues associated with these functions include reductions in the price of 'traditional' farm outputs, supporting the income of farms where this is justified for reasons of heritage and social inclusion, compliance with environmental and animal welfare standards, and protection of European environment and heritage.

3.5.5 In order to understand the implications of these developments for future market and policy developments, we generated scenarios to inform our understanding of the likely trends which farmers will take into account in the coming years.

3.6 Modelling the Impact of Agenda 2000 for English Agriculture

3.6.1 In attempting to predict the outlook for English agriculture in the medium term (the next three to five years, the period over which the CAP will be reformed), two policy scenarios were formulated, each involving different assumptions. Appendix 2 sets out the assumptions that have been made. In the context of formulating the scenarios referred to, it is worth noting that the outlook for United Kingdom agriculture, and therefore English agriculture, is at present probably more uncertain than at any time in the recent past. The results are presented in Table 3.2

Table 3.2 The results of the simulation experiments

	Average farm profit (£) under each scenario				
Farm type	1998/9 baseline	Post-Berlin Agenda 2000 prices with compensation € = 65	Post-Berlin Agenda 2000 prices with compensation € = 60	Post-Berlin Agenda 2000 prices without compensation € = 65	Post-Berlin Agenda 2000 prices without compensation € = 60
Mainly Dairy	23,976	21,103	14,003	9,421	3,224
Hill Rearing	18,491	18,336	17,489	15,263	13,869
Mainly Cereals	17,605	-1,403	-5,839	-2,094	-6,477
Mixed Arable/ Dairy	24,900	3,014	-4,043	-36,849	-40,837

(Note 1. The word average here, as in average farm profit, refers to the average farm size in hectares for the farm type in question based on the survey data. Therefore, the outcomes modelled would almost certainly look different for both very small and very large farms. It should also be noted that the profit measure used includes depreciation, the value of unpaid labour etc., so that a negative profit figure does not necessarily imply bankruptcy, but may, instead, mean a reduced standard of living for those operating the business.

Note 2. For full results see Appendix 2.)

2.1.2 The simulation modelling results indicate that if the post-Berlin Agenda 2000 price cuts were implemented with compensation they would have a serious negative effect on the profitability of Mainly Cereal and Mixed Dairy and Arable Farms, when compared with profits for 1998/9. Further, if these price cuts were implemented in the absence of compensation payments they would have a serious negative effect on the profitability of Mainly Dairy, Mainly Arable and Mixed Dairy and Arable Farms, again when compared with profits for 1998/9. The profitability of Hill Rearing Farms under both scenarios is only maintained by the existence of Hill Livestock Compensatory Allowance payments. Generally farmers will experience serious income reductions if the 2000 reforms are implemented without compensation, and/or the value of the Euro drifts down to around £0.60. This impact will be most serious for 'mainly cereal' and 'mixed arable/dairy' farmers.

2.1.3 The results were discussed in the three farmer panels which indicated that while farmers are realistic about the likely consequences of Agenda 2000, there is no simple and

straightforward single response to these policy and market chnages in any commodity sector. Agriculture is a diverse industry and the responses of farmer sot change reflect that diversity. While some farmers were prepared to contemplate opportunities for enterprise diversification, others preferred to concentrate on changes within their farming enterprise. This was particularly the case in the south west panel (for elaboration on the 'business as usual' scenario preferred by some Devon farmers see Lobley 2000). All groups of farmers anticipated deteriorating economic conditions, even though some were protected by continuing subsidies for the time being. They were concerned about the poor prospects for new entrants for the industry. Whilst conservation-based farming was welcomed, farmers were sceptical that new strands to the income line could really compensate, either economically or culturally, for the loss of traditional production. Attitudes to conservation advice were generally positive, though there was hostility to environmentalists who did not understand farming. Equally, whilst farmers were alert to new information technologies, they were guarded about the cost of hardware and software, and about the loss of face-to-face contacts especially those who could provide a single point of advice and cut through red tape. The results are discussed further in the next chapter.

2.1.4 While most farmers accepted the inevitability of declining agricultural prices, a number challenged the scenarios suggesting that predictions were hard to make with any degree of confidence with so many variables and consequently that circumstances might change unexpectedly. The responses may be interpreted cautiously as inferring that farmers will be receptive to advice by someone who can give direct assistance on a spectrum of issues and understands agriculture, that there is an exploratory role for 'new technology', and that, despite sympathy towards conservation, many farmers are under such economic pressure that they would have to revert to intensive production if market forces dictated.

2.1.5 The results of the modelling, the panel findings and the trends briefly mentioned in the opening chapter provide the following picture of agriculture in ten year's time:

- fewer commercial farms on larger holdings;
- more small hobby farms owned by newcomers to agriculture;
- fewer farm workers and a greater use of contract workers and other flexible labour inputs;
- a higher level of direct environmental regulation and indirect intervention through market dictates such as quality assurance schemes;
- a higher level of farm diversification, including more businesses with alternative land uses and added-value food enterprises.

2.1.6 The implications of these trends for advice provision are developed in the final chapter.

2.7 Understanding Farm Households

2.7.1 The term farm household should be interpreted broadly to include anyone involved in the core decision making of a farm business. Clearly in some instances, there will be corporate business structures running farms which do not comprise members of a single household. However, most farms are family-run businesses, and a household comprising

members of the farm family is commonly the relevant decision making structure. To place emphasis on the household in this way is not to make any assumptions about the nature of the decision making or that all members of a household are equally involved in decision making. Relations within households, as in the workplace, are likely to be unequal and will vary from by context. Moreover there is much debate as to how decisions take place and the extent to which external factors impinge on the decision making process.

2.7.2 Thus, there are three contrasting approaches to decision-making within the farm household. The first has its roots in micro-economics and social psychology; the second in sociology and geography, and the third in anthropology. Whilst, in many studies, these approaches complement each other, their individual contributions are important to note as forces constraining the role of advisory services relative to other influential factors. Thus:

- The micro-economic approach has as its explicit focus, decisions and decision taking. It is concerned with the expressed 'goals' and 'values' of farmers. Its focus on external factors is likely to be confined to those perceived as 'constraints' or 'opportunities' by farmers themselves. It is, in short, strongly focused on the farmer as a social actor, a person. Its analytic tools are those of psychology and of behavioural neo-classical economics. The methodology is entirely "farmer", or occasionally household, focused with a strong emphasis on structured interviews, statistical analysis and, increasingly, on the modelling of decision-making processes. Again to simplify, the underlying assumption is that farmers take decisions in a "rational" way and that their explanations for what they have done and why - are likely to be "plausible", albeit placed within the constraints of "personality type". Examples of the micro-economic approach include Gasson (1979), Gilmore (1986), and Willock *et al* (1999).

- The political-economy approach, common in sociology and geography, focuses less explicitly on decisions. Rather it seeks to analyse farm household behaviour in the context of the wider political, economic, cultural and physical environment in which farmers operate. Thus an individual farmer's expressed goals and values, even his/her decisions have to be seen in the context of wider forces, which the farmer may or may not perceive as having had a bearing on particular actions. The force of these wider 'structural' forces may be such as to close down farmers' options and opportunities for choosing particular courses of action. In this case analytic attention may be focused on structural factors such as debt/tenure, farm characteristics and policies rather than decisions as such. Examples of the political economy approach include Lowe *et al* (1994) and Marsden *et al* (1993).

- The anthropological approach, though based on a very different set of concepts in some ways, brings the two approaches together. Those in this tradition attempt to retain the importance of structural factors, particularly macro-economic and policy constraints, whilst understanding the manner in which farmers in a highly heterogeneous industry negotiate these factors and re-form them according to their own diverse circumstances. Examples of the anthropology approach include Gray (1996, 1998) and McEachern (1992).

4.1.3 Understanding the behaviour of farm households requires an awareness of how these alternative frameworks affect our perceptions of, and research into, the use of knowledge.

2.8 Adjusting to Change

2.8.1 It is clear that both economic and social processes are likely to have a major influence on the behaviour of farmers. Previous research has shown that, when faced with increased family needs, or constant needs when farm income is reduced, farmers have several courses of action open to them (Agricultural Adjustment Unit 1968; Bryden *et al* 1993; Gasson 1988; Gasson *et al*, 1992; Gaskell 1994; Munton *et al*, 1990). These courses of action, also known in the literature as 'adjustment', 'business' or 'survival' strategies, are of four main kinds, namely:

1) Adjustments in the use of on-farm resources

- Changes are made to the existing farm business and may include:
  1a) increasing the area of the farm business by renting or purchasing land;
  1b) intensifying production by applying more of other inputs, usually capital, on the existing area;
  1c) specialising production by concentrating on the most profitable enterprises at the expense of others;
  1d) changing the labour profile of the farm, usually by replacing hired labour with family members;
  1e) changing the legal status of the farm business to take advantage of taxation and inheritance laws;
  1f) joining co-operative input purchasing and output marketing organisations.

2) Development of other activities

- Sources of non-farm income may include:
  2a) non-conventional farm-based activities such as bed and breakfast accommodation or a farm shop;
  2b) the farmer and/or other family members may also look beyond the farm gate for additional income by seeking employment and/or business opportunities.

3) Make no change

- No adjustments are made and the farm family accepts a lower standard of living.

4) Leave farming

- The farm family may leave agriculture altogether and seek employment in another sector of the economy.

2.8.2 Of the four broad adjustment strategies, those which involve the re-deployment of on-farm resources and the development of non-farming sources of income are of most direct interest in terms of their likely knowledge needs and potential consequences for land use and the management of the countryside. Farmers who adjust their businesses by modifying their farming activities often initiate changes which alter land use and the way in which the landscape is managed. Landscape and habitat change has been particularly associated with the processes of farm expansion, intensification and specialisation. While each of these processes may occur in isolation, they are often common features of adjustment strategies aimed at expanding the farm business.

2.8.3 Gasson (1988) has suggested that farms which have developed non-farming sources of income may be cushioned to some extent from the vagaries of the cost-price squeeze. As a result, they may not be under the same pressure to increase output and strive for ever higher efficiency as farmers who are heavily dependent on agriculture for their income. There is some evidence to suggest that part-time farmers often practise a type of farming which is largely compatible with environmental protection and landscape maintenance.

2.9 Feedback from the Regional Panels

2.9.1 Adjustments 1 and 3 were well represented in our regional panels. Hill farmers, for example, saw a rather bleak future, suggesting perhaps long-term apprehension despite short-term stability:

> The message here is fairly clear that without compensation, Agenda 2000 is going to result in significantly reduced margins - where that compensation comes from.....I mean at the moment it comes via headage payments but the indications are that that's not the way it will come in the future.
>
> Well the main thing is how to survive and be in business next year

2.9.2 So too, dairy farmers took a similar view:

> The figures aren't representative because sizes vary and the method of farming varies, but oh yes that is what's happening and it is still on a downward spiral.
>
> More cows of higher breeding, going into really the super-dooper cows. We are going to Holstein cows rather than Dutch and breeding.

2.9.3 Adjustment Strategy 2, might be expected to encompass a strong commitment to both agri-environment schemes and to farm diversification. Pour farmer panel, members although clearly considering or already embarked on these routes tended to highlight their fragility and uncertainty:

> where CSS will fall down is let's say if wheat's back at £90 a ton again after your ten year's gone - then a lovely habitat for ten years and the plough goes straight into it - somewhere along the line it mustn't just be an easy way for farmers to get extra income into their farms and then be eradicated after ten years - it's got to be a genuine conservation method
>
> Also with environmental schemes there needs to be a certain amount of productivity because at some stage - maybe not in my lifetime - they might want us to provide food again and therefore we need to be in position to open shop again
>
> There's been diversification on the agenda for many years and of course the majority of farmers have diversified not by setting up new projects but by wives, daughters, sons working on the farm and bringing in some income

> Certainly I think that people think that tourism is an answer, but you have to think do I want strangers to come into my house or farm?
>
> There's a group of farmers got together in our area to sell lambs direct to the public which seems to be going well but it isn't moving many lambs - a model farmer will probably have 1500 lambs himself and you're not going to move those by any means - you need an outlet - either a big supermarket or something like that - and I think Skipton Auction on February 29th I think there is a launch of a project which will involve probably a supermarket and a wholesale butcher and that is significant
>
> at the moment we have environmentalists who are promoting schemes and they haven't a clue whether farmers will be better or worse off - the farmers need to know - if you want to promote something to farmers you show them the front of your financial benefit and they'll move there like a shot.
>
> the agri-environment route of the stewardship schemes is fine and it is a very attractive thing for some farmers but there are lots of costs associated with that and as keen as I am on Stewardship, you've got to say that there has to be expenditure on a lot of the schemes for habitat creation - and that's not necessarily the lifeline to a farmer who's on the borderline

2.9.4 A few farmers were clearly moving towards the fourth adjustment strategy of quitting farming, although this was commonly associated with the next generation:

> No, there's not much younger generation - there's no incentives to go into farming - with us it was a way of life we took over - the younger generation need a living now rather than a way of life.

2.10 Conclusions

2.10.1 This chapter has illustrated that opportunities to influence agri-environmental knowledge provision should not be pursued solely with regard to a separate policy sector labelled ‘conservation advice’. While traditional conservation advice may remain a key to the effectiveness of various policy instruments, including regulation, mainstream agricultural payments and agri-environment incentives, it is likely that attention should be focused in other areas too. There are opportunities to influence the knowledge used and available to farmers across the spectrum of technology, market and policy development.

2.10.2 It seems clear that market and policy developments are leading to radical change within the agricultural industry. In such a context, it seems likely that agricultural adjustment will requires a ‘knowledge economy’, comprising a blend of traditional and novel expert advice, networked advice from a trusted peer group, and demonstration sites.

2.10.3 Information and advice and education (including training) are crucial to English farmers who are set within the wider context of global restructuring and information processing and rapid developments in communications technologies. These factors are inextricably linked with innovation on farms, thus knowledge is a crucial resource for farmers, and feedback and iterative learning are imperative within agriculture.

2.10.4 It is important that sections of the farming community are not marginalised through lack of access to information relating to research findings and policy developments. The information age requires interaction and participation rather than a more traditional 'top-down' approach to advising farmers.

2.10.5 Technology, markets and policy along with other factors relating to the characteristics of individual farms and farm households, all have an impact on farm management and decision-making. Knowledge is also crucial to this process. The farm system and decision-making process must be understood in its totality if the link between knowledge and farmers' impacts on the environment is to be fully appreciated.

2.10.6 The need for new knowledge and skills to assist farmers in adjusting to changes in agricultural policy is evident. This is in line with government's aim of developing a 'learning society' in which everyone, in whatever circumstances, routinely expects to learn and upgrade skills throughout life. It recognises that to implement the principles of lifelong learning, barriers to learning will have to be overcome through new forms of delivery and better advice and information (DFEE, 1998).

2.10.7 There is one further message of relevance to emerge from the life-long learning approach which is that a sharp distinction between education and advice or training is no longer valid. The old demarcations in agriculture between the colleges and universities (education), training (Lantra) and advice (various advisory services) is at last breaking down.

2.10.8 Overall, farmers' knowledge is to be understood within the context of decisions based on micro-economics and an understanding of market opportunities and technological possibilities; decisions which are influenced by policy initiatives and legal frameworks; and the more personal choices which occur at the level of the individual household. To aid the farmer in these decisions, is a variety of codified and tacit knowledge, available through education, training, advisory and informal channels. Farmers have valuable local knowledge which is often excluded from the formal R&D/advisory system. Ideally advice provision should be site specific and include local knowledge. Farmers need to be aware of policy as it affects price structures, agri-environmental schemes, their legal responsibilities and general land and conservation management issues.

4 CURRENT PROVISION OF KNOWLEDGE

4.1 Introduction

4.1.1 In this chapter we seek to provide a full description of the organisational structure of the agricultural knowledge system (AKS) operating in England. The chapter draws extensively on recent work undertaken for the Worldwide Fund for Nature (Winter 2000b; Winter and Mills 2000), including fresh empirical work updating the findings of earlier research (Winter 1995). England operates an open arrangement of the Agricultural Knowledge System, which is complex, and involves a wide range of influences and organisations, not all tied into a single central government department (Winter, 2000b). An open AKS is, by definition, fragmented and this fragmentation cuts both vertically and horizontally (Winter and Mills 2000).

4.2 Vertical Fragmentation

4.2.1 Vertical fragmentation refers to a lack of clear mechanisms and resources to link agri-environmental science findings to varying forms of extension. It occurs when the mechanisms and/or resources are inadequate to ensure a flow of information and interaction between the different levels of the system. In particular, this concerns flows of information from scientific research downwards. This is not a new issue and lies at the heart of a much wider debate within UK policy about the science base, its responsiveness to industry needs, and the mechanisms that exist for technology transfer.

4.2.2 Vertically, the relationship between the different levels in the English AKS is weak and, arguably, weakening still further. This is routinely referred to as the technology transfer problem, with inadequate mechanisms for the delivery of research outputs (either as new knowledge or new technologies) to farmers through demonstration or via advisers, trainers and educationalists. During the 1970s and 1980s the state advisory service, ADAS, provided a partial solution to the vertical fragmentation problem through provision of free agricultural advice, technical bulletins based on R&D work, and an R&D programme linked to its own experimental husbandry farms. During this period, links between advisers and scientists were strong, and (partly due to the central funding role of MAFF) there was close communication between universities, research institutes (RIs) and MAFF.

4.2.3 Nowadays, ADAS continues to conduct research as a private company - but the sources of funding are much more diverse and coordination is, therefore, far more difficult. In addition, the complementarity of the two sectors of research - ADAS conducting near-market R&D and the universities and RIs more basic research - has largely broken down. .

5.2.4 The technology transfer problem arising from vertical fragmentation has been compounded by the changing nature of the technologies deriving from publicly funded research. R&D primarily oriented towards production techniques is likely to result in technologies that can be developed and marketed within the commercial agricultural supply sector. New machines, agro-chemical products or plant breeds marketed by commercial companies provided a ready solution to the technology transfer problem under productivist agricultural conditions. However, there has been a substantial shift in publicly funded R&D away from production-oriented science and technology towards science designed to deal with

concerns over environmental issues, animal welfare and food safety. Such issue-driven research does not always result in commercial applications. Moreover, even if the results of environmental research might have potential commercial benefits to farmers, this is now less likely to derive from the purchase of new products. For example, research designed to reduce inputs within Integrated Farming Systems research may well achieve environmental benefits at the same time as reducing farmers' expenditure on fertilisers or pest control products (Morris and Winter 1999). To reap such benefits, farmers require technical knowledge rather than new capital items, although sometimes these are required as well. Knowledge-rich agriculture lies at the heart of moves towards sustainability.

4.3 Horizontal fragmentation

4.3.1 Horizontal fragmentation relates largely to the extension sector. There is differentiation in the operation of the AKS spatially by region and by sector. We find a plethora of organisations and initiatives devoted to some extent to providing agri-environmental information and advice to farmers. The situation in the 1970s and early 1980s saw ADAS, the front-line agricultural advisory service, joined by the Farming and Wildlife Advisory Group (FWAG) and local authorities (including National Parks) as providers of advice to farmers. This inevitably led to significant geographical discrepancies in the quantity and quality of advice available. Since then the situation has become considerably more geographically complex for two reasons. First, the emergence of geographically specific agri-environmental schemes, such as Environmentally Sensitive Areas (ESAs), introduced intensive systems of information provision in specific areas. Secondly, areas designated as 5b areas under the European structural programme have brought about a burgeoning of schemes with an environmental advice element. These is little evidence of any degree of co-ordination of these conservation schemes. Even the provision of agri-environmental advice with public funding appears to be poorly co-ordinated.

4.3.2 Table 4.1 shows the current complexity of agri-environmental advice provision in England in comparison with the rest of the UK.

Table 4.1 Non-commercial providers of agri-environmental advice to farmers in the UK

	Advice Organisations	
	Major providers of advice	**Minor providers of advice**
England	ADAS	Countryside Agency
	Farming & Wildlife Advisory Group	English Nature
	FRCA	Environment Agency
	Objective 5b schemes	Game Conservancy Trust
	Organic Conversion Information Service	Forestry Authority
	Local Authorities	NFU/CLA
	National Parks	RSPB
	Wildlife Trusts	
Wales	ADAS	Environment Agency
	Coed Cymru	Farming & Wildlife Advisory Group
	Countryside Council for Wales	Forestry Authority
	FRCA	Game Conservancy Trust
	National Parks	Local Authorities
	Objective 5b initiatives	NFU/CLA/FUW
	Organic Conversion Information Service	Objective 5b initiatives
		RSPB
		Wildlife Trusts
Scotland	Farming & Wildlife Advisory Group	Forestry Authority
	Objective 5b initiatives	Game Conservancy Trust
	Scottish Agricultural College	NFUS/SLF
		Objective 5b initiatives
		RSPB
		Scottish Natural Heritage
		SEPA
		Wildlife Trusts
Northern Ireland	Department of Agriculture (NI)	Department of Environment (NI)
		Farming & Wildlife Advisory Group
		RSPB
		Ulster Farmers Union
		Ulster Wildlife Trust

Source: Winter 2000b

4.4 Publicly-Funded Conservation Advice: Farming and Rural Conservation Agency

4.4.1 The FRCA was formed in 1997, as an agency within MAFF, to conduct work formerly carried out by MAFF's Land Use Planning Unit or by ADAS prior to privatisation. It has been responsible for assisting the government in the design, development and implementation of policies on the integration of farming and conservation, environmental protection and the rural economy. The FRCA has 120 project officers and assistant project officers who deal with government environmental schemes such as ESAs and the Countryside Stewardship

Scheme. They provide farmers with comprehensive technical advice about the schemes and their practical implementation. It is estimated that approximately 30 per cent of a project officer's time is spent providing advice - that is to say, 36 person years for the provision of free conservation advice (Winter et al, 2000). In 1998/99 FRCA officers made 14,578 free conservation advisory visits to farmers throughout England in connection with ESAs and the Countryside Stewardship Scheme. Most were one-off, with very few repeat visits.

4.4.2 Cooper (1999) provides an analysis of strategies used by FRCA in delivering advice in ESAs, discovering that generally speaking, Project Officers (POs) are bound by the rules and regulations of MAFF in delivering advice to farmers, although there is a limited degree of discretionary freedom, notably in the administration of derogations and implementation strategies. The strategies adopted in implementing schemes by POs depend on time and staff availability. If time is limited then the approach tends to be reactive rather than proactive. Generally speaking it is left to agreement holders to contact the PO for advice. With more time and staff available a proactive approach can be taken with POs promoting the scheme to all farmers within an area, continuously contacting non-participants in order to persuade and encourage them to enrol and meeting participating farmers to discuss problems and offer advice. One strategy in this situation is to target larger farmers with the hope that other smaller farmers may follow the example of the dominant local farmer (trickle-down effect). However, there is evidence that the use of this approach in Breckland has been largely ineffectual in encouraging smaller farmers to join the scheme (Cooper, 1999).

4.4.3 The FRCA Project Officers are also responsible for the operation of the Countryside Stewardship Schemes. The CSS Project Officers do not make pre-application visits or offer advice, but refer potential applicants to Partner Organisations, such as FWAG, ADAS, Wildlife Trust, RSPB and others who assist in the production of applications. A CSS objective has been to increase the number of applicants receiving advice from these Partner Organisations. In 1991/2 four percent of applications included advice from professionals rising to 27% in 1993/4 (LUC, 1996). Table 4.2 shows that the number receiving advice has risen still further to 84% for 1998/9. Thus, this CSS objective has now largely been achieved.

Table 4.2 Receipt of advice in preparation of application - postal surveys (1999)

	Agreement holders		**Unsuccessful applicants**	
	No.	**% of total applications**	**No.**	**% of total applications**
Total no. Receiving advice	1007	84	270	77
FWAG	490	39	114	33
ADAS	181	15	50	14
Local Authority	126	10	27	8
Wildlife Trust	115	10	30	9
Private	160	14	52	15
Other	179	15	41	12

Source: ADAS and CCRU (1999)

4.4.4 Once the application is submitted the Project Officer undertakes a paper assessment scoring. If a high enough score is achieved and taking account of the budget for the year, the Project Officer will visit suitable applicants (usually 135% of budget) and will make an offer on 110%. At these site visits the Project Officer may explain the scheme rules and regulations, answers any queries about the operation of the prescriptions, re-schedule work to avoid overburden in the early years and identify further environmental opportunities on the farm. Often the Project Officer will undertake a follow-up visit at the end of the first year, aiming to visit twice during the 10 year agreement.

4.4.5 One problem encountered by Project Officers is that their work spread over a wide geographical area leading to lack of continuity. If Project Officers were allocated to a particular area it might facilitate the advisory process, ensuring they were on-hand to offer advice and to identify any irregularities in the operation of a scheme.

4.4.6 Not all the advice offered by FRCA officers is on a whole farm basis. POs will also give advice on other areas of the farm to ensure that conservation opportunities are not missed. The advice is part of the ESA/CSS package for farmers. Within ESAs, advice is based on a cross-section of whole farm and single field features. On the South Downs, for example, an application might only concentrate on the scarp slope, rather than the whole farm. The FRCA officer will also give unsolicited advice on other parts of the farm to ensure that conservation opportunities are not missed, such as derelict ponds or species rich hedgerows.

4.4.7 In addition, FRCA officers advise on the Habitat Scheme (now incorporated within CSS) and in 32 Nitrate Sensitive Areas they advise on ways of reducing nitrate leaching. In 1998/99 a total of 1,210 advisory visits were made to farmers in the Habitat Scheme and Nitrate Sensitive Areas.

4.5 Publicly-Funded Conservation Advice: ADAS

4.5.1 Although ADAS offers most of its advice commercially in its capacity as a private company, it also offers free conservation advice to farmers under contract to MAFF. This is done through free advisory visits, together with a programme of promotional activities (farm demonstrations, agricultural shows and talks to farmer groups). In England the free advice includes details of relevant grant schemes and encourages applications where appropriate, but the advice is not directly aligned with any particular scheme. Preparation of grant schemes is not part of the free advice service. In the provision of advice, ADAS advisors encourage a whole farm approach, with particular emphasis on the protection and enhancement of biodiversity and the landscape, especially where species and habitats are present for which there is a Biodiversity Action Plan.

4.5.2 There are 45 ADAS consultants who deliver free MAFF-funded conservation advice across England. In 1998/99 they made 1,880 free visits in England - an increase on the 1,400 visits in 1993. This amounts to an equivalent of 17 person years of advice. In addition, as part of its programme of free pollution advice, MAFF has commissioned ADAS to run annual campaigns in up to eight catchments in England, offering free consultancy advice in the preparation of 500 Farm Waste Management Plans conducted by 12 ADAS consultants (equivalent to five person years). The campaigns include visits and promotional meetings. Also with regard to pollution, ADAS is contracted to provide 500 visits in Nitrate Vulnerable Zones, conducted by 16 consultants (equivalent to five person years). ADAS is also

responsible, under contract to MAFF, for establishing pilot farms to demonstrate Nutrient Management plans and Waste Minimisation plans.

4.5.3 ADAS also uses existing structures to put across extension messages. Farmer networks (some of which are very concentrated, e.g. ten growers provide 90% of the carrot crop in Britain), are easily targeted in terms of making an impact on the ground. Also, agrochemical distributors can be targeted, for example, ADAS is trying to promote the codes of good agricultural practice by making sure that 'multiplier groups', such as the agricultural supply industry, who regularly visit farmers, are fully aware of the codes and incorporate these messages into their work.

4.5.4 There is anecdotal evidence that farmers may be sceptical about conservation advice from ADAS, perhaps distrustful of ADAS's motives in moving from the provision of production and business advice to free conservation advice.

4.6 Publicly-Funded Conservation Advice: Organic Conversion Information Service

4.6.1 The OCIS is a service introduced to provide organic farming advice to farmers. It is co-ordinated for MAFF by ADAS but is dealt with separately here because of the involvement of other organisations. OCIS consists of a dedicated telephone helpline and free advisory visits to farmers. The Soil Association operates the helpline and a team of experts from the Elm Farm Research Centre undertake the advisory visits. The helpline, operated by three members of staff, gives initial advice on basic issues of organic farming such as organic production standards, registration, and the support available for conversion. On request, farmers are sent an information pack. Table 4.3 shows the number of inquiries received by the helpline in England since its inception.

Table 4.3: Number of enquiries received by OCIS telephone helpline

Jan-March 1998	718
April-June	880
July-Sept	1,017
Oct -Dec	1,025
Jan-March 1999	1,957

Source: OCIS, 1999

4.6.2 The number of inquiries has steadily increased. The advisory visits are made by 50 full- and part-time advisers from the Elm Farm Research Centre, who have specialist knowledge in organic livestock and arable farming. When a request for advice is received, an adviser is allocated depending on their area of expertise. The advisers will visit the farm for half a day and give detailed technical advice on organic conversion and marketing prospects, tailored to the needs of the individual holding. The farmer will be helped to draw up an outline conversion plan and is given enough information to make an informed decision on whether the farm is suitable for conversion to organic farming and whether it is a realistic option. A further full day of advice is also available. In 1998, advisers made 1,800 half day and 600 full day visits in England. This amounts to 7.5 person years of advisory time.

4.7 Publicly-Funded Conservation Advice: Farming and Wildlife Advisory Group

4.7.1 FWAG is a specialist environmental agency, part-funded by government with 30 years experience of conservation advisory work (Cox et al 1990, Winter 1996). FWAG has focused on the provision of agri-environmental advice, with a strong emphasis on the agricultural interests of their farming members (Winter, 1996). Throughout all their work, advisers for FWAG promote the notion of 'voluntary co-operation and goodwill' (Cox et al, 1985). They are perceived as working for the agricultural industry, helping farmers to meet political demand for environmentally sensitive farming.

4.7.2 In 1998/99, FWAG advisers made 4,723 visits in England compared with 3,500 in 1993/94, covering around 3 per cent of all registered agricultural land. There has been a general increase in the number of FWAG advisers since 1994. In 1999 there were 54 in England compared to 35 in 1994. As a result, the geographical distribution of FWAG advice input has improved. However, advice is still unevenly distributed and some counties are better served than others. For example, there are three FWAG officers in Herefordshire, in contrast to only one in Hampshire

4.7.3 FWAG offers comprehensive advice across a wide range of issues as shown in Table 4.4, which compares the type of environmental advice provided by FWAG in England in 1992/93 and 1998/99. As the table indicates there has been an overall increase in the frequency of environmental advice provided since 1992/93, corresponding with increased staff resources over this period. Significant differences in the type of environmental advice provided are also evident, with an increase in advice relating to agriculture and its environmental impacts, rather than just a concentration on conservation management advice. For example, advice on pollution control and pesticide and fertiliser management has increased significantly. The only area of advice that has witnessed any significant decline is that relating to woodlands. New areas of advice include old orchards, statutory and permissive access and LEAF Audits. FWAG advocates the whole-farm approach: through its 'Landwise' initiative, where a FWAG adviser undertakes a detailed analysis of the wildlife and habitat assets of the total farm environment resulting in the farmer receiving a detailed report with recommendations for short and long-term management. Increasingly FWAG are moving towards more pictorial reports with maps generated by a Geographical Information System (GIS).

4.7.4 During the last five years FWAG has received extra Government funding. However, the level of core government funding is now virtually static and combined with a continued increase in adviser numbers, the reliance on chargeable income and funding for discrete projects such as those with the Environment Agency has increased. A number of county councils continue to offer financial support to FWAG, but generally funding remains precarious. It is generally felt that FWAG is effective at a county level, but nationally and regionally is under-resourced.

Table 4.4 Comparison of FWAG Advice in England between 1992/93 and 1998/99

	1992/93		*1998/99*		*Actual Difference*	*% difference*
ADVICE GIVEN ON:	*Frequency*	*% cases*	*Frequency*	*% cases*		
Landscape Issues	2,154	71	3,123	66	969	-5
Woodland Management	787	26	1,173	25	386	-1
Woodland Planting	764	25	803	17	39	-8
Shelterbelt Planting	338	11	298	6	-40	-5
Amenity Trees	1,124	37	1,134	24	10	-13
Hedge Trees	1,201	39	2,668	56	1,467	17
Scrub Management	646	2	1,303	28	657	26
Pond Management	770	25	1,245	26	475	1
Pond Restoration	523	17	1,076	23	553	6
Pond Creation	621	20	862	18	241	-2
Watercourse	765	25	2,564	54	1,799	29
Wetland Management	594	20	1,208	26	614	6
Improved Grassland	555	18	1,400	30	845	12
Unimproved Grassland	1,092	36	2,046	43	954	7
Wildflowers	438	14	2,054	43	1,616	29
Hedge Management	1,488	49	3208	68	1,720	19
Hedge Planting	757	25	1804	38	1,047	13
Field Margin Management	807	27	2561	54	1,754	27
Pesticide Management	657	22	1997	42	1,340	20
Fertilizer Management	870	29	2503	53	1,633	24
Pollution Control	281	9	2094	44	1,813	35
Heather/Moorland Manag.	35	1	102	2	67	1
Shooting	207	7	513	11	306	4
Fishing	149	5	350	7	201	2
Species conservation	564	18	2694	57	2,130	39
Drystone walls	143	5	364	8	221	3
Archaeological/historical	386	13	1425	30	1,039	17
GRANTS ADVICE						
Farm Wood. Prem. Sch.	296	10	581	12	285	2
Stewardship	868	29	3052	65	2,184	36
Habitat Scheme	0	0	12	0	12	0
HIAP	0	0	0	0	0	0
Moorland Scheme	0	0	2	0	2	0
Countryside Prem. Sch.	0	0	0	0	0	0
ESAs	112	4	136	3	24	-1
Woodland Grant Scheme	827	27	985	21	158	-6
SNH	0	0	1	0	1	0
Local authority grants	1430	47	939	20	-491	-27
Other grants	311	10	467	10	156	0

Source: Winter 2000b

4.7.5 FWAG also has initiatives with the private sector such as its Farm Biodiversity Action Plan scheme part sponsored by Sainsbury's (see Box 4.1)

BOX 4.1 Farm Biodiversity Action Plans

The Farm BAP is a new initiative, developed by FWAG, in partnership with the major supermarket Sainsbury and with support from English Nature. The aim is to address environmental issues by encouraging suppliers to consider biodiversity and habitat management across the whole farm. Following the success of a pilot scheme, the Farm BAPs were launched at a FWAG Conference in October 1997 exclusively to Sainsbury's suppliers and then in 1998 at the Royal Show for the general public. A FWAG adviser visits farmers and growers who are interested in commissioning a Farm BAP. The adviser surveys the farm and discusses with them the details of the BAP. Together the farmer and the adviser identify four species or habitats on appropriate to the farm's circumstances which are considered to be of national or local importance. The farmer or grower receives a folder containing a profile of each species or habitat, a map of the farm highlighting the areas where each can or could be found and an overview of management options. He or she also receives laminated maps and posters, which can be displayed around the farm to communicate the message to farm workers and visitors. The accompanying work guide provides a detailed and agreed timetable of short and long term commercial activities. These include managing and enhancing existing features, creating new features and making adjustments to everyday farming operations. The cost of having a Farm BAP prepared for a farmer or grower is £250. By the end of April 1999, 125 Farm BAPs, covering a farmed area of 27,460 ha, had been completed or were in development across England and Scotland. An evaluation of the pilot scheme revealed that it was well received by farmers and appeared likely to be successful in achieving conservation gains. Significantly, it was felt that some farmers who might not otherwise have wished to be involved with FWAG and conservation advice were draw into the scheme because of Sainsbury's involvement.

Source: Morris and Winter (1998).

4.8 Publicly-Funded Conservation Advice: Objective 5b Schemes

4.8.1 Although the main rationale for Objective 5b regions is economic regeneration, many projects have proved to be an important source of environmental advice to farmers. The consequence has been to create a concentration of environmental advice within geographical areas based on economic rather than environmental criteria. This has had a substantial impact on the geographical distribution of environmental advice throughout the UK. Eleven areas in the UK were awarded Objective 5b status for the period 1994-99 largely on the basis of low GDP, a high proportion of employment dependency on agriculture, a low level of agricultural income and a low population density. The 11 areas include five per cent of the population and cover 27 per cent of the land area including much of the UK's most environmentally favoured and naturally diverse areas.

4.8.2 Obtaining information about 5b projects has proved to be a difficult task and there appears to be a serious lack of monitoring and evaluation of these schemes. There also appears to be a lack of co-ordination between the government bodies administering the three

structural funds. This paucity of information has created difficulties in providing an overall figure for the advisory input of 5b projects.

4.8.3 The extent to which 5b projects fund environmental advice targeted at farmers or landowners differs regionally. Within England there are a number of projects where environmental advice is the main component whereas in Scotland, for example, the projects providing environmental advice tend to be focused on the wider rural community. The Objective 5b projects tend to build on existing networks of advisors and experience in operating local authority grant aid schemes. However, it is not just a case of funding existing mechanisms via a new financial source. Advice provision is particularly significant in terms of additional 'advice hours' offered. For example, within the Suffolk 5b area, FWAG have been able to increase their provision of advice from half a day to one day per week of free advice. At a more general level, 5b projects seem to have played a potentially important role in forging new networks and perhaps cementing others. The Northern Uplands Moorland Regeneration Project provides an example of a project with a strong partnership. It is managed by ADAS with a steering group comprising the Moorland Association, English Nature, MAFF/FRCA, National Sheep Association, NFU, Game Conservancy and RSPB.

4.8.4 Objective 5b schemes offer advice to farmers through farm visits; technical guides; newsletters; seminars; training and demonstration events. In this way farmers are progressed along the environmental adoption continuum (Winter et al, 2000). Participants generally favour integrated projects because they provide opportunities for some economic benefit from environmental management. Winter et al (2000) found that a wide range of Objective 5b projects offered advice but it was difficult to make any firm claims about the contribution of these projects to environmental education amongst farmers and landowners because of the difficulty in accessing monitoring information. The 5b projects have been classified into 5 types with some representative case studies presented in Boxes 4.2, 4.3 and 4.4:

- Single species projects, which focus on management practices that benefit a particular species. *(e.g. Barnacle Goose Project and Black Grouse Recovery Projects in Scotland and the Welsh Grouse Project in Wales)*

- Farm diversification projects which, while predominantly business-orientated, do offer some baseline environmental advice *(e.g.* Meneter A Busnes - Rural Wales 5b area, Marches Farm Enterprise Programme*)*

- 'Traditional' landscape conservation grant aid projects offering a fairly basic level of advice on tree planting etc. (such as the Okehampton to Polson Bridge Recreation and Land Management Initiative and Southern Marches Environmental Action Plan)

- Demonstration projects associated with practical land management initiatives (some of which are more 'passive' than others) such as Mynydd Y Ffynnon, Balancing Environment and Agriculture in the Marches (BEAM)

- Integrated projects covering environmental and economic issues where advice and training are core (e.g. Bodmin project, Bowland project, South Pembrokeshire Farm Support Scheme, Peak Park Farm and Environment Project, Tamar 2000 Support)

BOX 4.2 Suffolk 5b Landscape Project

It appears that 'traditional' landscape conservation grant aid projects offering a fairly basic level of advice on tree planting have replaced some of the advice that used to be provided by the Countryside Commission's landscape grants. An example of this type of project is the Suffolk 5b Landscape Project. The overall aim is "positive management of Suffolk's landscape and the creation of habitats to underpin successful economic development and the maintenance of diversity". The project is very much advice-orientated both in terms of practical conservation and in terms of making successful grant applications. Specific targets include advice to 250 landowners resulting in increased uptake of existing grant schemes, 125 environmental and habitat improvement schemes and demonstration events. A key feature of the scheme is tree planting although an equally important aspect appears to be the scheme's ability to act as a 'one-stop-shop'. The project builds on existing networks of advisors and experience in operating local authority grant aid schemes. However, it is not just a case of funding existing mechanisms via a new financial source. Advice provision in particular is significantly extended.

BOX 4.3 Tamar 2000 SUPPORT

An example of an integrated project is TAMAR 2000 SUPPORT (Sustainable Practices Project on the River Tamar). Its origins lie in the lack of both advisor and farmer time to devise holistic management plans. The main aim is to conserve and restore environmental quality for both people and wildlife while delivering economic gains. This is achieved by optimising farm inputs, employing best management practices and the management and restoration of key river and wetland habitats with benefits to water quality, fisheries and other wildlife, linked to recreation and tourism development. There are three advisers who work independently as multi-faceted advisers receiving specialist and individual training from other organisations, such as BDB Associates, WERG and the WCRT plus contributions from the Environment Agency ADAS and Silvanus. The inclusion of these organisations in training the advisers improves the level of advice offered. Each farm has approximately a week of advisor time.

Certain areas are targeted within each sub-catchment. Farmers with river frontage are written to, telephoned and visited. The initial visit results in a database proforma listing many features on the farm. The farmer is given verbal advice at the time of the visit, which may be detailed. The project advisers will produce a management plan free of charge if required – a River Wise Plan. This looks at the vision of the farmer for the future, the environmental impacts and opportunities to reduce damage. The plan considers the whole farm system and aims to cover both economic and environmental gains in a sustainable package. The advisers work closely with individual farmers in a strong one-to-one relationship, producing non-prescriptive plans, backed up with advice. The project has been successful in producing plans for every farm with frontage on the main river or main tributaries. A response rate of 3 out of 5 was expected, but it has been closer to 95% (9 out of 10). In July 1998 in excess of 150 farmers were receiving one-to-one training and guidance from the advisers, and in excess of 150 integrated farm management plans have been completed.

BOX 4.4 BEAM PROJECT

A demonstration farm has been established in the Marches to demonstrate the potential of integrated farming systems. The first phase was to establish a farm in Herefordshire as a demonstration of Integrated Farming Systems within a whole farm business. The second phase is to assist and evaluate the uptake of IFS management on a number of farmer in the Marches areas. Each farm receives 3 advisory farm visits, involving an assessment of the farm, development of an IFS plan and a follow-up consultation. A number of 'early adopters' throughout the Marches have been identified

4.9 Publicly-Funded Conservation Advice: Local Authorities

4.9.1 Winter (2000b) provides an update of his earlier (1995) 'Networks of Knowledge' on county councils, which revealed that the majority gave advice in some capacity to farmers, although most had less than one full-time employee engaged in this. Seven out of the 36 respondents to the more recent survey claim to have no staff employed to give farm conservation advice. Where advice is given it is likely to be funded under the councils' own grant schemes, although these are generally being reduced when compared with the situation in 1993 (the former Countryside Commission ceased to provide funding in 1994/95) [see Table 4.5]. Staff cuts, also, mean that over half of the councils have witnessed a reduction in the overall level of conservation advice provided to farmers. Almost all county councils offer financial assistance, or assistance in kind to FWAG and other conservation organisations. A key finding from Winter's (1995) research is that grants appear to be pivotal to farm conservation advice offered by county councils. The level of information gained from the survey of local authorities in 1993 by Winter was found to be unsatisfactory in terms of details relating to the staff involved and the type of advice given. Further research is required in order to discover more about farm conservation advice from county councils. A few district councils were found to have special schemes but none offered a farm advisory service as such.

Table 4.5: Type of advice provided by Local Authorities in England and Wales in 1993 and 1998

	1993		1998	
Type of advice	Priority Advice	No. of times mentioned	Priority Advice	No. of times mentioned
Wildlife creation	4	28	52	42
Habitat creation	5	28	27	40
Ecological assessments	1	19	2	26
Woodland management	13	30	30	42
Pollution control	0	7	0	6
Landscape enhancement	14	30	38	35
Whole farm plans	1	18	6	13
Other *	4	14	0	16

* Other category includes restoration of orchards, access, recreation, habitat management, archaeology, grant brokerage.

Councils could mention more than one category

Source: Winter 2000b

4.9.2 Winter (2000b) finds that few county councils keep records of the number of advisory visits made. Of those that do keep such figures, few councils now make more than 100 visits each year. Because of the large number of councils, in aggregate terms this still represents a very considerable advisory input in the country as a whole, which we estimate to be 45 person years. It is not possible to assess the comprehensiveness of these visits. In some cases it may have been a lengthy whole farm plan visit and in others a brief conversation with a farmer (Winter 2000b).

4.9.3 As well as a reduction in grants, the nature of advice offered by English councils over the past five years has shown a shift in emphasis (see Table 4.6). Given the general reduction in grant aid, half the councils appear to be targeting their advice to specific areas such as local projects, AONBs or Heritage Coasts. This suggests that advice may be unevenly distributed within these counties. On the other hand, some counties are taking a wider view of the county through Biodiversity Action Plans. Most of these BAPs are in the preliminary stages and are gradually being implemented. Some councils feel it would be difficult to translate advice into action with the limited finances available. Others are adopting a co-ordinating role in the action and monitoring of the BAP.

Table 4.6: Proportion of Advice Offered in Connection with the English Councils' own Grant Schemes in 1993 and 1998

	1993	1998
Proportion of advice	No. of Counties	No. of Counties
None	4	11
20% or less	3	4
21 – 39%	3	1
40 –59%	5	1
60-79%	7	7
Over 80%	5	3
Not specified	3	3

Source: Winter 2000b

4.9.4 The councils are also adopting a more strategic view of the wildlife assets of the county through involvement in more formal partnership projects. For example, Oxfordshire County Council provides staffing and other resources through its Countryside Service to assist the partnership based schemes of Oxfordshire Woodland Project and the Wychwood Project (Oxfordshire Farming Study). Table 4.6 also indicates a movement within the councils towards increasing the priority placed on advice targeted at wildlife conservation and habitat creation, whereas advice to farmers on pollution control has remained a low priority.

BOX 4.5 Case Study: Devon Local Authority

Devon contains a number of local authority-based countryside services which exist to support initiatives or directly carry out work to protect and enhance the natural environment. Bodies such as the Heritage Coast Services, and the Coast and Countryside Services, are instrumental in carrying out community exercises to generate support for conservation. In addition, they provide finance for conservation initiatives, either directly or via voluntary bodies equipped to deliver conservation on the ground. (Devon Biodiversity Partnership, 1998)

Source: Devon Biodiversity Partnership *(1998) The Nature of Devon: A Biodiversity Action Plan* July 1998.

4.10 Publicly-Funded Conservation Advice: National Parks

4.10.1 Regarding advice from National Park Authorities, Winter (1995) found that all offer free conservation advice to farmers and this generally amounts to a very significant advisory input with 3-6 staff employed in an advisory capacity in each Park. During the last five years it is interesting to note that there has been a dramatic decline in advice offered by Dartmoor National Park owing to the introduction of the Dartmoor ESA in 1994, which has restricted the Park's work to habitats outside this area. The Lake District National Park has also reduced its advisory capacity as a result of reduced grant funds and an increase in advice from other sources (e.g. Cumbrian Broadleaves Project and the Forestry Authority). Five Parks had increased their advice provision since the early 90s (Table 4.7).

Table 4.7: Provision of Farm Conservation Advice by National Parks in 1993 and 1998

	Number of advisory staff 1993	Number of advisory staff 1998	Total advisory input 1993	Total advisory input 1998	Estimated no of farm visits p.a. 1993	Estimated no of farm visits p.a. 1998
Brecon Beacons	3	4	0.6	1.1	Not avail	300
Broads Authority	4	5	0.45	0.75	55	500
Dartmoor	6	5	2.8	0.83	Not avail	not avail
Exmoor	5		0.85		205	
Lake District	4	4	not avail	0.30	Not avail	100
N. York Moors	5	9	2.25	2.15	365	800
Northumberland	3	5	1.25	2.20	150	150
Peak	6	5	4.4	4.2	1,110	800
Snowdonia	6	6	5.5	5.8	800	280
Yorkshire Dales	6	7	2.35	3.25	400	500
Sussex Downs Conservation Board		6		0.20		100

NOTES
These figures are approximations in many cases. All figures were provided by the Parks themselves.
Some Park authorities referred to the work of Park wardens and rangers; others did not. For the purposes of this table, these have been excluded from the analysis.
Some Parks provided data on contacts with farmers on archaeology, farm buildings and planning matters; all these have been excluded for the purposes of this analysis.
Some Parks provided data on administrative back-up to farm advisory services; these have been excluded from the analysis.

Source: Winter 2000b

4.10.2 In terms of advice on specific habitats and landscapes, National Park Authorities were found by Winter (2000b) to provide advice on wildlife conservation, habitat creation, ecological assessments, woodland management and landscape enhancement, with the main focus on woodland management. Also all respondents gave advice in association with grant schemes, with nine offering their own schemes, such as the Lake District Countryside Conservation Grant Scheme. Individual rangers also have separate budgets for conservation work. Seven of the National Parks did not target specific areas within the designated areas for advice, although some occasionally had priority areas in connection with special projects. For example, in the Lake District, priority is given to habitat restoration in areas with a combination of red and grey squirrels. There is evidence of considerable variation in the emphasis placed upon farm conservation advice between different National Parks.

4.11 Publicly-Funded Conservation Advice: Environment Agency

4.11.1 One of the roles of the Environment Agency is to advise farmers on actions needed to comply with anti-pollution regulations. Much emphasis is placed on a partnership approach based on advice and co-operation. For example, in 1998 the Stour Environment Protection Team visited farms in North Dorset to assess waste storage facilities and practices and offer advice on how to avoid pollution. The Agency was particularly focusing on:

- The production and use of farm waste management plans
- Containment facilities to suit each farm
- Suitable application of collected slurries to land
- Efficient applications of nutrients to crops
- Locked and bounded fuel stores

4.11.2 Farmers are also being offered free advice and visits by the Environment Agency in a joint approach to improving the River Tamar on the Devon and Cornwall border. A leaflet explaining how farmers can help with the Environment Agency's work on the Tamar was sent to 2,300 farmers in the area. The Agency aims to work in partnership with farmers to solve farm effluent and storage problems.

4.11.3 The Agency is shortly to publish comprehensive set of advisory leaflets aimed at farmers covering the following topics: soils on the farm; crop protection; hedges, grass and trees; establishing crops; water on the farms; conservation grants; bank erosion; farm tracks; livestock management; manure management; managing ditches.

4.12 Publicly-Funded Conservation Advice: Countryside Agency

4.12.1 The Countryside Agency, like its predecessor, the Countryside Commission, provides some funding for advice, but does not make a significant advisory provision directly except in the case of the Agency's new Land Management Initiative (LMI). The LMI aims to implement integrated rural development under the new Rural Development Regulation associated with the CAP Agenda 2000 reforms (see Countryside Agency, 1999). Free conservation advice to farmers and landowners will be part of the package for some of the areas covered by this scheme.

4.13 Publicly-Funded Conservation Advice: Forestry Commission

4.13.1 The Forestry Commission provides advice through its grant schemes - the Woodland Grant Scheme and the Farm Woodland Premium Scheme. Once an application has been submitted, a Forestry Commission Woodland Officer will usually visit the site to assess the application and whether the proposals meet the aims of the scheme within 4 weeks. The farmer/landowner is not obliged to be present during the visit but may be called on to clarify certain points through discussion. Thus this may not be the most participatory form of advice giving. The Forestry Commission also publishes a number of guidelines advising on the sound management of the forest environment.

4.14 *Landowner/farmer Organisations: Country Landowners Association (CLA)*

4.14.1 Landowner bodies such as the Country Landowners Association (CLA) also link into advisory structures. The Association has been working with MAFF, Environment Agency (EA) and the NFU to actively promote good environmental practice in farming, and has been involved in the drafting of new codes of agricultural practice. Hodge, a CLA conservation advisor (CLA website) states that, 'these codes are a vital source of information to farmers to attain sustainable agriculture through good practice. They will be a valuable tool for land managers, bringing them up to date on new developments in water, soil and air. They are also essential for transferring much needed advice and information to farmers and landowners and the CLA will actively promote them to its members'.

4.15 Landowner/farmer bodies: National Farmers Union (NFU)

4.15.1 The National Farmers Union (NFU) represents farmers and growers in England and Wales. Its central objective is to promote the interests of those farming businesses producing high quality food and drink products for customers and markets both at home and abroad. Central to this objective is its encouragement of environmentally-friendly and welfare-conscious farming practices and a desire to ensure the long term survival of viable rural communities. It has been important in spearheading a national drive to integrate farm assurance into farming routine (NFU website). The Assured Produce and the Assured Combinable Crops Schemes are both the product of NFU/industry collaboration (Environment Agency, 1996).

4.16 Private Sector Advice

4.16.1 Consultancy demands different skills from extension since the consultant must win the client's trust, maintain regular contact and give sound advice which is tailored to the needs of a given farm and farming system (Gasson and Hill, 1996).

4.16.2 Within the private sector, advisors from consultancies tend to be members of the British Institute of Agricultural Consultants (BIAC), the Rural Practice Division of the Royal Institution for Chartered Surveyors (RICS) or the Institute of Ecology and Environmental Management (IEEM). The number of members of these organisations offering conservation advice has mushroomed since the 1970s and the existence of a number of government grant schemes for conservation related schemes has been the focus for work for many.

4.16.3 In 1994 BIAC had a membership of 250 (Winter, 1995). The BIAC index has an environment and conservation section, under which is listed nature reserve management, game conservation, ecological surveys, pollution, wildlife management, waste disposal and environmental impact assessment. A few relevant entries also appear under Trees and Forestry. Winter (1995) found that of the 250 entries, 54 were entered as providing advice in the field of environment and conservation, although it is unlikely that 100% of their time is spent on such work. The geographical distribution of BIAC members is heavily skewed towards the south of England with well over a half of its members located south of the Severn/Wash line. Representation is particularly poor in Northern England (and in Scotland and Northern Ireland). Most are situated in the arable areas of the country where there is

perhaps more scope for consultancy with larger, more prosperous farms and estates and more work through planning applications and inquiries.

4.16.4 The RICS Rural Practice Division represents those at the forefront of work with farmers in areas such as estate management, conservation and other environmental concerns, and is an important advice resource in terms of the large land area into which they have a management input. The RICS has a membership numbering in excess of 100,000 fully qualified surveyors worldwide. In 1995 the Rural Practice Division covered just 6.5% of members. RICS members are important amongst private consultants offering advice to farmers, although perhaps less in relation to the number of farmers/landowners they might have contact with, but in terms of the substantial land area into which they have a management input.

4.16.5 The IIEM aims to raise the profile of the ecology and environmental management profession and establish, maintain and enhance professional standards. The Institute also develops initiatives and makes relevant contributions to policy developments. It currently has around 1,000 members and associates of which 40% are consultants. The IIEM has a Code of Professional Conduct and entry qualifications. Like BIAC, IEEM has a southern bias with over half its membership in East, South East and South West England. A third of its members are involved in higher education or located in local Government offices. Only about half the membership are self-employed or in private practice.

4.16.6 Winter (1995) revealed that the amount of time spent by BIAC and IEEM members on agri-environmental advice was minimal. Twenty out of 25 of the BIAC/IEEM members spent less than 10% of their time on this work and in many cases it was just 1-2%. In only 5 instances was more than 10% of BIAC/IEEM members' time spent on agri-environmental issues. Woodland management, management agreements and farm diversification plans often stimulated approaches to consultants. Thus, in most cases advice on conservation was not the primary reason for the initial enquiry but became an add-on to the other advice the farmer was receiving.

4.16.7 Only in the case of RICS advisers did a significant proportion spend more than 10% of their time on advising farmers on environmental matters – 23 of the 45 in the sample. Twenty-five of the RICS sample advice particular estates on their estate management on a regular basis and of those sixteen dealt with more than one estate or landholding. This clearly represents an enormous opportunity for imparting advice. These land agents were responsible for advising at least 850 tenants. Advice on environmental matters was offered to tenants in 18 cases. Most concentrated on issues thrown up by statutory regulations or income generating possibilities, chiefly pollution control and woodland management.

4.16.8 One of the limits of advice provided by private consultancies is the need to demonstrate value for money. This brings into question how 'awareness advice' is provided, as the immediate business benefit of such advice is difficult or impossible to quantify. A number of information providers interviewed by Angell et al (1997) drew attention to the need to stimulate the demand for advice so that farmers are actively looking for it.

4.17 Voluntary Sector Advice

4.17.1 Voluntary sector advice ranges from very specialist advice offered by the Game Conservancy and by BASC, to general conservation advice from county wildlife trusts and

the RSPB. It could be argued that these organisations are more efficient in the provision of farm conservation advice as farmers pay less for this advice. There is, however, a danger of too many single-issue groups, with their own agendas. This means that they are often poorly 'networked' with other providers, which leads to a fragmentation of advice to farmers.

4.18 Wildlife Trusts

4.18.1 A postal survey of Wildlife Trusts (Winter 2000b), which generally operate at a county level, revealed that all Trusts had staff offering direct conservation advice to farmers and private landowners, but none on a full-time basis. Much of the advice delivered by Wildlife Trusts in the past has been reactive, responding to requests from farmers, but there is evidence that the they are becoming increasingly proactive due to new funding sources. Work with the farming community is increasing and the new Wildlife Sites initiative is proving to be an important delivery mechanism. This aims to identify those sites in the wider countryside that are the best areas for wildlife outside statutory protection. This is designed to bring to the attention of landowners the unique value and importance of their wildlife, allowing them to manage the sites sympathetically and with best knowledge. It also enables the Trusts to gain initial access to farms and to encourage farmers to adopt farm conservation practices to protect their wildlife sites. Winter (2000b) estimates 25 person years of conservation advice are offered through the Trusts. The Wildlife Trusts would like all Wildlife Sites to be eligible for incentives such as those provided by agri-environment schemes and for advice on appropriate management to be available to all owners or managers. The sites should be identified in development of Local Plans. Information is provided on request to bodies with an interest in wildlife conservation for use in their day-to-day work, thus wildlife trusts provide advice to some of the 'advising organisations'.

4.18.2 The majority of Trusts also feel that the involvement in biodiversity action planning has led to fresh consideration of environmental advice for farmers. Some Trusts have used the BAP process to involve farmers in producing farmland action plans, such as Arable Action Plans and Grassland Action Plans (Winter et al, 2000).

Box 4.6 Green Gateway Initiative

Devon Wildlife Trust has an already established and successful Culm Grassland Advisory Service providing on-farm advice to farmers occupying these important habitats. With DETR and Landfill Tax Credit funding, the Trust has now established Green Gateway to promote new connections between this important element of natural capital and sustainable economic development. The project aims to develop and market products based on the natural environment.

4.18.3 Linked to the Wildlife Trusts is the Association of Wildlife Trust Consultancies, a body set up by the Wildlife Trusts to monitor and advise Trust Consultancies on matters relating to professionalism, standards and quality of service. For example, 'Lapwings Consultants' is one such organisation which is a wholly owned trading company of the Lincolnshire Wildlife Trust with four Directors appointed by the Council of the Trust and the consultants give nature conservation advice to a wide range of land users. Kent Wildlife Consultants help with developing management plans for landholdings and a monitoring service to gauge the success of land management or habitat creation schemes, and reliable up-to-date advice on sources of funding and planning matters (Kent wildlife trust website).

4.19 Game Conservancy Trust

4.19.1 The Game Conservancy charges for some of its advice given from its trading subsidiary, Game Conservancy Ltd, but also gives free advice covering the whole of England. The Trust advises farmers on how to improve the occurrence of natural game species, particularly pheasant and partridge. It conducts a considerable amount of research on the ecology of game birds and game management. The advisory effort is small - just seven advisers throughout Britain and Ireland compared with more than 70 research staff. Even so, advice is integral to the Trust's philosophy and because it tends to work on large estates, its impact may be greater than is implied by the number of its advisers.

4.19.2 Conservation messages are delivered on a one-to-one basis on the farm, to groups of farmers at farm walks, lectures and shows where groups of farmers can get together. The latest group of people who have benefited from advice (through seminars) are BASIS-trained agronomists, advisors who are on the farm all day advising about pesticide use and crop protection who are now aware of the Game Conservancy trust's conservation messages (http://www.game conservancy.org.uk/research/feu/pglt.html). The Trust is currently working with the RSPB in implementing the Biodiversity Action Plan for black grouse. The Trust's main areas of interest (into which it undertakes a great deal of research) are farmland, moorland and woodland conservation, river and habitat restoration, disease, predation control and education. The Game Conservancy Trust also has a demonstration farm in Leicestershire to show the benefits given to game species by farm management techniques such as set-aside, game bird feeding and predation control, and the benefits to other forms of wildlife through this sympathetic management. The Trust disseminates information about its research activities on the internet, including information about integrated farming systems and it promotes this approach on the internet.

4.20 LEAF

4.20.1 LEAF (Linking Environment and Farming) is an independent charitable organisation, part of a Pan-European Project, and claims to have been consistently at the forefront of the promotion of Integrated Crop Management (ICM) especially amongst the more commercial and larger scale, mainly arable, farmers. ICM combines the best of traditional methods with practical and profitable methods of food production. ICM involves a set of principles and procedures relating to the farm's local environment. One of the organisation's key functions is to provide up-to-date information about developments in ICM. One long-term objective is to seek marketing agreements with the supermarkets to ensure widespread adoption of ICM by farmers. It is closely involved with Quality Assurance schemes and this is seen as important in terms of UK and EU policy-making, formation of a Pan-European ICM Forum in Brussels and development of a statistical database to counter anti-farming media (Farmers Weekly, 1997).

4.20.2 The initiative is farmer-led with the onus on farmers developing their farms to meet the LEAF objectives related to ICM before formally becoming a LEAF farm. One long-term objective is to seek marketing agreements with the supermarkets to ensure widespread adoption of ICM by farmers.

4.20.3 LEAF uses a whole farm approach and the best LEAF farms claim to be good examples of ICM, often utilising computer-based technology to adjust fertiliser and spray levels according to need. The work on field margins and natural predators is also innovative. However, there is little available evidence as to whether all LEAF farms attain these ideals, with no available monitoring or evaluation. A project awarded to the CCRU and IGER by the Countryside Agency in July 2000 is examining any available evidence.

4.20.4 LEAF farmers must comply with all legal requirements and relevant codes of good agricultural practice, and endeavour to operate under the Guidelines for Environmentally Responsible Farming, produced by FWAG. Farmers undertake their own environmental audit and then LEAF provides a practical guide to integrated crop management. Farmers pay a membership fee to become a recognised LEAF farm and membership benefits include visits to LEAF demonstration farms; regular newsletters; training seminars and talks on integrated farming; and, technical information on ICM across Europe.

4.21 RSPB

4.21.1 The RSPB provides advice relating to the sympathetic management of habitats but they operate differently from some other organisations since their advice is targeted at advisers rather than the farmers themselves. For example, the RSPB have recently employed an Agri-Environment Project Officer who will be advising DANI staff on the management of land for farmland birds and other biodiversity, and help target the new Countryside Management Schemes to the most important areas in Northern Ireland.

4.21.2 The RSPB works with local policy makers; undertakes fund-raising and protects vulnerable sites. The RSPB produces a wide range of documents for farmers, nature reserve owners and other land mangers from major habitat management handbooks to leaflets aimed at making the most of countryside grant schemes. One of the purposes of the RSPB's agricultural work is to promote agri-environment schemes. The RSPB uses a website to disseminate information relating to the importance of hedgerows (including legislation) and the best ways to manage or plant hedges for conservation purposes including listing the sources of grants for this purpose. The website gives the numbers of telephone helplines for MAFF and English Nature. Details on how to encourage grey partridges, linnets, corn buntings, reed buntings, skylarks, and tree sparrows are also given at the site (RSPB website). RSPB staff, part-funded by EN's Species Recovery Programme, work with farmers to protect nests and provide advice. The RSPB also work in partnership with the Countryside Agency; LEADER Programme and EN in the North Pennines to encourage wading birds in an area suffering from the marginal economics of hill farming and the loss of rural infrastructure. So far, work has included a wading bird survey; advisory meetings and liaison with farmers to help them manage their land better for breeding wading birds.

4.21.3 The RSPB Volunteer and Farmer Alliance, piloted in Central England, has been developed as a free service for those farmers who want to understand and provide for the needs of birds on their land. Volunteer surveyors paid several visits to farms to survey birds. Each participating farmer receives a package containing a map showing where the birds are located; a certificate of participation; advisory material and details of where professional farm conservation advice can be sought. Clearly, participation is a key element to this particular scheme:

Working with farmers to recognise the value of their land for birds will help achieve the RSPB's vision for farming - that of farmers producing food and wildlife on the same land and the same time (http://www.rspb.org.uk/cons_issues/volunteers.html).

4.21.4 In the South-west region RSPB has worked in Devon to increase the population of cirl buntings and has succeeded in trebling the numbers, stating that, 'key to the success of this project was the involvement of the local community. This included working with landowners and farmers helping to develop farm management agreements through to children carrying out special projects in schools across the county. In East Anglia, collaborative work with landowners has halted the decline of stone curlews. This means that the first target of the UK Biodiversity Action Plan for stone-curlews has been met two years ahead of schedule.

4.22 Summary of Free Conservation Advice

4.22.1 The analysis above identifies a plethora of organisations providing free conservation advice. Figure 4.1 and the supporting Table 4.8 provides an estimate of the contribution of each organisation to the provision of free conservation advice and the extent to which this advice meets conservation management, landscape improvements and pollution advice.

Figure 5.1 Free conservation advice provision by organisation

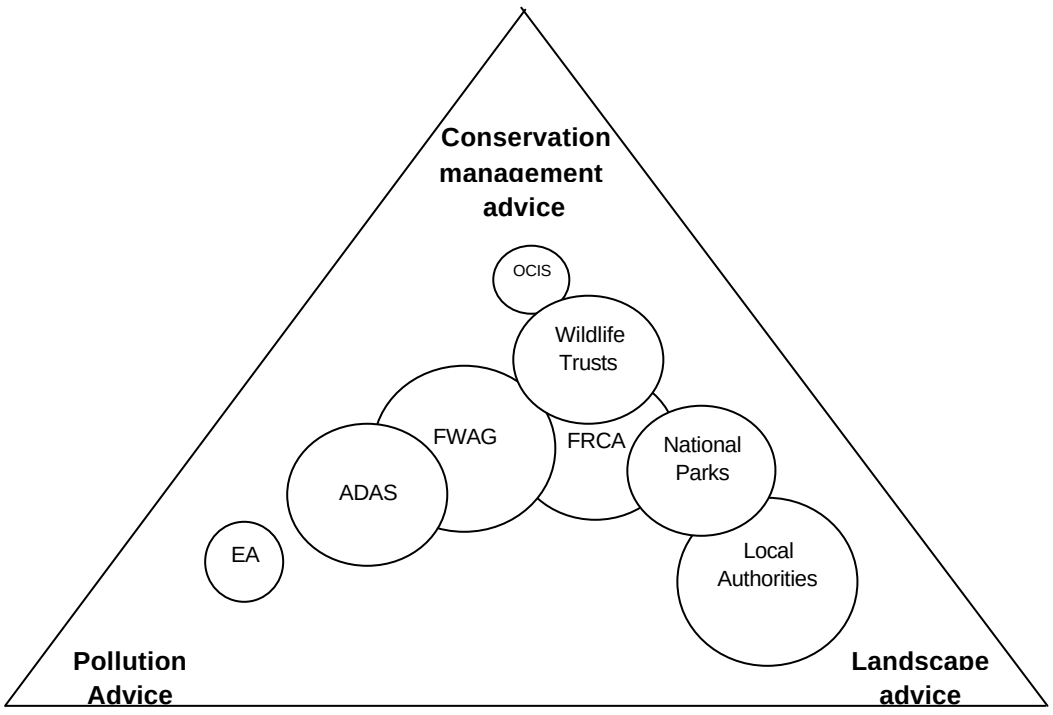


Table 4.8 Free Conservation Advice provision in England (1998)

Advice providers	Person years of free conservation advice
FRCA	36
FWAG	45
ADAS	27
Local authorities	45
National Parks	25
Wildlife Trusts	25
OCIS	7.5

Source (Winter 2000b)

4.23 Conclusions

4.23.1 Vertical fragmentation means that there is a lack of clear mechanisms and resources to link agri-environmental science findings to varying forms of extension, creating problems for technology transfer. The extension sector has become increasingly fragmented (horizontally) since the role of advice-giving by ADAS has diminished and numerous organisations have started to provide information to farmers. In contrast to this level of fragmentation, farmers appear to favour integrated projects that provide both economic and environmental benefits. Agenda 2000 reforms will mean that there is more emphasis on integrated rural development through the implementation of the Rural Development Regulation. Advisory provision and structures need to reflect the new-found interest in integration without becoming monolithic. Integration needs to be pursued in such a way that the initiative and vibrancy that has arisen from diversity is not lost. At the same time obvious duplication and/or competition needs to be examined. FWAG and ADAS continue to receive funding from central government to do the same job. On the ground this sometimes means that these two organisations are competing against each other to provide free conservation advice to farmers.

4.23.2 It appears that existing structures such as farmer networks (e.g. carrot growers) can be easily targeted in order to make an impact on the ground. Farmers require technical knowledge rather than new capital items, and a truly sustainable agriculture must be knowledge-rich. The agricultural supply industry can also be a useful messenger in terms of promoting codes of good environmental practice. However, there is evidence that the 'trickle-down' effect anticipated to result from focusing on larger farmers does not, in practice, work (Cooper, 1999).

4.23.3 The different sources of conservation advice are complementary, and display strengths and weaknesses, as well as changing characteristics. Conservation advice is not uniformly available: for example, the geographical distribution of FWAG advice has improved but some counties are still served better than others. During the last five years, FWAG has started to become more reliant on chargeable income. Local authorities give financial support to FWAG and other conservation organisations and have also shifted emphasis to local projects, AONBs and Heritage Coasts, or are using BAPs to take a county-wide view. They are also contributing to more formal partnership projects. Objective 5b projects tend to build on existing networks of advisers. All National Parks offer a significant advisory input and their

role could be formalised to act as an agent for a variety of bodies within their areas. The Countryside Agency will now offer advice in some areas through the new LMI scheme. The Countryside Stewardship Scheme has a target of increasing the numbers of agreement holders receiving advice from partner organisations, and has made good progress in this direction. Farm BAPs are a new initiative developed by FWAG with Sainsbury's which involves consideration of biodiversity and habitat management across the whole farm. Wildlife Trusts are becoming more proactive in the farming community due to new funding sources. The new Wildlife Sites initiative, along with county BAPs are proving to be important delivery mechanisms. The Game Conservancy Trust plays an important role on large estates and also has an important research role.

4.23.4 There is a plethora of organisations providing conservation advice, but with little co-ordination at a national or regional level. The voluntary sector, for example, has some of the most innovative programmes at a county or local level. However the tendency to operate single issue agendas and poor 'networking' with other advice providers, even locally and certainly regionally and nationally presents a serious challenge. It is perhaps ironic that some projects dedicated to facilitating a flow of information to farmers are not adequately networked into information exchange activity with other organisations also seeking to influence farmers.

4.23.5 Winter and Mills (2000) identify some of the problems stemming from the fragmentation of the advisory system:

- Confusion among farmers as to where to go for advice;
- Dangers of duplication and/or wasteful competition among providers of advice;
- Geographical unevenness of advice provision with some areas under-provided for;
- Dangers of contradictory messages going to farmers;
- Difficulties of monitoring and evaluating provision and of quality control;
- No overall co-ordination and consequently no real sense within government of the nature and extent of some of the above problems.

4.23.6 However, they suggest that there may be opportunities for a cross-fertilisation of ideas across the network. It is undoubtedly the case that the open system in England allowed a more rapid transition from an agricultural productivist advisory regime to an environmental regime than elsewhere in the UK. Innovation is more likely within a diverse group of advisors and advisory bodies especially, perhaps, where there is a combination of networking and creative competition between agencies. Above all, perhaps, the open system has encouraged the environmental NGOs to become involved in the AKS, bringing their own specialist expertise but also exposing them to the tough realities of practical farming and land management. Thus the gap between environmental critique and the real world of farming, which FWAG successfully breached for many years, is increasingly being straddled by other NGOs, notably the more successful wildlife trusts.

4.23.7 Private consultants are more active in the South of England, mainly on arable farms. BIAC/IEEM members are more concerned with woodland management, management agreements and farm diversification plans than agri-environmental issues. RICS advisers, however, spend more time on environmental matters and this represents an opportunity for imparting advice. Moreover, there is a need to stimulate the demand for advice so that farmers are actively looking for it, and private consultancies do not provide this 'awareness advice' due to the need to demonstrate value for money. This type of advice must come from public-funded sources of advice provision.

4.23.8 A number of key issues arise from this part of the research. The first is to explore further the significance of the range of extension practices adopted in the voluntary sector and the varying emphases between organisations. For example, the Game Conservancy Trust conducts much research relative to its advisory effort. LEAF's advisory effort is focused on visits to their own network of demonstration farms, regular newsletters, training seminars and farmer-administered audits. The RSPB targets advice at advisors rather than farmers and produces a wide range of documents. FWAG's efforts are primarily devoted to face to face advice given by full-time professional advisers mainly in response to requests from farmers. These contrasting methods and approaches are in part a consequence of the different goals of the organisations concerned, but they may also reflect different views of the effectiveness of alternative extension methods. Key people need to be brought together to tease out the implications of these differences and to share good practice.

4.23.9 A second key issue concerns the significance of proactive work among farmers. Many organisations aspire to this but find it difficult to implement in practice not least because of resource limitations. FRCA adopt the strongest proactive approach with regard to agri-environment schemes. Nonetheless their work also depends on time and staff availability. Recently published empirical work by Beedell and Rehman (2000) conclude that "those farmers most in need of advice and training are the least likely to seek it voluntarily or use grants or other incentives available to them

4.23.10 A final point of conclusion to this chapter is the issue of training and career structures for advisers. FWAG have confronted difficulties of retaining advisers due to the lack of a career structure and FRCA too note a lack of continuity with Project Officers moving to other jobs. Thus more attention needs to be given to how agri-environment advisers are recruited, trained, deployed and given opportunities for career advancement.

5 METHODS OF PROVIDING KNOWLEDGE

5.1 Introduction: Agricultural Extension

5.1.1 During the 1950s 'agricultural extension science' developed as an important discipline, which conceptualised the dissemination of agricultural information. Gasson and Hill (1996), in reviewing literature relating to technology adoption, suggest that the technology transfer paradigm focuses on the delivery of a message from a change agent to target group. However, they claim that great gains in effectiveness may be achieved by measures which strengthen the flow of information from and about target clients back to the change agents, such as advisors. They view technology transfer as a communication process, and visualise the agricultural information system as a chain of communications linking the research, extension, consultancy and user sub-systems, with feedback from end users to the researchers. 'The research sub-system generates **information** which the extension system turns into **messages,** while the consultancy sub-system adapts information and messages into appropriate **individual advice'**. Much new technology is information-intensive requiring end-users to make marginal adjustments to existing practice.

5.1.2 Extension is an *intervention*, which can only be effective through inducing *voluntary* change (Gasson and Hill, 1996, p.22). Therefore, there is an inherent contradiction within its own definition which implies a need to involve both bottom-up and top-down approaches to advisory extension services. Extension agencies around the world have often concentrated their efforts on progressive farmers or innovators in the expectation that this will serve to distribute the message amongst the rest of the population: the innovation-diffusion model which builds on the foundational work of Rogers (1962). Röling (1988) suggests reasons that extension agents use to justify this approach:

- The impact on agricultural production in the short run is greater if the extension effort is directed to progressive farmers who are usually farming on a large scale
- Progressive farmers are well educated and share the values of extension agents so that it is easy for them to communicate with one another
- Having experienced success in controlling their environment, progressive farmers are eager to follow advice and little time is wasted in trying to convince them of the desirability of an innovation
- Progressive farmers have the means to try out new ideas; they can afford to run risks
- Progressive farmers provide an intellectual challenge to the extension worker, who also learns from what to tell others;
- Progressive farmers <u>demand</u> advice; they complain if they feel neglected and may be powerful enough to affect the career of an extension worker.

5.1.3 Röling moves on to suggest that different strategies are needed for high-access and low-access (to resources) farmers. For high access farmers the 'trickle-down' approach is adequate, but for low access farmers more effort and ingenuity are demanded. To ensure access it might be possible to identify opinion leaders within each stratum and for extension agencies to communicate with them, enabling the message to be diffused horizontally. A 'laggard' on an extensionist's scale could be an 'innovator' with respect to his or her own peer group (Gasson and Hill, 1996).

5.1.4 Chambers et al (1989) refer to bottom-up approaches termed, 'farmer-first', 'farmer to farmer' and 'farmer participatory research' where extension science should be based on a thorough appreciation of client needs and choices. These bottom-up flows of information can be:

- deliberately stimulated, e.g. market research, training needs assessment;
- autonomous, e.g. farmer lobbies, political processes, user control;
- market-induced, e.g. commercial extension, consultants.

5.1.5 For effective technology transfer, scientists must communicate with farmers either directly or indirectly. In terms of links between research institutes and extension agencies such as ADAS, communication depends a great deal on individual advisers cultivating personal relationships with scientists. Where research organisations provide training for extension staff the result is effective collaboration.

5.1.6 Direct communication between researchers and end users depends on individual researchers being accessible to farmers thereby allowing the opportunity to build relationships, e.g. by attending conferences, meetings, events and shows. Generally speaking extension agents take the information from researchers and interpret it for consultants and end users. Messages may be targeted at different levels within the farming community and might be presented as a programme of publications, talks and demonstrations in order to ensure that research results are taken up by agriculturalists.

5.1.7 Farmers may also receive extension messages by participating in trials, recording schemes and farming systems research. Certain sectors (pigs, poultry and horticulture) are very highly concentrated meaning that information can easily be disseminated through already existing groups. Where the structure of agriculture is fragmented use can be made of 'multiplier groups' such as input suppliers to spread ideas to producers.

5.2 Mechanisms for Information Delivery

5.2.1 A number of tools are used by organisations delivering conservation information, such as: advisory publications; group meetings; face-to-face advice; and demonstration. Table 5.1 gives an overview of the delivery mechanisms used by individual organisations to deliver conservation advice to farmers.

Table 5.1 Primary Delivery mechanisms used by conservation advice providers

	Publications	Discussion groups, road shows, meetings.	Face-to-Face advice	Demonstrations
ADAS	✓	✓	✓	✓
FWAG	✓	✓	✓	✓
FRCA/MAFF	✓	✓	✓	
Obj 5b schemes			✓	✓
OCIS	✓		✓	
Local Authorities	✓		✓	
National Parks	✓		✓	
Wildlife Trusts	✓		✓	
Countryside Agency				✓
English Nature	✓		✓	
Environment Agency	✓		✓	
Game Conservancy	✓	✓	✓	✓
Forestry Authority	✓		✓	
NFU/CLA	✓	✓		
RSPB	✓	✓	✓	

5.3 Publications

5.3.1 Written messages span the whole spectrum from research reports and papers in scientific journals, which may be read by a small percentage of top farmers or members of their technical staff, through to articles in the farming press and free handouts at agricultural shows or events (Gasson & Hill, 1996).

5.3.2 Amongst the farmer focus groups conducted by Angell et al (1997) there was a consensus that little written information was of immediate value although most farmers enjoyed reading farming journals. There is a feeling that factors affecting agriculture need to be interpreted at the individual farm level. Some organisations were found to only provide written information, but they recognised that its value was greatest if it was read by professionals who then went on to provide advice to farmers. One government agency questioned the amount of written information that they produced, and wondered how much was actually read.

5.3.3 A number of organisations use publications as a means of delivering information and advice to farmers. For example, different approaches to distribution of publications by FRCA/MAFF include:

- Mailshots – which can be expensive and wasteful;

- Leaflets sent to appropriate bodies asking them to send out copies with their mailing to tell farmers where they can obtain copies;

- Notices in the farming press telling farmers what leaflets are available. There is a tendency to target its distribution of environmental protection publications rather than use blanket coverage. On farm wastes, for instance, the message might be sent to specific regions or catchment areas (Gasson & Hill, 1996).

5.3.4 The Environment Agency also relies heavily on publications in order to inform farmers about anti-pollution regulations. They produce Pollution Prevention Guidelines, on for example sheep dip and pesticide use and are currently devising a new series of 12 pamphlets on agricultural best management practices (Environment Agency website, 1999). In 1999 the Agency contacted 65,000 growers and sheep farmers across England and Wales by letter, with a leaflet detailing the types of agricultural activity covered by the new Groundwater Regulation and how to apply for an authorisation.

5.3.5 A number of organisations publish membership magazines which offer advice. County FWAG branches provide newsletters to members offering practical advice. The NFU publishes a quarterly Magazine and Business publication, which concentrates on issues common to all farmers, whilst a range of monthly county and regional publications provide an opportunity to target messages at the local level (NFU website, 1999).

5.3.6 One of the difficulties with publications is to know whether the information is getting across or into the right hands. If the information is received it may not be read or acted upon (Gasson & Hill, 1996). There is evidence that farmers are inundated by literature through the post and rarely act solely as a response to such information (Silsoe College, 1997).

5.3.7 It is also important that publications are distributed in the right circumstances. An evaluation of the marketing of Countryside Stewardship Scheme, Silsoe College (1997) found that the application pack had often been used in an inappropriate manner. On occasions, farmers had been given the pack in response to their initial enquires and found this comprehensive and complex document daunting and indigestible. In this situation a simple leaflet stating key features and benefits of the scheme would have sufficed.

5.4 Face-to-Face Farm Visits

5.4.1 The individual farm visit remains one of the most appropriate and effective methodologies to use in the dissemination of new advice and information (Singh, 1981, Benor *et al*, 1984; Röling 1988). On-farm visits give the advisor the opportunity to view the individual farm holding and to assess how a policy or technology may be integrated within the farmer's personal farm plan.

5.4.2 Research by Silsoe College (1997) examining the uptake of arable options in the Countryside Stewardship scheme, also found that face-to face interaction with advisors on the farm was an important channel of communication. The research showed that, although the mass media appeared to have been the chief vehicle through which farmers became aware of the CSS, it was more often through discussions with advisors that they were informed of the arable field margin option within the scheme. The research found that personal communication with advisors played a significant role in persuading farmers to take up the schemes which they had heard of through the farming press. One comment, which was typical of many, was "If I received Countryside Stewardship Scheme literature through the

post I'd be unlikely to read it. I am more likely to be spurred into action if someone visited the farm to give advice".

5.4.3 This view is also supported by Angell et al (1997) who found that farmers prefer face to face contact with information providers. Farmers feel they have little time for information gathering, they would rather have face to face contact with someone who has interpreted the information within the context of their own business.

5.4.4 The information providers themselves recognise that the face-to-face approach is important and effective and most adopt it as a means of delivering conservation advice to farmers (Angell et al, 1997). For example FRCA consider farm visits a primary tool in which to persuade and enrol farmers into individual management agreements. FRCA ESA Project Officers (PO) adopt a conciliatory approach with farmers in order to gain trust and co-operation (Cooper, 1999). As Cooper explains, the PO will first listen to the interests and objectives of the individual farmers and attempt to understand the farmer's vision for the farm. Having maintained this silent and objective role, the PO will then seek to discuss, advise and suggest how the agreement holder may implement the scheme in line with individual farm plans. POs maintain a non-dictatorial role, seeking to understand farmers' individual objectives and thereby gaining co-operation and trust. According to Cooper the POs recognise that any attempt to adopt an official approach to policy implementation would be met with extreme resistance from the farmers. They seek to listen to farmers' views and to assist them to implement these within scheme rules.

5.4.5 Cooper (1999) found that the majority of farmers interviewed in the Breckland and Cotswold Hills ESA appeared greatly to appreciate the help and advice given to them by the FRCA POs. They spoke of the need for individuals such as POs to be located at the ground level, to help farmers make sense of government schemes and to advise them on how best to implement MAFF's rules in relation to their own farm business objectives. Even non-participants emphasised the need for a PO to operate at the ground level, to act as a link to government officials and to assist farmers to adjust to 'new' political initiatives. Many of the farmers also stressed that POs should possess knowledge and experience of general agricultural issues. When it was suggested that environmental groups might wish to implement the agri-environmental schemes the majority of farmers interviewed expressed their fears of such a situation arising and asserted that environmental groups should remain peripheral to the agri-environmental implementation process. It has to be said, however, that where environmental groups have become involved such negative attitudes can be transformed. The good relations established between Devon Wildlife Trust conservation advisors and farmers with culm grassland sites has resulted in the majority of important culm sites being brought into appropriate management in recent years (Winter 2000b). Independent research shows high levels of satisfaction among farmers on the Culm (Wilson pers. com).

5.5 Discussions, Road Shows and Meetings

5.5.1 Although face to face advice delivery is popular with farmers it is also recognised as being the most expensive from of delivery. Discussion groups, road shows, workshops, seminars and meetings represent alternative and more economic methods of speaking to farmers directly. Whilst it is less easy to deal with individual farm circumstances at such occasions, there are two potential advantages over face to face visits. First, meetings provide an opportunity for farmers to meet together and share ideas and experiences. Secondly,

scientific experts in a particular field, for whom face to face visits to individual farmers would not feasible, can talk direct to several farmers at one time.

5.5.2 A number of organisations hold meetings with farmers. ADAS, for example operates a programme of promotional activities, under contract to MAFF, which includes talks to farmer groups. Also FWAG holds a number of conferences, which are free to members. Angell et al (1997) found that the organisations responsible for giving information placed some value on presentations to groups, but recognised that this would not necessarily be a good method for reaching all sectors of the farming community although it might be very effective in the case of progressive farmers. Some grant schemes, such as the ESA scheme, which deliver direct financial benefits, can achieve high numbers of potential scheme applicants in scheme areas. Conversely, more generalised environmental meetings have sometimes had disappointing attendance.

5.5.3 Different kinds of presentations will appeal to different audiences. A national meeting may well only attract a few dedicated farmer and indeed, many of these are aimed at advisors and representatives of commercial companies. To reach the next stratum, regional meetings are needed because research has found that most farmers are unwilling to stay away overnight or travel more than 50 miles (Gasson & Hill, 1996). Below this are local meetings with one speaker, often held in the evening to attract working farmers. Increasingly, old-style conferences are giving way to workshops, where farmers are more involved in the proceedings (Gasson & Hill, 1996).

5.6 Demonstration Farms

5.6.1 Research has found that good demonstrations are valued by farmers (Gasson & Hill, 1996). As one respondent in a survey of horticulturalists put it "Growers really appreciate these 'muddy boots' events, which give them the opportunity to see but also to mingle with researchers and advisers and ask questions" (Gasson & Hill, 1996). The CLA is one of several organisations to promote demonstration farms. In welcoming a MAFF initiative establishing demonstration farms in Yorkshire, Cheshire, Worcestershire and Essex designed to improve groundwater and river-water quality' the CLA assert that 'practical advice is often the most successful route for the transfer of technology including training, promotional activity and farm-scale demonstrations" (CLA website).

5.6.2 In Britain there has been a recent revival of interest in demonstration farms for the dissemination of practices (Winter *et al* 1995). In the past demonstration farms were attached to research or education institutions. College farms have tended to be used for teaching purposes, while universities and research institute farms tend to exhibit research which may be at too early a stage to be demonstrated as good practice. In all cases, demonstration is not the main aim and without adequate resources demonstrations may be ineffective.

5.6.3 However, there are other types of demonstration farm. NAAS (the forerunner to ADAS) established experimental husbandry farms (EHFs) which were 'open' in nature and geographically spaced to cover different climatic conditions, soil types and specialised farming enterprises (Wormell 1978). Twelve were founded and tended to conduct applied research and development (the development aspect was very important). EHFs held open days and farm walks and supplied information through their own bulletins and ADAS bulletins. Since the Agriculture Act in 1986, EHFs have been re-designated as Research Centres and only ten now exist. Commercial pressures have meant that the openness of ADAS to the

farming community has been somewhat compromised. As Winter *et al* (1995) point out, the EHFs displayed some important strengths, notably:

- the R&D work took place within a whole-farm context;
- the emphasis given to the dissemination of research findings;
- strong links with other forms of extension such as advisors, advisory booklets.

5.6.4 However, not being fully commercial farms and with thin geographical coverage, they were not ideally placed to win the hearts and minds of all farmers.

5.6.5 The Countryside Agency's (formerly Countryside Commission's) Demonstration Farms Project (DFP) was set up in 1974 with the aims of:

- discovering, developing and implementing measures to enable the conservation of visual, wildlife and historic features to be combined with modern agricultural measures;
- demonstrating the principles and practices to farmers and landowners;
- advising on the most effective management methods.

5.6.6 Ten farms were set up by 1981 and they enabled farmers to see how certain types of conservation and commercial farming could be integrated. It was felt by those involved in their establishment that the farm-level interface between the practicalities of commercial farming and conservation management provided a powerful tool to help persuade farmers of the benefits of environmentally friendly methods of agriculture (Winter *et al* 1995). Based on the evidence of early FWAG farm-based conservation demonstrations it was felt that farmers would respond well to this form of dissemination (Cox *et al* 1990).

5.6.7 Winter *et al* (1995) report on several evaluations undertaken by the Social Research Consultancy (1982); Cobham (1984); Matthews (1987); Llewelyn-Davies (1987); and Turner (1994). The Demonstration Farm project was long-term enough to allow visitors to see the end results of conservation management. However, only 18.5 % of visits were made by farmers and of those living within 100 acres of the farms only 3.5% visited them (Llewelyn-Davies 1987; Winter *et al*, 1995). A large proportion of farmers said that they would have visited the farms had they received an invitation. Also the small number of farms restricted access and they were not generally well-marketed. The lack of an extension service linked to the farms also limited the effectiveness of the DFP. Visits to demonstration farms should provide an opportunity to follow up and advise farmers on how best to implement conservation activities on their own farms.

5.6.8 Two of the evaluations - those by Social Research Consultancy and Llewelyn-Davies - involved interviews with farmers. The various evaluations of the DFP showed they had a significant impact in helping persuade farmers of the benefits of environmentally friendly methods of agriculture. The evidence suggests that farmers respond well to this form of dissemination. The longevity of the project allowed medium and long-term conservation management activities to become established, potentially allowing visitors to see the 'end product'.

5.6.9 However, the longevity of the project had some serious drawbacks. From an administrative standpoint the project was open-ended. No provision was made to replace farmers as they dropped out from the project, and by 1991 only two of the original ten farms wished to continue as demonstration farms. The lack of fixed-term agreements between the participating farmers and sponsors is recognised as a problem for both parties. Also the economic and policy environment, within which farmers operate, changed with the passage of time. The original farms were selected to show how certain conservation activities need not reduce the productive capacity of commercial farms. However, after more than a decade of agricultural change, Llewelyn-Davies Planning (1987) argued that the management systems operating on the demonstration farms were too inflexible and were no longer best suited to demonstrating contemporary opportunities for conservation. In particular there was limited scope for demonstrating low input systems and the advantages of joining the growing number of agri-environment schemes, and tended to neglect sporting and other interests.

5.6.10 The DFP was based on the creation and implementation of multi-purpose plans which proved to be too restrictive - more flexibility with some farms in the network could have been useful for thematic conservation programmes.

5.6.11 The DFP was discontinued in 1991, although some of the farms became LINK farms under schemes managed by county FWAGs. All of those we interviewed agreed that there was still a need to demonstrate conservation techniques to farmers (and put over the conservation message to other audiences such as agricultural students and advisors) provided clear targeting could be achieved. The lessons learned from the DFP suggest that the demonstration farm concept remains a valid means or disseminating environmental knowledge to farmers. Moreover there are clear messages for how any limitations might be overcome. Lessons for the future appear to be the following:

- Using a denser network of farms reflecting different geographical regions and farming systems. Farms selected should also illustrate varying economic circumstances and some should be responsive to changing policy signals.

- Ensuring that the projects are flexible and can respond to change.

- Ensuring that sufficient resources are allocated to identify the target audience and market the product.

- Ensuring that the project does not stand alone and is networked with advisory services and integrated with a wide range of dissemination techniques which in turn need to be carefully orchestrated to achieve the desired results. Both Cobham (1984) and Llewelyn-Davies Planning (1987) stress the importance of establishing a follow-up network of advice which is sensitive to the specific needs of farmers on their own farms.

- Farmers in future projects should have fixed-term agreements which are sensitive to the nature of the conservation activities taking place.

- Unconverted farmers are more likely to attend events featuring agricultural topics or where the financial attractions of conservation can be highlighted.

- Special efforts should be made to attract advisers and representatives of the ancillary industries as well as farmers (concentrating on specific appropriate themes).

- Farmers should be offered a range of farms to visit with the opportunity to visit new farms coming on-stream over a period of time.

5.6.12 Currently, the Countryside Agency is developing its Land Management Initiative to operate in 11 sites in England covering arable, lowland, pastoral, upland and wetland farming systems. The aims of each project will be defined locally, in partnership with farming, community and environmental interests, and guided by the objectives of the national programme. The idea is to test and demonstrate how England's land management and farming systems can respond to the changing demands on agriculture in ways that will maintain a healthy, attractive environment and contribute to thriving economies and communities. There will be a significant advisory programme attached to some of the LMIs, with demonstration farms a possibility.

5.6.13 The mantle of demonstration farms has been inherited by LEAF (Linking Environment and Farming) which aims to have 50 demonstration farms by the end of 2000. LEAF farms provide the biggest current network of demonstration type farms. Demonstration is its main activity and it has limited face to face advisory capacity. With its origins in integrated crop management (ICM), it remains strongly oriented to the arable sector. It is seeking to remedy this by covering lowland and upland livestock and dairy farming systems. LEAF farmers open up their farms to a wide range of invited groups so they can explain what they do and why.

5.6.14 There is a move away from LEAF demonstration farms being geared towards farmers, and the general public and policy makers are now being encouraged more strongly to visit the farms. One worker for LEAF stated that it was difficult showing farmers around the farms as 'they were always trying to catch you out'. This points to a 'them and us' situation and suggests that farmers' view of these demonstration farms might be that they are not representative of the real world. The spokesperson also referred to 'farmer fatigue' in relation to visiting demonstration farms.

5.6.15 Habitat restoration and arable reversion techniques are demonstrated on a number of National Trust, RSPB and county wildlife trust sites. Other examples include:

- Sacrewell near Peterborough, an NFU initiative with a big education component;

- Land Heritage (which buys and promotes organic farms);

- Some Countryside Stewardship farms (used for open days);

- Many farms used by ADAS, FWAG and others for open days (some in the case of FWAG as LINK farms, a local example of demonstration farms).

- BEAM Project (ADAS), Titley Court farm, Hereford used for farm walks, demonstrations, training events, etc on IFS

- LINK collaborative research programme on integrated crop production (an initiative funded by Government Departments and Research Councils in support of science and technology), and LIFE, a MAFF research project on integrated farming systems, - both projects involve on-farm demonstration of results to visitors.

- A network of four MAFF demonstration farms promoting the better use of manure.

- The work of the Countryside Restoration Trust.

5.6.16 A new demonstration initiative for network farms was proposed by Winter (1996). This subsequently led to a failed Objective 5b bid in the south west but the proposal has been revived and redeveloped for a forthcoming Objective 1 bid in Cornwall. The proposals is for 'network farms', based on an amalgam of the best practices developed by the EHFs and the DFP, but also using existing local assets via FWAG. Within a regional network different farms would have different projects. The key objectives are as follows:

- To allow *demonstration* of current best agri-environmental practice and innovative environmental management techniques within a commercial farming operation (e.g. demonstration of production techniques that give environmental benefits as well as habitat restoration and other management techniques).

- To *improve the flow of information* from research institutes to farmers, allowing the innovations of research to be adopted more readily by members of the farming community.

- To develop farmer-based monitoring systems.

- Ultimately to *develop ideas* for new research and development work, particularly through interaction between researchers and farmers.

- To provide, where appropriate, *training sites* for the dissemination of practical environmental management skills.

5.6.17 The involvement of research institutions is in order to ensure a flow of ideas from the research community. Equally important is the close involvement of farmers, based on supporting farmer networks, in the following activities:

- the identification of research priorities.

- the identification of suitable farms and development projects.

- the dissemination of the results to the wider farming community, through farm walks, meetings, training events, etc.

5.6.18 It is not anticipated that any one farm in a single county or region would cover all development projects relevant to a particular farming region or type. Instead, there would be a regional network of farms covering different projects. In many instances a development farm would be selected purely for the purpose of developing one particular idea over a fixed time frame. In other instances, a particular farmer might express a deeper commitment over a longer time period involving a range of different specific projects. There is similar scope for variety in the kinds of development project likely to be demonstrated. In some instances tried and tested (but not widely adopted) environmental management techniques could be demonstrated. In such instances links with R&D would be relatively slight. Other projects

should have a more experimental and developmental flavour, where the links with research establishments will be a vital element.

5.6.19 In each instance it would be expected that network farms would adhere to basic principles:

- exemplify best practice in areas of management directly relevant to their development role.

- exemplify good practice in other areas (e.g. fertilizer use, pesticide use, waste management, and environmental land management).

- encourage local farmers to develop practical solutions to the environmental issues they face.

- demonstrate the philosophy that environmental objectives can and should be addressed within a farming system.

- at the *regional* level (this might be a county or a group of counties) there should be a network of farms.

- these regional networks would be co-ordinated *nationally*.

5.6.19 If this were to be successfully achieved, Winter (2000) believes that it is crucial that regional networks should develop without too great a sense of national prescription. Rather, national co-ordination should be of a facilitating nature offering a general framework rather than imposing any kind of national blueprint. Committed individuals and regional project officers would also be key ingredients.

5.7 Information Technology

5.7.1 The study by Angell et all (1997) revealed that a large number of the information providers highlighted the importance of information networks within agriculture in order to improve the access to information. In particular the Royal Agricultural College with others has formed a Network to disseminate information to farmers through demonstrations and seminars. Another example is SWARD as shown in the boxed example below.

5.7.2 Currently such networks are limited and fragmented in nature although there is a strong desire amongst most organisations to improve networking. A major hurdle to overcome prior to the proliferation of networks is the overall co-ordination of information sources as highlighted by Craig (1995).

> ".....there is enormous need for better sign-posting mechanisms if all the agricultural information sources in the UK are to be found and used by the people who need them"

5.7.3 The introduction of the Rural Business Network along with Farming-on-Line and Farmers Weekly Interactive have gone some way to providing single points of contact for large quantities of information. However this medium relies on active participation which

from the evidence of this report may prove a drawback to the use and development of these systems by farmers.

Box 5.1 Case Study - The South West Agriculture and Rural Development (SWARD) Project

This farmer self-help group project based in Devon is funded by quite a number of partners (including the Business Link; Lloyds Bank; TSB; MAFF; BT; Duchy College and the European Social Fund) and is managed by 'PROSPER' (a training organisation). Through the project 36 network groups have been formed each with 4-12 farmers involved. Over 300 people are involved altogether. The Groups are networked using information and communications technologies. Audioconferencing facilities are made use of regularly to discuss issues and disseminate ideas. PROSPER have provided the IT equipment and training (generally farmers are unsure where to go for training). The Project Officer draws up action plans including plans for training, projects and research requirements. Issues that might be discussed are the use of IT, and diversification into sustainable land use and methods, and it is a useful way for farmers to learn from each other through advising each other in an informal way. The mutual support has been very important to the farmers involved and the networking opportunities allow them to be both reactive and proactive. The training and projects are individually tailored and very diverse with the training taking place through PROSPER; the Internet and the farmers' own initiative in setting up training opportunities themselves. Other farmers outside the Objective 5b area are keen to join but are prevented from doing so by the boundary of the designation.

5.7.4 The technology of technology transfer is changing as research information and extension messages can be transmitted by electronic mail, while computer -aided decision support systems are designed to assist and perhaps eventually supersede the role of the farm advisor in giving face-to-face advice. Angell et al (1997) refer to recent findings which point towards a gradual uptake of Information Technology in the agricultural industry. However, from the results on the NatWest Survey (1992) the usage is skewed towards the larger, wealthier arable areas in the east of the country. These conclusions were reinforced by focus groups which revealed that larger businesses (especially those form eastern counties) looked upon computer based information as essential for the running of their business. The overall attitude of the focus groups was one of positive resignation to the ongoing development of information and technology, for example, Angell et al cite the following anecdote, 'The Rural Business Network will cover a lot of ground down a very accessible route, I will rely on it more than the journals that come through the letterbox' (Peterborough). However, it is noted that this view was only held by a minority of farmers and although most felt that IT had a role to play in the future, there was general agreement that there would be no great rush and that IT use in agriculture is held back by farmers' attitudes and skills. A number of farmers mentioned fax machines as a useful way of communicating written information and was actually highlighted in preference to the computer.

5.7.5 Angell et al (1997) refer to the way in which a number of organisations highlighted the unwillingness of farmers to seek out information as being a hindrance to changes in the way that farm businesses are run, 'this is a characteristic of technology transfer that highlights the potential drawback to using information technology to provide information, as this media relies on the active retrieval of written information - something that the majority of farmers appear unwilling to do'. From interviews undertaken with a range of organisations it seemed that most had taken the view of 'providing more of the same' rather than identifying gaps or

needs and responding accordingly. It is likely that one reason is that they are comfortable with the services they currently offer and will just evolve these further.

5.7.6 Angell et al (1997) found that many of those who were optimistic about the role of IT still felt that its role was limited to information provision, and would never replace the need for face to face contact. It was felt to be most useful to intermediaries to the industry who could interpret the information and then selectively disseminate it to their clients. One significant drawback of IT was getting the right information to the right people

5.8 Training

5.8.1 Practical training has been very much the cinderella of extension in recent decades. In conducting this research we came across no new studies of training since the work undertaken by Winter (1995). Since then the commercialisation and fragmentation of agricultural training provision has proceeded apace. For the UK as a whole Winter found that there were significantly low levels of uptake of training schemes amongst farmers especially compared to the numbers of advisory visits made which is a matter for some concern.

5.8.2 Lantra is the National Training Organisation for the land-based sector. It represents, promotes and supports the vocational education, training and business development needs of the land-based industry with partnership TECs, LECs and other government agencies. One of its roles is to promote environmental good practice throughout the sector.

5.8.3 As well as farmers being trained, farm conservation advisors also need to develop appropriate skills, especially agricultural knowledge and should ideally be generalists within the context of a deep knowledge of farm management and its constraints (a similar model to that of LAWS in ADAS) (Winter, 1995). Agriculturalists with some re-training were seen as the best deliverers of advice for ADAS and FWAG. However, it is rare to hear of agricultural training for conservation specialists as a route into the profession and Winter (1995) suggests that the view that advisers need to be trusted and respected by farmers has been promulgated by ADAS owing to the difficulties associated with re-deploying staff in the face of declining demand from the state for their mainstream agricultural advice services. FWAG has tended to place more emphasis on conservation training and education. Certainly more attention needs to be given to the issue of how agri-environment advisers are both recruited and trained.

5.8.4 Considerable changes are potentially afoot as training as a result of Article 9 of the Rural Development Regulation (Council Regulation EC No 1257/1999):

> "support for vocational training shall contribute to the improvement of the occupational skill and competence of farmers and other persons involved in agricultural activities and forestry activities and their conversion. Training shall in particular be designed:
>
> to prepare farmers for qualitative reorientation of production, the application of production practices compatible with the maintenance and enhancement of the landscape, the protection of the environment, hygiene standards and animal welfare and acquisition of the skills needed to enable them to manage an economically viable farm, and

to prepare forest holders and other persons involved in forestry activities for the application of forest management practices to improve the economic, ecological or social functions of forests."

5.8.5 MAFF has issued (May 2000) a consultation document on the implications the implementation of Article 9. Based on work done by the regional partners and Lantra in its Labour Market Analysis, the following areas have been identified as a high priority for training:

- information Communications Technology
- business / marketing skills
- traditional craft skills
- countryside and environmental skills
- customer care skills
- farm management skills
- development of innovation
- initiative, leadership and facilitation skills
- the provision of practical experience to underpin more formal courses of education.

5.9 Quality Assurance Schemes

5.9.1 Quality Assurance Schemes (QAS) have been developed by the food industry to provide a set of standards for every step of the food supply chain from point of product to point of purchase. Being part of the industry's own self regulation, QAS do not represent statutory standards, rather they represent a series of agreements between producers, processors and suppliers.

5.9.2 Research commissioned by the Environment Agency (1998) assessed the impact of a number of producer and multiple retailer QAS requirements on the environment. The research found that many of the national producer schemes have an environmental component included in their protocols. However, in general the guidelines issued to farmers under the protocols are not explicit with regard to environmental considerations. The Royal Agricultural College (1999) drew the same conclusion from an evaluation of environmental conditions in quality assurance scheme. They found that although schemes include environmental elements to varying degrees, they are not the primary focus and do not cover all legislative requirements affecting agricultural production. In addition, when environmental issues are covered, the schemes mainly look at environmental protection as set out in the codes of good agricultural practice. They do not generally feature compliance with current wildlife and countryside legislation.

5.9.3 Within the arable sector environmental considerations are well developed with schemes including a number of agri-environment requirements. Whilst many of these simply represent the bolstering of existing statutory conditions and non-statutory guidelines, some components raise the environmental/husbandry standards of production above the guidelines in the MAFF codes, indicating a move towards the introduction of more sustainable farming practices. Examples include requirements to map out drainage and SSSIs/NSAs and requirements to demonstrate that nutrients, pesticides and irrigation water have been applied on the basis of proper decision making tools which demonstrate need (Environment Agency, 1998).

5.9.4 However, the research found that the animal husbandry QASs relate mainly to animal health and welfare and food safety concerns and their environmental component is minimal or non-existent. Schemes such as Farm Assured British Beef and Lamb (BABBL) and Farm Assured Welsh Lamb (FABL) make little attempt to improve standards of production and environmental considerations are not a high priority. This is in part due to the need for such schemes to be attractive to subscribers and therefore commercially viable. In contrast, the Farm Assured British Pigs scheme (FABPIGS) is keen to raise the standard of pig rearing in the UK to a level above that of European competitors and has introduced an environmental component into its protocol. The study concluded that there is considerable scope for the greater inclusion of specific, environment related standards in the animal husbandry sector (Environment Agency, 1998). Morris (2000) has also concluded that the schemes should be seen for the potential they offer rather than necessarily being expected to deliver greatly improved environmental outputs as presently designed.

BOX 5.2: Case Study: Farm Assured British Pigs (FABPIGS)

The philosophy of the FABPIGS is to demonstrate best and good practice in terms of pig health, welfare and food safety issues. In 1998 greater emphasis was placed on environmental aspects of production, including a requirement for waste management plans. Prior to receiving membership, all applicants receive an advisory visit. In the past, around 30% of applicants needed to carry out some remedial action following this first visit. Around 16% of producers fail a subsequent inspection, although 80% of these can achieve the required standard within three months (Environment Agency, 1998).

5.10 Conclusions

5.10.1 There is evidence that it is useful to identify opinion leaders within particular stratum on an extension scale so that messages may be diffused horizontally. For effective technology transfer, scientists must communicate with farmers. It is important to engender farmer participation through 'bottom-up' processes which are related to local economic, social and environmental conditions. Such collaboration can be achieved by making budgetary allowances for training provision (for advisers) within research grants. Written advice needs to be clear and in plain English. A drawback is that farmers can be inundated with such advice and tend to ignore publications through information overload. It is also difficult to know whether publications have been read or not. Face-to-face advice through farm visits is the preferred advice delivery mechanism by farmers. They allow participation by farmers and attention to be given to farm plans on an individual basis. There is evidence that personal communication with advisers played a significant role in convincing farmers to take-up agri-environment schemes. Presentations through conferences, meetings etc. is a cost-effective

process in terms of influencing the most progressive farmers but there is no guarantee that the people who would most benefit will go along to such events.

5.10.2 Farmer networks are important for information dissemination, and encouraging farmer participation. The Rural Business Network has gone some way to providing single points of contact for large quantities of information. Highly concentrated farming sectors (e.g. pigs, poultry, horticulture) allow the easy dissemination of information; however, not all farmers are willing or able to actively participate in networks which can lead to some social exclusion.

5.10.3 Farmers appreciate good demonstrations since 'seeing is believing'. Longer-term projects allow farmers to see some of the benefits of conservation schemes more fully. The farmer panels indicated that farmers do not generally go back to the same demonstration farm for repeat visits, and there was a suggestion that it might be better to have a number of farms within a specific locality demonstrating different aspects of farm management. Farmers are of the opinion that demonstrations should be believable - on proper working farms.

5.10.4 There is a gradual uptake of Information Technology within the farming industry but currently it is skewed towards larger, arable areas in the east of the country (there was also evidence of this bias from the farmer panels). There is a view that IT will not become a substitute for face-to-face contact.

5.10.5 Training schemes under the RDR offer an important new way forward for the provision of information to farmers in the coming years.

6 ASSESSING AND IMPROVING THE EFFECTIVENESS OF KNOWLEDGE PROVISION

6.1 Introduction

6.1.1 It is important to recognise that any information provision to farmers needs to be monitored and evaluated. However, in the past this has happened all too infrequently. More recently central government programmes have tended to be evaluated. Nonetheless there is limited readily available information on the effectiveness of advice in terms of delivering conservation on the ground. MAFF have undertaken evaluations of the take-up of free advice delivered by ADAS in Nitrate Vulnerable Zones, free pollution control advice, written codes of good practice, free conservation advice, and farm waste management plans. This work by MAFF is not explored in detail here but reference has been made to it as an example of some of the limited work that has been carried out in terms of assessing the effectiveness of advice by organisations. Recently MAFF has let a project, which is currently evaluating its own funded programmes of free conservation, pollution and organic farming advice provision. The project is due to report in September 2000.

6.1.2 The objectives of this chapter are first to consider the issue of effectiveness in general terms; secondly, to draw on our farmer panel and interview findings to discuss some important issues in relation to effectiveness; and thirdly to consider how reforms might improve effectiveness. The farmer panels held in Yorkshire (hill farmers); Devon (dairy farmers) and East Anglia (arable farmers); and interviews with representatives of the CLA and NFU.

6.2 Measuring Effectiveness

6.2.1 Effectiveness can be measured in a number of ways. One measure frequently used involves calculating the level of enrolment into agri-environment schemes, or assessing the degree to which advice is taken up by farmers. However, as Morris & Potter (1995) argue, this method of assessing effectiveness of conservation advice is rather ineffectual if motivational factors are unaccounted for. They stress the importance of identifying whether conservation advice and farmers' entry into agri-environment schemes have had an impact on farmer behaviour, installing a long term commitment to farm conservation.

6.2.2 An alternative approach to measuring the effectiveness of advice is to identify the actual environmental outcomes but hitherto the majority of evaluations have focused on farmers. Winter *et al* (1996), in an evaluation of free conservation advice provided to farmers in England by ADAS and FWAG, found that such advice often dealt with specific features or activities rather than with a whole-farm strategy. The most popular targets of advice were hedgerows, ponds, woodland and semi-or unimproved grassland or wetlands (often covering all such features on a farm). On average, farmers had completed 1.4 conservation tasks per farm as a result of free advice. The main reason for not implementing advice were lack of time, money, difficulties over obtaining grants, the farmer's own preference and judgement and lack of authority. Most farmers were very satisfied with every aspect of the free advice they had received, FWAG clients being even more satisfied than ADAS, and those who had sought advice previously more satisfied than those who had been approached by advisers.

Suggestions for improvement were related to more comprehensive information on grant schemes and other sources of advice, greater farm orientation in the advice and improvements in the quality and financing of the service for ADAS, with more FWAG clients suggesting the need for more resources and better publicity for the organisation.

6.2.3 In the absence of free advice, Winter (1996) found that 29% of farmers surveyed said they would not have gone ahead with conservation initiatives. The majority, 47% would have sought advice, which underlines the importance of advice for farmers - most popular sources after ADAS and FWAG were local authorities, the Forestry Commission, various environmental trusts, commercial and informal sources. Three quarters of the sample had undertaken at least one conservation task on the farm in the past five years, in addition to tasks following free advice, and these had mostly been completed without advice from official bodies. ADAS was also widely consulted over pollution, commercial forestry and farm business questions. FWAG emerged very favourably compared to ADAS in terms of farmers remembering more details of the advice given, farmers going on to implement the advice, and, higher satisfaction levels concerning the advice received.

6.3 Feedback on Effectiveness from the Panels and Key Interviews

6.3.1 The number of conservation and agricultural bodies offering conservation advice means that there is certainly plenty of information available to farmers. However farmers are not necessarily taking advantage of this. A CLA representative stated during interview that the problem is with a lack of take-up, not with a lack of availability of advice.

6.3.2 One observation made by Yorkshire Dales hill farmers was that, 'sometimes there is a tension between the environmental prescription under these (agri-environment) schemes and the amount of labour on the farms, and clearly it does come down to economics in the end'. This situation may result in the environmental outcomes being less successful than they would be with more labour available. Countryside Stewardship has been effective in terms of increasing the amount of advice offered by partner organisations and was also praised by Yorkshire hill farmers for the healthy two-way dialogue which enabled farmers to get much more out of it.

6.3.3 The view from the Yorkshire Dales farmers' panel was that statutory bodies were effective because of the fact that they provide free advice - 'If we start getting a lot of private consultants charging £250 per day then farming would need to improve quite considerably to justify these kinds of costs'. The farmers attributed the closure of the ADAS office in Skipton to the fact that it started charging for advice. In an interview with an NFU representative, the comment was made that 'people get sceptical about ADAS as they seem to have a lower reputation in terms of conservation advice based on the fact that they used to provide business advice and clients don't necessarily trust the move towards conservation'.

6.3.4 It should be noted that the 'new breed' of adviser is often perceived by farmers as seeking free information to input back into the research industry, and farmers are often reluctant to co-operate since they have to pay for advice themselves. Here it should be reiterated that agricultural extension is effective where the flow of information from farmers back to change agents (advisers) is strengthened.

6.3.5 One of the most important findings which emerged from the regional farmer panels is that conservation advice should be married with a demonstration of financial gain. The view

in the Yorkshire Dales was that, 'If you want to promote something to farmers, show them the financial benefits and they'll be there like a shot'. One way in which financial benefits can be demonstrated is to give evidence from individual case studies of farms which show that better profits can be obtained by following a certain route. The Tamar 2000 project is successful in that it combines economic and environmental gains in farm management plans. Here the advisers are trained by various agencies to improve the quality of advice and so that they can operate in a multi-faceted way. There has been a very successful (95%) response rate from farmers. It is also important to recognise that conservation can be a valuable business too.

6.3.6 With regard to written messages a CLA interviewee said that it can be effective just to send a leaflet but only with careful design and planning. “Leaflets are fine” he said “but more value could be added by sending drafts round to other agencies to ask whether there is any duplication, and logos of other bodies can be added to give more weight and induce farmer confidence.” Leaflets are often adequate for single straightforward issues. For example, the CLA sent out a leaflet on ragwort which was adequate in terms of informing farmers in general terms how to encourage the species. By contrast, a leaflet on complex management, for example lowland bog preservation, is likely to require additional advice tailored to individual needs.

6.3.7 It is difficult with publications to know whether the information is getting across or into the right hands. During interview a CLA representative stressed that farmers are not necessarily good at implementing information of a general kind.

6.3.8 At the Devon farmer panel the importance of publications in advice giving was appreciated - 'trade magazines are really so helpful because they have always got information in there that you could follow-up'. Winter (1996) found that the quality of written advice generally was judged to be good or fair by farmers, with the potential for wildlife and landscape benefits - the quality was somewhat higher in the case of FWAG than ADAS. Also, in terms of the quality of written advice, agencies could consult more widely before publishing information.

6.3.9 Basically the main drawback in terms of the effectiveness of written information is that any advice not tailored to individual farms *can* be wrong and most written advice is no substitute for farm visits and speaking to farmers directly.

6.3.10 The preferred method of delivery for advice stressed by farmers at all farmer panels, and by interviewees, was that of the farm visit and face-to-face advice. It could be inferred therefore that this is the most effective method of advice delivery since the individual attention is appreciated by farmers. However, hill farmers in Yorkshire stressed that farmers did not want a continual dialogue of advice but were generally happy to take agri-environment payments and “be left to get on with it”. “When an ADAS man came round once or twice a year he'd put you in the picture and leave something for you to read and think about”. Farmers are receptive to the provision of advice provided the adviser is knowledgeable about farming as well as conservation:

> They were people they felt comfortable with and who they could talk to - the worst thing that can happen is to have a fellow come in and talk down to a farmer - someone who's been there 30-40 years - he will not listen at all

> I know we're all here for English Nature, but the approach has been authoritative - 'Thou Shalt Not' - I think there is a need for a more positive attitude amongst English Nature people

6.3.11 Equally, there was recognition of the reverse obligation – for agricultural advisers to understand conservation – suggesting a role for conservation 'advice' as part of initial training/education:

> Agronomists need training in environment matters

6.3.12 Indeed, farmers were often intrinsically sympathetic to conservation and thus likely to be receptive to advice:

> The very sad thing was that we had skylarks in our top moor, and because we changed from hay making, when the skylarks could hatch, to silage making the poor skylarks went. We had a sort of swamp area where we had bee orchids and spotted orchids. They are not there now, this is when we should have had the stewardship. We were encouraged to drain it all, because they wanted their food. Hedges out and drainage, and that is exactly what we did and now comes the stewardship and which is actually thinking that maybe we have done it too well.

6.3.13 In general, advice from an informed individual was preferred to 'impersonal' technical support, as this was more compatible with a one-stop shop approach, though the difficulty of achieving this over large areas was acknowledged.

> (On-line technical support) will happen slowly but I mean it costs about £1000 for a computer and software plus some training -and we actually do have one for cattle records and this sort of thing but we haven't gone onto any sort of internet

> I think it is difficult to get individuals who are experts - to get one person who can advise on the economics, the nature the landscape, it's quite tricky - and whilst that's the ideal and maybe we should strive hard towards that by putting a bit emphasis on interaction between the agencies and training - perhaps the interim state has to be one lead person - FRCA perhaps or National Parks or whatever but backed up with advice from other agencies

> We'd prefer (face-to-face advice) and I think an important aspect of it is a one-stop shop where you can go to somebody and know that you can get advice or co-ordination on every aspect of things because I think the worst thing possible is going to one organisation over one issue and then having to go elsewhere for another (and, whilst this happens to an extent already, one person) couldn't service the whole of the farming community in the Yorkshire Dales could you?

6.3.14 Whilst concentration of advice is the most efficient in resource terms, its perceived value to farmers is likely to be limited by virtue of its inflexibility. Farmers wanted to see results demonstrated in a range of conditions, and advisers who regularly acquainted themselves with actual problems on the ground.

> I think the general feedback we got was that setting up one or two farms as demonstration farms wasn't the best way forward because people wouldn't go back to a

> farm they'd already been to necessarily - but you're better to circulate it around a whole number of farms or situations where there are different experiences and where people come simply to chat about the pros and cons of what's gone on these farms
>
> I think our experience of the schemes has been that it's very important to try to get an environmental advisor out working with farmers at least 2/3 visits a year in terms of setting up a scheme and going out and talking about and learning from each other about how things work on the ground and yes the farmers have as much to teach the conservationists as vice versa but that dialogue I think is very important in the early years when going ahead with stewardship type schemes without that dialogue then the farmer will not get nearly as much out of it....

6.3.15 Conferences, meeting, seminars and workshops are some other means by which farmers hear about new technology. Different kinds of presentations will appeal to different audiences. A National meeting will only attract a few dedicated farmers. To reach the next stratum, regional meetings are needed because research has found that most farmers are unwilling to stay away overnight or travel more than 50 miles (Gasson & Hill, 1996). Below this are local meetings with one speaker, often held in the evening to attract working farmers. Increasingly, old-style conferences are giving way to workshops, where farmers are more involved (Gasson & Hills, 1996).

6.3.16 Research has found that good demonstrations are valued by farmers (Gasson & Hill, 1996). As one respondent in a survey of horticulturalists put it “Growers really appreciate these ‘muddy boots’ events, which give them the opportunity to see but also to mingle with researchers and advisers and ask questions” (Gasson & Hill, 1996). Another way of seeing good practice is to join a study tour. At the Yorkshire Hill farmers' panel the view was expressed that it was good to see 'things' in practice but there were problems with making a one-off visit to demonstration farms in that perhaps not enough information could be communicated, or that farmers only saw it once at a particular time of year under particular conditions. The farmer group in The Dales had received feedback on demonstration farms, the general gist of which was that setting up one or two demonstration farms was not the best way forward because people wouldn't go back to a farm they'd already been to necessarily: 'It would be better to circulate demonstrations around a whole number of farms or situations where there are different experiences and where people come simply to chat about the pros and cons of what's going on at these farms'.

6.3.17 Also the point was made during interview with an NFU representative that good demonstrations followed up with face-to-face advice tailored to individual farms are the preferred mediums for advice to farmers. If these are targeted to local areas it can result in 'across the hedge' conservation, i.e. the spreading of conservation messages and techniques from farm to adjacent farm.

6.3.18 Farmers actually taking part in experimental work is now seen as one of the most effective means of technology transfer. Increasingly organisations are carrying out trials on private holdings instead of experimental husbandry farms. Although this approach is widely used for crops and horticultural products, it is limited for grassland research as the requirement for animals for experiments makes the costs prohibitive (Gasson & Hill, 1996). However, one comment made by farmers in the Yorkshire Dales was that, 'certainly the experimental farms played a great part in improving production techniques on farms but they

come from an ideal point of view and from a labour and expertise point of view they are not everyday working farms'.

6.3.19 The level of computer use for communicating ideas in farming varies across the country. For example, the farmer panels showed that in the Yorkshire Hill farming community, use of the internet was catching on very slowly and it was suggested that busy farmers would not spend two or three hours looking up conservation advice on the internet. In East Anglia, however, there was found to be a genuine eagerness amongst the farmers questioned to receive training in IT skills. The SWARD network of farmers in Devon (see chapter 6) has proved very effective in using the network to assist farmers with being more proactive and reactive. It would be interesting to establish the extent to which this means of farmer communication has influenced conservation activity actually on the ground.

6.3.20 The point was made during interview with a CLA representative that with networks, discussion on e-mail or using internet services, there is a need for someone to coordinate the comments for this to be effective. Otherwise there is a tendency to 'start the ball rolling' with with ten comments or so, then a few weeks later the situation is still the same with no further discussion being added. If somebody is overseeing these types of discussion they can consolidate the comments and make suggestions relating to e.g taking up conservation schemes or advice opportunities.

6.3.21 A NFU representative suggested that the internet and IT does not yet work as a delivery mechanism but has a role as a signpost, and until 80% of farmers start using e-mail it is only a long-term opportunity. In the short term it is only really a small part of the picture. The NFU are taking farmers down this route as it is a new medium which needs encouraging, however, it will not replace the face-to-face advice certainly until it is more established.

6.3.22 The Yorkshire hill farmers felt that, 'we should strive hard to put the emphasis on interaction between the agencies and training. Perhaps with one lead person - FRCA perhaps, or National Parks or whatever, but backed up with advice from other agencies'. There is of course a certain level of collaboration amongst advice giving bodies - certainly the Wildlife Trusts work closely with FWAG in some areas and in Somerset they have merged completely.

6.3.23 A CLA representative suggested that if all organisations agreed to support FWAG's Landwise initiative, for example, farm conservation advice could be better coordinated. FWAG is well accepted and could coordinate advice giving, with specialists coming in as appropriate.

6.3.24 Local and the national biodiversity action plans represent wish lists at different spatial levels and also provide an opportunity for co-ordination and discussion between conservationists, environmentalists and landowners, especially since a partnership approach is actively encouraged in the rhetoric surrounding the production of BAPs. However in terms of implementing these on the ground there is some considerable delay which is now being seen in many places as a driver for moving forward rapidly and spreading the message to the farming community. If local BAPs are to be the main focus of engendering action locally, then they need underpinning by establishing what is available in the county/regional area and if the main organisations 'sat down'at national level it would help to make the process more effective. The UK Biodiversity Information Group, whose rate of activity has now dropped, tried to establish a more integrated system.

6.3.25 Very often it appears to be specific projects which enable a more effective integrated approach from advice giving bodies, for example, the RSPB Lapwing Project in Shropshire has proved to be a useful vehicle for getting interested parties to talk to each other. Whilst this is a positive step and encourages the effectiveness of delivering conservation targets on the ground, it still represents a certain *'ad hocness*' from the point of view that the existence of such projects varies spatially and they vary also in style of delivery and number of organisations involved.

6.3.26 In terms of encouraging conservation on the ground it is not only farmers who should be targeted with advice but also landowners more generally, many of whom have the primary aim of encouraging conservation. A lot of arable land, e.g. in the south east, is reverting from arable to pasture for horses and with good advice the pasture could help to support BAP objectives, but the pasture, currently, is often appallingly grazed and over fertilised

6.3.27 An NFU representative stated during interview that 'information, advice and support are the things required to influence farm decision making and these areas should be co-ordinated nationally or regionally. We haven't thought about a marketing strategy yet for conservation. We just supply conservation advice without thought to market fragmentation and overall end goals. We can learn a lot from innovation-diffusion models'. Advisory bodies would be more effective if more attention was paid to how conservation advice complements the broader picture of farming and agricultural policy generally. Policy change will drive structural change and dictate who holds the land and the advisory network must be alive to these changes.

6.3.28 The main problem to redress is that there are too many sources of advice of variable quality, and the most useful thing for farmers is advice that is tailored to individual farms. Perhaps in some situations the bodies who want conservation initiatives implemented on farms should be prepared to 'foot the bill' and pay for these schemes (interview with CLA representative).

6.4 Principles of Effectiveness

6.4.1 In a recent paper Morgan and Murdoch (2000) following Lundvall and Johnson (1994) identify four kinds of knowledge: know-what, know-why, know-how, and know-who. *Know-what* refers to information or facts. In our context this might include facts about wildlife or the pollutant characteristics of silage effluent. It might also include knowledge of agri-environment schemes. *Know-why* refers to scientific principles, such as the chemical and biological principles underlying nutrient cycles or the ecological principles underlying the notion of an ecosystem. *Know-how* refers to the skills and practical knowledge required to deploy particular technologies or undertake certain tasks. *Know-how* refers to ‘social’ skills whereby people know where and how to get information, in particular revolving around who knows what.

6.4.2 It is clear that building an effective strategy to improve information provision for an environmentally sustainable agriculture requires a recognition of these four types of knowledge and that this should be an underlying principle at the heart of any strategic thinking on future provision. In devising any agri-environmental knowledge systems, it is necessary to identify both the kind of knowledge particular groups or categories of farmers require and how such knowledge should be provided.

6.4.3 The investment of public money in knowledge provision requires the clear identification of criteria for success based on assessment of the following

- Level of enrollment;
- Distributional consequences;
- Reasons for adoption and non-adoption;
- Quality of work subsequently undertaken;
- Consistency of advice given;
- Geographical variation in availability of advice;
- Farmers' perceptions of advice;
- Cost of delivering advice.

6.4.4 Another important principle is participation. In Britain, farmers have not participated to any major extent in formulating advisory, research or development programmes for new technologies. Even where they have made a contribution to costs through the levy systems which fund, for example, the Milk Development Council and the Home Grown Cereals Authority, farmer participation has not been notably high. Chambers (1994) would perhaps attribute this lack of participation as linked to the way in which expert knowledge has tended to override local knowledge in scientific research and development generally. Farmers actually taking part in experimental work is one of the most effective means of technology transfer. Increasingly organisations are carrying out trials on private holdings instead of experimental husbandry farms. Although this approach is widely used for crops and horticultural products, it is limited for grassland research as the requirement for animals for experiments makes the costs prohibitive (Gasson & Hill, 1996).

6.4.5 Pretty (1995) suggests that a coercive policy which is intended at achieving a particular outcome tends not to work, but a 'democratically developed policy, arising out of consultation and participation, and reflecting local people's and farmers' needs and specific circumstances, is much more likely to create widespread support' (Pretty, 1995a). He identifies a number of levels of participation from 'manipulative participation' (which is really a pretence with people's representatives on official boards but who are unelected and have no power) down to 'self-mobilisation' where people participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions for the advice they need, but retain control over how resources are used. Pretty suggests that self-mobilisation can spread if governments and NGOs provide a framework for support. He stresses that sustainable agriculture is not a set of practices to be fixed in time and space but requires that farmers and other actors can change and adapt in response to alterations in external and internal conditions. Consequently, sustainable development policy should not be aimed at just prescribing a set of practices 'across the board' for farmers, but needs to be related to local economic, social and environmental conditions. In other words it is important to engender farmer participation through a 'bottom-up' approach to agri-environmental matters. Schonhuth (1994) examines a range of participatory learning approaches (including

Participatory Rural Appraisal techniques) for involving farmers in decision making, and also provides a number of case studies.

6.4.6 Effective advice delivery also often requires partnership between agencies. Many of the information deliverers talk of partnership type modes of delivery. For example, the Environment Agency collaborated with the Maize Growers Association to address the problems of soil erosion, nutrient pollution and pesticide pollution. The partnership succeeded by facilitating the identification of mutual benefits for both grower and agency. They may adopt this approach with other sectors of the industry in the future. The Countryside Agency sees their role as a pump primer, helping organisations develop ways of influencing farmer and grower behaviour. They mention both LEAF and Countryside Stewardship as two models they are monitoring closely, both reliant on partnership collaboration.

6.5 Building for More Effective Advice Delivery

6.5.1 Extension is a vital link in the TT chain and there is no point in research being carried out without funds being put into communicating findings to farmers. Gasson and Hill (1996c) argue that consultancy is not a substitute for extension, and suggest that there were four requirements of an extension agency which ADAS exemplified, and which are not being met by the new players filling the gap:

- Providing a service to all producers;
- Offering the professional skills and expertise needed for effective extension work;
- Providing a wide range of skills, experience and services within one umbrella organisation
- offering impartial advice which can be trusted.

6.5.2 Gasson and Hill (1996) believe from their research that those seeking to fill the gap left by ADAS by shifting responsibility onto researchers or consultants do not fully appreciate the skills required. One of the strengths of ADAS was that it could call on experts with a wide range of skills within the organisation - and the umbrella extended to MAFF as well, making ADAS the natural outlet for MAFF-funded research. There is no private consultancy on the same scale or with the same depth of expertise.

6.5.3 A number of commentators have developed ideas for improving the effectiveness of information provision. For example, Gasson & Hill (1996) have developed the idea of a technology transfer campaign, which is based on the following propositions:

- To be effective TT requires a relationship of trust with the target groups and an adequate understanding of the basis of technology.
- Information from individual projects can often give confusing or even conflicting messages. Hence information should be distilled from a large number of project before putting the message together.

- Extension message should be delivered as a “package” of press notices, scientific reports, handouts, demonstrations, conference presentations etc, all reinforcing one anther. Conflicting messages give farmers the excuse to disregard the whole package.

- If the messenger loses credibility, the message is discredited. Attention needs to be paid to details of presentation (eg. quality of speakers) to build confidence in the message.

- That TT is a skill involving a number of communication techniques;

- That extension messages are often composite messages coming from a range of research projects;

- That end users rarely take information from a single course;

- That extension services are best delivered as a package of mutually consistent written materials, talks and demonstrations;

- That messages need to be: targeted to farming systems, relevant, timely and economically realistic;

- That both messenger and source must be credible if the message is to be accepted.

6.5.4 Such a campaign could be useful in terms of ensuring value for money from MAFF-funded research and overcoming market failure due to the non-commercial nature of much new technology.

6.5.5 Winter and Mills (2000), drawing on earlier work by Winter, have advocated Affiliated Regional Advisory and Training Services (ARATS) to deal with drawbacks of the current system, and this idea goes further than the previous recommendation in that a formal affiliation of organisations is proposed. The idea is that ARATS could enhance the flow of information from research findings to dissemination through advice, training and education, and encourage effective skill transfer between agencies involved in the provision of agri-environmental knowledge. They would also contribute towards an improved career structure for advisers and result in a more systematic attempt to monitor and evaluate advisory and training provision thus identifying areas for improvement, gaps in provision and duplications.

6.5.6 Through the establishment of ARATS, agencies would be brought together not only to co-ordinate advice and training provision, but also to interact in ways that would improve the advice and training on offer. The inclusion of non-advice giving agencies in this process, preferably with formal links to ARATS, is a vital element in facilitating an improved flow of findings from research agencies to advice agencies. ARATS would therefore not only provide a first-stop shop for agri-environmental advice and training but would also provide a monitoring and evaluation service; establishment of quality control procedures and standards for environmental advice provision; the facilitation for continuing professional development and training for advisers/trainers; a means of liaison with the agricultural education and research communities in order to improve the dissemination and adoption of relevant research findings; the establishment of a network of demonstration farms. Not only would ARATS improve the take-up of advice, but also, the content.

6.5.7 The ARATS approach would seek to build on and enhance the strengths of pluralism, at the same time as recognising and confronting the inherent problems of fragmentation. Additionally, as a strong regional agenda in English government emerges, an ARATS approach would provide an opportunity to demonstrate the validity and strength of regional environmental governance.

6.6 Conclusions

6.6.1 This chapter has stressed the importance of measuring the effectiveness of advisory provision. It has assessed the different types of knowledge provision showing clearly that farmers and landowners continue to believe that effectiveness is best guaranteed through a delivery of information via a mix of methods. Face to face advice is still seen by many as the most effective method.

6.6.2 In assessing the way forward for effective information delivery we stress some important principles as follows:

- There is a need for all providers of information to identify the type of knowledge required;
- There is a need for farmers to be involved in the knowledge process as participants not merely as recipients.
- An effective delivery system requires co-ordination building on the strengths of pluralism but tackling the inherent weaknesses of fragmentation.

7 LEARNING LESSONS FROM OTHER COUNTRIES

7.1 Introduction

7.1.1 The first aim of this chapter is to examine the wider context of extension developments around the world. Our treatment is inevitably brief. Given that such a large literature is already available we refer readers to two edited collections of papers as a starting point for those who wish to further investigate developments in other countries – Röling and Wagemakers (1998) and Rivera and Gustafson (1991). Secondly, we provide two case study examples, from Australia and the Netherlands. The examples were chosen because we feel that England might have something to learn from them, as agencies and government departments seek to develop appropriate extension strategies for the new millennium.

7.1.2 Finally, as a prelude to the conclusions to take forward from this selective overview of developments outside England, we consider the conclusions from a recent OECD conference on Agricultural Knowledge Systems held in Paris in January 2000.

7.2 Agricultural Extension in Global Perspective

7.2.1 Agricultural extension in industrialised countries has a long history as shown in Table 7.1. One of the earliest and most ambitious extension services was put in place in the United States in the 1900s to transfer knowledge from the Land Grant universities and research stations to farmers in the field (Axinn and Thorat 1972). By mid century, agricultural extension was a vital tool in the expansion of high output farming throughout the world. According to the 'science push' extension paradigm, one of the chief barriers to the adoption of new technologies and techniques is an information or knowledge gap on the part of potential adopters. The role of extension is to bridge the gap – through dissemination of research, demonstration and face to face advice from an expert. A science of extension methods arose to furnish a methodology for extension officers. As a sub-discipline of rural sociology this was particularly associated with academic developments in the USA and the Netherlands (Ruttan 1996).

Table 7.1 Year of Origin of National Agricultural Extension Systems in Selected Countries

Country	Year of Origin
Japan	1893
USA	1914
UK	1946
Israel	1948
India	1952
Netherlands	1953
Brazil	1956

Source: Rivera 1991

7.2.2 With hindsight, it is easy to criticise the instrumentalism of the post-war approach. However, as Röling (1993) has argued, until the late 1970s this particular type of knowledge system – top down and expert driven - was well able to deliver the productivity gains and increases in output efficiency that were deemed to be required by government and the public. Subsequently, with a growing emphasis on tailored management techniques and the declining availability of universally available production-enhancing technologies, extension has become more 'farmer centred'. Today, agricultural extension is less a matter of technology transfer and more a variety of adult education, albeit with a strong instrumental focus. In the US, for instance, the work of the Federal Co-operative Extension Service has for some time now been tailored to individual management solutions and employs group discussion techniques to raise awareness and stimulate interest.

7.2.3 The development of conservation extension in many countries dates from the late 1970s and early 1980s. To begin with, the tools of conventional agricultural extension were applied to problems of land degradation and soil erosion in the US particularly. The US Extension Service was one of the first in the world to have soil conservation as part of its mission and under the 1977 Resource Conservation Act this was strengthened significantly (Lovejoy and Napier, 1986). In Australia, where state departments of agriculture have also traditionally been major providers of agricultural extension, the federal-funded extension programme was replaced in 1988 with the National Soil Conservation Program designed to apply the tools of community education and extension to overcome problems like soil erosion and soil salinity. These approaches often encompass technologies which are experimented with in a locality, with information then made available to others on the basis of local experience.

7.2.4 Gradually, however, the limitations of this instrumentalist and rather technocratic approach became clear as experience revealed the resistance of soil conservation practices to 'quick fix' solutions (Lovejoy and Napier, 1986). Once it had been recognised that not all farmers are reachable, let alone persuadable, via conventional extension techniques, the stage was set for a paradigm shift. The practical implications of this included being more selective in targeting farmers of particular types for advice and information, making better use of demonstration projects and putting more emphasis on the diffusion of the knowledge required to learn technical and management skills tailored to individual situations. A feature of the so-called 'demand pull' extension paradigm which now established itself, is the idea that farmers themselves should be given more scope to define problems and tailor solutions. As Chambers and Jiggins (1987) point out, the transfer of technique model is output rather than client orientated, involves the development of a product by scientists and its 'sale' by extension personnel, rarely allows for feedback and implicitly assumes that scientific knowledge is superior to farmer knowledge. According to demand pull, on the other hand, what is required is a process of social learning by farmers achieved through facilitation, group interaction and a light-handed process of adult education. Niels Röling, one of the most indefatigable exponents of this idea, has argued that the extension of sustainable agriculture is not simply a matter of 'passing on the message' but requires a change of mentality and a learning process Röling and Wagemakers 1998).

7.3 Australian Landcare

7.3.1 The concept of Landcare originated in Victoria in the mid 1980s as voluntary associations of farmers who had come together to pool knowledge and experience in tackling problems of soil salinity in broad acre farming (Campbell 1998). There are intriguing parallels

with the UK's Farming and Wildlife Advisory Groups in these early days, with small groups of farmers setting up local meetings in order to discuss the practical problems of reconciling environment with modern agriculture through the development of a 'land care ethic'. One of the most important of these early associations was the Potter Farmland Project, set up in Western Australia in 1984 to address a long established pattern of declining farming viability and land degradation. The fifteen holdings which began the project became 'Potter farmers', after the Ian Potter Foundation which initially funded the project. A defining feature of the project was the use of whole farm plans which takes a comprehensive approach to farmland ecology, looking at issues like landscape diversity, water quality and soil conservation and the protection of native species (Campbell 1998). It pioneered the idea of looking at farms as a series of interconnected systems and in a 'self help' manner which involves farmers from the start. Landcare took this up and, with federal government assistance, aimed to promote the integrated management of land and water resources and to create a community-wide land conservation ethic.

7.3.2 Just before this, in the middle 1980s, a state government inquiry had decided that conventional agricultural extension in Australia had had its day and that what was needed was educational and managerial rather than technical assistance to farmers delivered in a decentralised way. A national Landcare programme came into existence to begin to promote this idea in relation to conservation management. In 1988, a partnership between the national Farmers' Federation and the Australian Conservation Foundation, called for a significant injection of government funds for Landcare. The Government responded by announcing that the 1990s would be 'the decade of Landcare' and committed US$250million to a ten year programme. Today there are over 2,700 Landcare groups in Australia involving over a third of all mainstream farmers (Campbell, 1998).

7.3.3 Individual groups are often quite small, comprising between 20 and 100 people but covering areas ranging from 4000 hectares to 14 million hectares. They are involved in a wide range of activities, including erosion control, tree planting and salt reclamation and operate through group meetings, demonstration projects and extension. Area plans are usually produced which span several holdings in order to facilitate an area focus. Recent years have seen more co-ordination of their work, with particular emphasis on measures such as catchment plans which plot individual farm developments within the context of a complete water catchment. States fund the provision of 'facilitators' who operate at a regional level and act as a link between groups and outside sources of information and advice. Facilitators set up initiatives and act as 'bureaucracy busters', seeking out technical information, clarifying regulations and steering farmers though the maze of grant applications. Co-ordinators, on the other hand, work at a local level and usually for one group only. Their more practical role is to organise meetings, be involved in planning and managing group projects and keeping less active members involved.

7.3.4 The Worromi Landcare Group is typical. It has 300 members and covers over 900 square kilometres in an area on the edge of the Hunter Valley, north west of Sydney. This is a region of mostly poor soils over sandstone, quite hilly and marginal farming, traditionally cattle. Drought and recession have been forcing farmers out of the industry or into letting on subdivisions of their properties. These 'new farms' are usually managed by Sydneysiders, who build houses and roads and stock the land with horses or cattle. Meanwhile, the land is vulnerable to flash floods and gulleying. The main agenda of the Worromi Group has been to unite farmland owners of different types in tackling these problems. It has had mixed success,

though in recent years an ability to access funds from Greening Australia has boosted its effectiveness.

7.3.5 There is much to admire in Landcare. It can claim to be one of the most innovative forms of conservation extension in the world and has enjoyed impressive growth in numbers and coverage. There are strong parallels with FWAG in the UK, though Landcare's institutionalised links with the Agriculture and Soil Conservation Departments means that its focus is less conservation-orientated than FWAG's. Supporters point to Landcare's success in promoting a concept of 'learning for change' amongst Australia's hardpressed farmers. Landcare groups effectively create a collective social pressure to develop more sustainable farming practices and enable a pooling of knowledge and resources to achieve this. As Campbell (1994, p33) puts it "Landcare groups re-establish a community focus, creating networks for social support, for sharing the stress of rural decline and for doing something constructive about it". Farmers appear to find it valuable to have a forum in which to discuss land management and environmental conservation matters – the rapid growth in group numbers against a background of farming recession and relatively modest government funding, attests to this. If there is such a thing as demand pull extension, this is it.

7.3.6 On the other hand, it is hard to point to a significant increase in the rate of adoption of conservation practices as a result of Landcare. The basic premise of the programme is that land degradation can be reduced by raising farmers' awareness and understanding of the problem. Yet the manner in which Landcare privileges farmer knowledge is seen as a weakness by some (for instance, Pannell, 1998), requiring a stronger steer from experts and professionally trained extensionists. A lack of long term funding and the patchy nature of the technical expertise which can be provided, are also constraining the expansion and consolidation of Landcare. Moreover, there are growing problems of co-ordination between the numerous local groups and a perceived lack of strategic direction at a regional and national level. Defenders would say that Landcare was never intended to be a tool of government policy, being as much a social movement and a method of communication as an instrument of environmental management. As commentators like Marsh and Pannell (1997) conclude, Landcare is probably a necessary but not a sufficient basis for sustainable agriculture in Australia. In classic innovation-diffusion terms, its rather special brand of information dissemination and group discussion is most effective during the early stages of diffusion when new ideas are in the process of being evaluated by farmers. But Landcare cannot alter the basic economic calculus of adoption versus non-adoption. Despite a higher level of awareness by farmers of land degradation as a result of Landcare, the rate of uptake of conservation practices on Australian farms is slow and is likely to remain so until the economic climate for broad-acre agriculture improves.

7.4 Social Learning in the Netherlands

7.4.1 'Intensive interaction' has long been a hallmark of the Dutch approach to extension. Extension, research and education have traditionally been important tools in stimulating agricultural production, the Ministry of Agriculture devoting on average 40% of its annual budget to these priorities during the 1980s and 90s. The largest and most important source of farmer advice is the Ministry's own Agricultural Advisory Service (the DLV). The three farmers' organisations each have their own socio-economic extension workers (SEV) who assist farmers with questions of insurance, taxation, succession, inheritance and issues of farm accounts (Röling 1993). These enjoy 50% government funding. Recent years have seen a

significant restructuring and refocusing of this provision and the promotion of sustainable agriculture as a central objective of extension and advisory work. In 1990 the Dutch Government published its Crop Protection Plan which laid down ambitious objectives for the reduction of pesticide and other farm chemical use in agriculture, proposing a target reduction in the use of pesticides of 50% by 2000. In a characteristically Dutch manner, while targets are specific and dictated, the means to achieving them are left to farmers and their advisers and extensionists. As Röling (1993) puts it "developing the methods is left to the creative ability of the industry: its growers, research institutes, commercial companies and a specially appointed task force at the IKC (the research arm of the DLV). The introduction of the Plan has had a galvanising effect on farmers and others to search for alternatives". Effectively, the Dutch Ministry of Agriculture has opted for an approach which they claim is better geared to encouraging innovation throughout the agricultural sector and stands by nationally agreed objectives for nature conservation and environmental protection. At the same time they seek to devolve more responsibility for effective implementation to local communities and groups of farmers and promote a more efficient co-ordination of research, education and extension by creating a co-ordinated agricultural knowledge system (Somers 1998).

7.4.2 The response of the extension agencies and other actors in the private sector has been to shift resources into the promotion and understanding of sustainable farming practices. Approximately 40% of the DLV's budget is now devoted to sustainable agriculture and recent years have seen the establishment of independent bodies such as the Centre for Agriculture and Environment (CLM) (founded in 1981). A special crop protection training programme has been established for agricultural colleges which will enable farmers to exchange information about the use of chemicals and learn from colleagues about alternative practices. The Information and Knowledge Centre (IKC) of the Ministry of Agriculture also plays an important role in upgrading expertise and have been charged with co-ordinating actor networks in different fields. Its mission is the transfer, translation and transformation of knowledge into products for extension and education. The Netherlands meanwhile stands out from all other EU member states in the heavy investment being made in extension and 'envisioning' under Regulation 2078. In 1997 66% of the agri-environmental budget was allocated to a series of projects designed to train, educate and persuade farmers of the merits of integrated farming and nature protection. Products now on offer from the DLV include:

- a check up with respect to environmental indicators on the farm
- an environmental audit indicating the level and extent of pollution generated and the economic and technical reasons for it;
- assistance in preparation of an environmental farm plan
- assistance in installing 'optimest', a software programme advising farmers on manure and fertiliser use;
- assistance in preparing a manure disposal plan and a mineral advisory plan
- help in setting up 'mineral bookkeeping', a procedure for tracking the quantity of inorganic fertilisers bought, used and disposed of on the farm over the year

7.4.3 The DLV is supported by an impressive array of state and quasi-public agencies (the DLV was partially privatised in 1993). Training is provided at the regional training centre ('Groene Welle'), which offers full time adult education and courses leading to certification in application techniques for pesticides and fertilisers, for example. Less formally, farmer study groups have been a feature of the agricultural education system in the Netherlands since the end of the nineteenth century as a form of self-help for farmers. By the 1960s the Extension Service was actively promoting study groups and their rate of formation, especially in the horticulture sector, was increasing rapidly. Generally involving between 10 and 50 farmers, the groups are at their simplest forums for sharing information and experiences. Groups with a more sophisticated modus operandi may compare results of their members and even carry out research and experimentation on new techniques (including mineral bookkeeping, now a mainstay of sustainable agriculture in the Netherlands). These now form a key ingredient in the new 'agricultural knowledge system' being formed in the wake of the Crop Protection Plan. Such groups are now being encouraged to develop the knowledge, skills, indicators, concepts and risk perceptions necessary for local management of complex systems. Soft System Methodologies and Participatory Rapid Appraisal techniques are being widely applied Checkland 1991, Engel 1997).

7.4.4 The Dutch can claim to have one of the most advanced systems of extension in the EU. No other member state spends as great a proportion of its agricultural budget on agricultural education and training and few have gone as far in facilitating the adoption of integrated crop management through the use of study groups and environmental co-operatives. Nature protection as such is less well served, though the work of the CLM is increasingly dedicated to promoting the management of habitat and landscape features on farms and there is very serious interest in the use of local product branding to improve the profitability of marginal farming in areas of high landscape value. Advocates of a more far-flung system of conservation advice and extension like Röling and Jiggins (1998), meanwhile, continue to campaign for a fundamental reorientation of agricultural knowledge in Holland in which there is 'continuous social learning' (see Curry and Winter 2000) rather than the transfer of products from experts to recipients. As their research in the Netherlands shows, it is becoming increasingly difficult to identify particular farmer target groups in this new policy environment. Farmers are becoming more demanding clients for advice and extension and are less willing to be 'sold' already assembled packages of information. Rather, they wish to be able to assemble information from different sources and are thus best served by an 'extension supermarket' approach (the Dutch equivalent of the 'one stop shop').

7.5 The OECD Conference

7.5.1 The Agricultural Knowledge Systems (AKS) conference held in Paris drew representatives from government agriculture departments around the world. Member states presented accounts of their own circumstances and common lessons were set out in the plenary session. Some NGO contributions were also made, including one on behalf of the Worldwide Fund for Nature by two of the authors of this report (Winter and Mills 2000).

7.5.2 The Conference (OECD website) adopted overall general recommendations as follows:

- that AKS institutions become more pro-active in developing networks and partnerships within AKS and between AKS and all other stakeholders in the agro-food chain to design, in partnership with relevant interest groups, appropriate dynamic interactions for

programme development, delivery and evaluation and that funding mechanisms be designed or refined to support such developments.

- that more AKS linkages of a global/international nature are needed to address the wider issues which increasingly transcend national boundaries and that AKS institutions develop these linkages under the auspices of OECD.

- that OECD be advised that AKS institutions and personnel should become a more active partner in the work of OECD as a whole (e.g. in relation to food safety, the environment, food policy, trade issues and the development of human capital) as opposed to involvement solely in issues related to AKS Conferences. The Conference would welcome a positive response from OECD in this matter and recommends that the national authorities also take steps to involve AKS more actively in national delegations to OECD Committees, Working Parties or Expert Groups, especially those dealing with medium to longer term issues.

- that specific mechanisms be put in place to enhance communication among AKS, the general public and policy makers with a view to mutual understanding of issues and the possible solutions which AKS can deliver in reconciling scientific evidence and public interests/concerns on food, environment and related policy issues.

- that urgent attention be given to developing and monitoring the most appropriate methods of evaluating the outcomes of AKS activities in research, education and extension/development in their relevant societal contexts and that this work be undertaken under the aegis of the OECD.

- that the next (Third) AKS Conference be held in about three to four years with appropriate preparatory work based on follow-up to the conclusions and recommendations of the Second AKS Conference and on analyses of possible future AKS strategies, organisation, financing and operating issues of best relevance to the agricultural and food issues and concerns expected to be in the forefront of the second half of the current decade and beyond.

7.5.3 The Conference concluded that agricultural issues should not be considered on a narrow sectoral basis but as part of the entire food chain. The OECD points to the sustainable use of natural resources requiring agricultural decisions to occur within a context of multifunctionality and rural development, emphasising, *inter alia*, the need for a social science input alongside technical inputs within AKS. Thus, many more stakeholders and client groups have become relevant to the dialogue and government has become one of several clients for AKS services. There is considerable potential for AKS to respond to new demands in innovative ways by forging new partnerships, new networks and new relationships in *Interactive Knowledge Networks.*

7.6 Conclusions

7.6.1 From both case studies and the OECD conference a number of key concepts emerge. Of particular note are three clusters of concepts around the themes of ‘interactive networks’ and ‘partnership’; ‘social learning’ and ‘participation’; and ‘monitoring’ and ‘evaluation’.

7.6.2 Schon (1971) was one of the earliest commentators to draw a distinction between a traditional model of the diffusion of innovations and a network approach. Drawing on empirical evidence from both business innovation and the development of particular political/social movements, he pointed out how the diffusion model depended on a centre-periphery metaphor with innovation at the centre, centrally produced and managed, gradually diffusing outwards to ultimate users. By contrast, Schon points to the emergence of 'learning systems' with no clearly established centre and no stable, centrally established message. Crucially, he identifies the knowledge transfer problem facing society as having shifted from the design of a product or technique to the design of a network:

> learning systems have begun to develop in diverse forms - business systems and constellation firms, new ways of forming and implementing policy in government, and some of the dominant social movements of our time. All these share two major themes: a shift away from centre-periphery to network modes of growth and diffusion. These tendencies converge on the concept of network. The design, development and management of networks become pivotal to learning systems. (p190)

7.6.3 Thus the challenge facing policy makers is to facilitate networks. Ensuring that organisations work in partnership is one way that this can be achieved.

7.6.4 Social learning based on participation of farmers in the knowledge process is the natural corollary of partnership and networking. Learning should be interactive and iterative.

7.6.5 Finally, the need for evaluation and monitoring emerges strongly from this brief overview. Not only was this one of the lessons that emerged so strongly from the OECD conference, but also the lessons learnt from the Australian and Dutch experiences are primarily an outcome of sustained monitoring and evaluation of the schemes in those two countries. It is hard to point to a similar level of activity in England.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

Methods of Knowledge Delivery

8.1.1 This report is based on the premise that knowledge is the essential ingredient to success in modern society. That includes the continuation of successful agricultural businesses and successful environmental management on farms. If biodiversity is to be maintained and enhanced, as measured through the protection of designated areas and the delivery of biodiversity targets, knowledge will be deployed. In Chapter 6 we identified four kinds of knowledge - know-what, know-why, know-how, and know-who – as essential to the development of knowledge-rich agricultural and environmental management. Each of these four types of knowledge is required by farmers as they make operational decisions within the spheres of technology, markets and policy, as discussed in Chapter 3. Knowledge-based decisions within each of these spheres take place within farm households. The farm household, as a decision-making unit, is the location for knowledge reception, interpretation and response.

8.1.2 It is clear, therefore, that the practical delivery of farm conservation management in England requires the identification of knowledge requirements not only in a technical sense but in this wider context. Providers of nature conservation knowledge need to understand farm businesses in their full social and economic context. The relevance of a social science input to the new thinking, as advocated by the OECD, is particularly relevant here. There is a lack of recognition within statutory organisations of the contrasting requirements of different types of farmers. Knowledge needs vary according to farm type, size, age of farmers and other characteristics. Yet there appear to be no strategic or operational guidance from agricultural or environmental departments acknowledging this heterogeneity.

8.1.3 There is also an important need for farmers to be involved in the knowledge process as participants and not merely as recipients. Participation is at the heart of most of successful forms of extension, though this has perhaps not always been fully recognised. Face to face advice, still recognised as the most effective of all knowledge transfer mechanisms, involves interaction between farmer and advisor. It is indisputably a two-way process.

8.1.4 Notwithstanding the growing importance of IT and other extension methods, face-to-face contact remains a crucial and seemingly most appreciated aspect of good extension. From the evidence it appears that this may be the most effective method and should therefore be encouraged amongst advice-giving agencies. Our panel farmers agreed:

> I think our experience of the schemes has been that it's very important to try to get an environmental advisor out working with farmers at least 2/3 visits a year in terms of setting up a scheme and going out and talking about and learning from each other about how things work on the ground and yes the farmers have as much to teach the conservationists as vice versa but that dialogue I think is very important in the early years when going ahead with stewardship type schemes without that dialogue then the farmer will not get nearly as much out of it....

> We'd prefer it (face-to-face advice) and I think an important aspect of it is a one-stop shop where you can go to somebody and know that you can get advice or co-ordination on every aspect of things because I think the worst thing possible is going to one organisation over one issue and then having to go elsewhere for another, and whilst to an extent this is the role that AS undertakes on the environmental side - and I think that's good news - but I mean you are a limited resource - you couldn't service the whole of the farming community in the Yorkshire Dales could you?

8.1.5 In addition, practical demonstration remains an important means of convincing farmers of the practicality of the outputs from scientific research. Coherence, co-ordination and monitoring of standards are all required. Demonstration allows farmers to interact and to observe in a participative manner. However, few would deny that greater attention needs to be given to improving and developing participative methods. There is evidence to show that focusing efforts on farmer networks can be a very effective way of spreading a message quickly and involving farmers in the process. Farmers are keen to network as this panel farmer emphasised:

> Setting up one or two farms as demonstration farms isn't the best way forward because people wouldn't go back to a farm they'd already been to necessarily - but you're better to circulate it around a whole number of farms or situations where there are different experiences and where people come simply to chat about the pros and cons of what's gone on these farms.

The Fragmentation Issue

8.1.6 The evidence given in this report points to continuing problems in the delivery of practical farm conservation advice in England. There is considerable spatial variation in the nature and quality of advice delivered and the methods used. As the crisis in the industry has deepened in recent years, so a plethora of initiatives has been born, with local authorities and the voluntary sector entering alongside older established providers. At no time in the post-war period has there been such a level of activity and concern.

8.1.7 As identified in Chapter 4, some of the problems stemming from the fragmentation of the advisory system include:

- confusion among farmers as to where to go for advice;
- dangers of duplication and/or wasteful competition among providers of advice;
- geographical unevenness of advice provision with some areas under-provided for;
- dangers of contradictory messages going to farmers;
- difficulties of monitoring and evaluating provision and of quality control;
- no overall co-ordination, and consequently no real sense within government of the nature and extent of some of the above problems.

- many advisory services are inadequately articulated with the drivers of scientific and technological developments in agriculture, particularly the scientific research community. In some cases this problem has grown worse as a result of the emergence of new providers of advice with no historic links with agricultural research.

- the danger that environmental objectives might be subordinate to business outcomes in advice giving.

8.1.8 While some of new initiatives are highly innovative and exciting, sadly very few display all of the following important characteristics:

- a combination of environmental and farm business or economic advice;

- involvement of farmers in a networking capacity rather than merely as recipients of advice;

- adoption of a whole-farm approach in which environmental outcomes and performance are assigned importance across all farming activities rather than on the margins of commercial agriculture;

- linking environmental outcomes to potential new markets for food and other countryside products.

8.1.9 It seems unlikely, and probably undesirable in the current context of diversity, that a large monolithic extension service will be re-created by government. However, this should not preclude the possibility of Government providing clear strategic guidance and below we recommend the formation of a joint departmental and agency working group to take this forward.

Agricultural Change

8.1.10 In Chapter 3 we identified some of the developing trends in contemporary agriculture as follows:

- fewer commercial farms but with larger holdings;

- more small hobby farms owned by newcomers to agriculture;

- fewer farm workers and a greater use of contract workers and other flexible labour inputs;

- a higher level of direct environmental regulation and indirect intervention through market dictates such as quality assurance schemes;

- a higher level of farm diversification, including more businesses with alternative land uses and added-value food enterprises.

8.1.11 Each of these has important implications for knowledge provision. The changing structure of agriculture requires knowledge provision to be sensitive to a wider range of circumstances on farms than in the past. The use of contract and flexible labour prompts the need to attend to the knowledge needs of that sector as well as to conventional farmers and workers. Farm diversification and quality assurance schemes also bring into the agro-food network new actors who also need to be enrolled within agricultural knowledge networks.

8.2 A Role for English Nature?

8.2.1 English Nature has several options for increasing its direct role. One is to increase its own advice giving within the wider countryside. This has clear implications in terms of skills availability, IT capacity, course provision, structures, staff availability, and resources generally. Moreover it would only increase the level of fragmentation already in the field. We would not propose EN take this path. Far better would be for EN to work with others perhaps taking a lead in providing the kind of strategic thinking indicated in this chapter. Resource implications would still require careful thought, but we see this as a more viable option.

8.2.2 Clearly EN might also help to fund or, a slightly different option, contract out an advisory provision. FWAG is the most likely contender for such funding by wildlife trusts and other local initiatives should not be ruled out. If some of the issues highlighted in this report are taken on board, EN would be well advised not merely to make a grant-in-aid but also to seek to influence structures and the nature of provision. EN could, for example, make as a condition of a funding package a move towards an ARATS style arrangement to improve co-ordination and networking of information flow, as discussed in Chapter 6.

8.2.3 Seconding of staff might be an important option to consider in achieving these deeper objectives. EN might also provide a strategic steer by advising and engaging other agencies (partner organisations) in debate and innovation, and in lending important policy support to innovative ideas and projects from the NGO sector.

8.3 Recommendations

8.3.1 English Nature should take the lead in stimulating informed debate on the issues contained in this report and appropriate policy responses. A joint departmental and agency working group be established to:

- consider the knowledge needs of a sustainable agriculture;
- consider how best to co-ordinate extension activities within the public sector;
- offer guidance, support and promote best practice to those undertaking extension activities outside the public;
- develop broad programmes of monitoring and evaluation;
- consider how best to target extension activities via local initiatives and innovation. This would encompass both geographical targeting in terms of the regional/local needs of the agricultural industry and priorities for particular habitats and Biodiversity Action Plan species.
- consider how best to establish suitable mechanisms to link agri-environmental science findings to various forms of extension. The interface between research and extension should be more open and direct, and in the funding of scientific research, account should be taken of the need for dissemination of research findings through advice provision/technology transfer. This may most usefully take the form of interactive dissemination through demonstration, discussion groups etc. Researchers need to be accessible to farmers allowing the opportunity to build relationships, e.g. by attending conferences, meetings, events and shows.

8.3.2 Subject to the findings and conclusions of such a working group, we anticipate the need for the following reforms to be put into place if effective farm conservation management is to be achieved in England:

- horizontal co-ordination and affiliation of information providers, preferably at a regional level;
- vertical co-ordination of AKS to ensure better technology transfer and dissemination of research findings;
- greater stimulus given to the participation of farmers in knowledge networks vertically with research organisations, horizontally with information providers and interactively with other farmers;
- much greater attention within constituent parts of the AKS to the emerging diversity of the agricultural industry. This should cover the needs of new entrants, contractors and consultants, and the implications of new land uses and developments in the agro-food sector;
- knowledge provision that fully integrates business and conservation advice.

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Appendix 1. Copy of Questionnaires used in Key Informants Survey.

1. Questionnaire for Advice Providers (FRCA, ADAS, FWAG)

How do you provide advice to farmers? What are your main mechanisms and structures for delivery?

Has the way you provide advice changed over time?

Is there any evidence that certain methods of delivery are more 'successful' or 'effective' than others in terms of farmer behaviour / changes in farming methods?

To what extent do you work with other bodies/organisations to provide advice?

What is the nature of these relationships?

Do you believe that the advice provided by your organisation could be improved in any way? If so, how?

How does your organisation intend to adapt its advice delivery in the wake of Agenda 2000 reforms? Do you think there will need to be some changes? What new advice might farmers need (if any)?

Do you monitor or assess the effectiveness of the provision of farm conservation advice? If Yes, please give details.

2. **Questionnaire for Farmer Representative Organisations (NFU, CLA)**

What are the main sources of conservation advice used by farmers?

Where would farmers prefer to get their conservation information and advice from? Who should be responsible for providing information for farmers? – government, private consultants, local authorities, other?

Are you aware of farmers having difficulties in obtaining conservation information and advice?

How satisfied are farmers with the advice? eg. quality of advice, number of visits. Could it be improved in any way?

Which is the farmers preferred way of receiving information and advice? What could be done to make good quality information available to farmers?- written advice, face-to-face advice, demonstration farms, farmer networks, the internet?

Are you aware of any research that has been undertaken on the 'effectiveness of advice'? Is there any evidence that certain methods of delivery work better than others?

Will advice provision need to adapt to current and future changes in policy? If so, how? What do farmers need to know?

Do you have any thoughts on how the bodies providing advice could work more effectively - perhaps through more collaboration? Should the arrangements / policy context for advice delivery be restructured in any way?

APPENDIX 2 - FARM INCOME MODELS

The simulation experiments

Accounting models representing a Mainly Cereal Farm in Eastern England, a Hill Rearing Farm in Northern England, a Mixed Dairy and Arable Farm in Southern England and a Mainly Dairy Farm in South Western England were constructed. They used data from the annual surveys of farm incomes carried out by University Departments of Agricultural Economics. All data used in the construction of the baseline models were for the production year 1998/9.

Once the baseline models had been constructed, two policy scenarios were simulated:

- post-Berlin Agenda 2000 prices with compensation.
- post-Berlin Agenda 2000 prices without compensation.

In addition for each scenario, and remembering that agricultural support prices and compensation payments are fixed in Euros, the consequences of exchange rates of 65 pence per Euro and 60 pence per Euro were also explored. This was designed to reflect the current and likely future volatility of the Euro.

Post-Berlin Agenda 2000 prices with compensation

This scenario is based on the compulsory elements of the agreement reached by Heads of Government at the Berlin European Council on 24-26 March 1999 on the CAP reform component of the Agenda 2000 package. The compulsory elements for the arable, beef and dairy regimes, i.e. the regimes affecting the farm types modelled, are summarised in Tables X, Y, Z.

Agenda 2000 changes to arable regime

- The cereals intervention price will be reduced by 15% in two steps starting on 1 July 2000, and the Agriculture Council will consider the need for a further cut thereafter.
- The area payment for cereals will be increased in two steps to Euro 63/tonne to partially compensate for this.
- Set-aside will be paid at the cereals rate.
- The area payments on oilseeds and linseed will be reduced to the same rate as cereals - Euro 63/tonne - over the three year period from 2000 to 2002.
- The area payment for protein crops will be Euro 72.5/tonne from 2000.
- The dates by which area payments are made to farmers will be changed from 16 October/31 December to 16 November/31 January.
- The “default” rate of compulsory set-aside will be 10% from 2000 to 2006.

Agenda 2000 changes to the beef regime

- The beef intervention price is reduced by 20% over three years, starting on 1 July 2000.

- Safety-net intervention price from 2002 onwards set at Euro 1,560/tonne (25% below current level).

- Price reductions are compensated for by increases in premiums to the following rates in 2002:
  - Beef Special Premium - Bulls Euro 210/head once per life;
  - Beef Special Premium - Steers Euro 150/head twice per life;
  - Suckler Cow Premium - Euro 200/head annual;
  - Calf Slaughter Premium (aid to veal producers) - Euro 50/head;
  - Adult Cattle (more than 8 months of age) Slaughter Premium - Euro 80/head.

- National ceiling for Beef Special Premium is increased for the UK by 100,000 head until such time as the UK is permitted to export calves under five months of age.

- Age brackets for the Beef Special Premium have been reduced from 10 to 9 months and 23 to 21 months.

- Ceiling on the availability of Suckler Cow Premium quota is fixed for all Member States as the highest number of animals on which payments were made in the years 1995, 1996 or 1997 + 3%; for the UK. This means that from 2000 onwards total quota availability (including any quota held in the national reserve) may not exceed 1,699,511 rights. This is likely to be about 40,000 units short of the amount of quota in circulation in the hands of producers in 1999, and implies a cut of about 3% in producers' quota holdings.

- National ceilings for Slaughter Premium are fixed on the basis of slaughterings/exports to third countries in 1995.

Agenda 2000 changes to the dairy regime

- Quota regime extended to the year 2006.

- 15% reduction in support prices, starting on 1 July 2005, to be phased in over three years in equal instalments (5% cut each year).

- Community-funded compensation for reductions in support prices expressed in Euros per tonne of milk quota held by the producer on 31 March each year, phased in over three years commencing in the calendar year 2005 (building up to Euro 17.24/tonne of quota in 2007).

- Provision for additional national envelope for topping up the basic payments.

- Specific quota increases allocated to certain Member States (Italy - 600,000 tonnes, Greece - 70,000 tonnes, Spain - 550,000 tonnes, Republic of Ireland - 150,000 tonnes and Northern Ireland - 19,700 tonnes). 64% of the additional quota to be allocated in the 2000/2001 quota year and 36% in the subsequent year.

- 1.5% linear increase in milk quotas for all other Member States including the UK, with phased allocation in equal instalments over three years starting on 1 April 2005.

Note: none of the compulsory elements are supposed to impact until the year 2005 at the earliest. This, in theory, takes it outside the scope of this study. The investigators have, however, assumed that the changes start in 2002 and the results subsequently presented show all phased policy changes as having been completed. The latter is for the sake of simplicity, with the obvious comment that the decline in profit shown would, *ceteris paribus*, be gradual over the first three years.

Post-Berlin Agenda 2000 prices without compensation

In this second scenario the post-Berlin Agenda 2000 price cuts under the arable, beef and dairy regimes were modelled in the absence of compensation payments. This scenario, the investigators would argue, might represent a situation where EU agricultural prices were closer to world market levels and serves as a useful comparison.

The Quantitative Results – output of the simulation models

The results of the simulation experiments just described are reported in Table A. For each farm type modelled this table shows the average profit achieved by that type in the baseline year 1998/9, together with what happens to the average profit for that type under each of the scenarios simulated. In looking at these results in more detail it is clear that a number of interesting features emerge. The first is that if the post-Berlin Agenda 2000 price cuts were implemented with compensation they would have a serious negative effect on the profitability of Mainly Cereal and Mixed Dairy and Arable Farms, when compared with profits for 1998/9. The second is that if these price cuts were implemented in the absence of compensation payments they would have a serious negative effect on the profitability of Mainly Dairy, Mainly Arable and Mixed Dairy and Arable Farms, again when compared with profits for 1998/9. The third is that the profitability of Hill Rearing Farms under both scenarios is only maintained by the existence of Hill Livestock Compensatory Allowance payments. The fourth, and final, is that the outcomes modelled are, of course, sensitive to exchange rate fluctuations.

As suggested earlier, to assume that the post-Berlin Agenda 2000 prices without compensation will apply is probably unrealistic, but it does provide a useful indication of the likely effects that a move towards something approaching world market prices would have. Even with compensation, the post-Berlin Agenda 2000 price cuts imply that the profitability of many English farms will continue to decline for the predictable future. Against this it must be appreciated that fluctuations in profitability, caused by unforeseen events, *might* be as significant as the trend changes of the type modelled.

The present exercise has three main limitations. The first is that the reliability of the results presented depends on the validity of the assumptions included in the policy scenarios. The second is that the effects of the discretionary elements in relation to the arable, beef and dairy regimes contained in the Berlin agreement and the support arrangements for the Less Favoured Areas have not been modelled as, at the time of writing, decisions by the UK government on these are still awaited. The third is that, due to constraints of budget and time, only four farm types were modelled and cannot be considered as representative of English agriculture as a whole, although the farm types used were selected to give a "cross-section" of English agriculture.

HILL REARING FARM **Baseline** (based on 37 farms av. Size 370.8 ha

		E=65 £/farm	E=60 £/farm
CATTLE			
Beef output		8,230	8,230
Support			
Eligible avg. nos			
Suckler cows SDA	28.74*47.5	1,365	
Suckler cows DA			
SCP (1&2)	33.32*112.41	3,746	
Suckler extens	33.32*40.34	1,344	
BSP steers	13.22*84.32	1,116	
BSP bulls			
Adult slaughter premium	20		
Other extensification	13.22*40.34	533	
One off payment		1,374	
Total Cattle Support		9,478	8,748
Total Beef Output		17,708	16,978
SHEEP		51,840	51,840
PIGS & POULTRY			
MISC+FORAGE		3,579	3,579
ENV PAYMENTS		7,892	7,892
TOTAL FARM OUTPUT		81,019	80,289
TOTAL VARIABLE COSTS		26,541	26,541
TOTAL FIXED COSTS INCL RENT		35,987	35,987
NET PROFIT		18,491	17,761

HILL REARING FARM **With compensation** (based on 37 farm av size 370.8 ha)

			E=65 £/farm	E=60 £/farm
CATTLE				
Beef output		down 20%	6,584	6,584
Support				
Eligible avg. nos				
Suckler cows SDA	Quota -3%	27.88*47.5	1,324	
Suckler cows DA				
SCP (1&2)	Quota -3%	32.46*130	4,220	
Suckler extens	Quota -3%	32.46*40.34	1,309	
BSP steers		13.22*195	2,578	
BSP bulls				
Adult slaughter premium		20*52	1,040	
Other extensification		13.22*40.34	533	
One off payment				
Total Cattle Support			11,005	10,158
Total Beef Output			17,589	16,742
SHEEP			51,840	51,840
PIGS & POULTRY				
MISC+FORAGE			3,579	3,579
ENV PAYMENTS			7,892	7,892
TOTAL FARM OUTPUT			80,900	80,053
TOTAL VARIABLE COSTS			26,541	26,541
TOTAL FIXED COSTS INCL RENT			35,987	35,987
NET PROFIT			18,372	17,525

HILL REARING FARM **Without compensation** (based on 37 farm av size 370.8 ha)

			E=65 £/farm	E=60 £/farm
CATTLE				
Beef output		down 20%	6,584	6,584
Support				
Eligible avg. nos				
Suckler cows SDA	Quota -3%	27.88*47.5	1,324	
Suckler cows DA				
SCP (1&2)	Quota -3%	32.46*112.4	3,649	
Suckler extens	Quota -3%	32.46*40.34	1,309	
BSP steers		13.22*84.32	1,116	
BSP bulls				
Adult slaughter premium		20		
Other extensification		13.22*40.34	534	
One off payment				
Total Cattle Support			7,932	7,321
Total Beef Output			14,516	13,905
SHEEP			51,840	51,840
PIGS & POULTRY				
MISC+FORAGE			3,579	3,579
ENV PAYMENTS			7,892	7,892
TOTAL FARM OUTPUT			77,827	77,216
TOTAL VARIABLE COSTS			26,541	26,541
TOTAL FIXED COSTS INCL RENT			35,987	35,987
NET PROFIT			15,299	14,688

MAINLY CEREAL FARMS **BASELINE** 142 farms av. Size 281.3 ha)
1998/99 prices

				E=65	E=60
CROPPING		(area found by output/output/ha)			
further output;					
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	172.7		238	41,103	37,938
yield	172.7	7.86	78.39	106,408	106,408
				147,511	144,346
OSR/LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	32.4		299	9,688	8,942
yield	32.4	3.27	157.5	16,687	16,687
				26,374	25,629
PEAS	area (ha)	yield (t/ha)	price/unit (£)		
support	7.31		344	2,515	2,321
yield	7.31	3.52	93.23	2,399	2,399
				4,914	4,720
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	8.72		344	3,000	2,769
yield	8.72	3.61	80.79	2,543	2,543
				5,543	5,312
SETASIDE	area (ha)	rate/ha			
	14.63	302		4,418	4,078
OTHER CASH CROPS				29,425	29,425
OTHER INCOME				24,501	24,501
TOTAL FARM OUTPUT				242,686	238,011
TOTAL VARIABLE COSTS				68,958	68,958
TOTAL FIXED COSTS INCL RENT				156,122	156,122
NET FARM INCOME				17,606	12,931

MAINLY CEREAL FARMS **With compensation** (based on 142 farms av. Size 28
1998/99 prices

				E=65	E=60
CROPPING		(area found by output/output/ha)			
further output;					
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	172.7		242	41,793	38,575
yield	172.7	7.86	66.63	90,445	90,445
				132,238	129,020
OSR/LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	32.4		242	7,841	7,237
yield	32.4	3.27	157.5	16,687	16,687
				24,528	23,924
PEAS	area (ha)	yield (t/ha)	price/unit (£)		
support	7.31		277	2,025	1,869
yield	7.31	3.52	93.23	2,399	2,399
				4,424	4,268
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	8.72		277	2,415	2,229
yield	8.72	3.61	80.79	2,543	2,543
				4,959	4,772
SETASIDE	area (ha)	rate/ha			
	14.63	242		3,540	3,268
OTHER CASH CROPS				29,425	29,425
OTHER INCOME				24,564	24,564
TOTAL FARM OUTPUT				223,678	219,241
TOTAL VARIABLE COSTS				68,958	68,958
TOTAL FIXED COSTS INCL RENT				156,122	156,122
NET FARM INCOME				-1,402	-5,839

MAINLY CEREAL FARMS **Without compensation** (based on 142 farms av. Size 281.3 ha)
1998/99 prices

				E=65	E=60
CROPPING		(area found by output/output/ha)			
further output;					
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	172.7		238	41,103	37,939
yield	172.7	7.86	66.63	90,445	90,445
				131,548	128,384
OSR/LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	32.4		242	7,841	7,237
yield	32.4	3.27	157.5	16,687	16,687
				24,528	23,924
PEAS	area (ha)	yield (t/ha)	price/unit (£)		
support	7.31		277	2,025	1,869
yield	7.31	3.52	93.23	2,399	2,399
				4,424	4,268
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	8.72		277	2,415	2,229
yield	8.72	3.61	80.79	2,543	2,543
				4,959	4,772
SETASIDE	area (ha)	rate/ha			
	14.63	242		3,540	3,268
OTHER CASH CROPS				29,425	29,425
OTHER INCOME				24,564	24,564
TOTAL FARM OUTPUT				222,987	218,605
TOTAL VARIABLE COSTS				68,958	68,958
TOTAL FIXED COSTS INCL RENT				156,122	156,122
NET FARM INCOME				-2,093	-6,475

MIXED ARABLE AND DAIRY FARM		**BASELINE**	(based on 24 farms av. size adj. 352.9 ha)		
				E=65	E=60
CROPPING		(area found by output/output/ha)			
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	157.17		238	37,406	34,526
yield	157.17	6.43	77.13	77,948	77,948
				115,354	112,474
OSR	area (ha)	yield (t/ha)	price/unit (£)		
support	25.7		299	7,684	7,093
yield	25.7	2.31	150	8,905	8,905
				16,589	15,998
LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	5.78		464	2,682	2,475
yield	5.78	1.24	130	932	932
				3,614	3,407
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	4.24		344	1,459	1,346
yield	4.24	3.8	80	1,289	1,289
				2,748	2,635
SETASIDE	area (ha)	rate/ha			
	11.29	302		3,410	3,147
OTHER CASH CROPS				13,251	13,251
OTHER INCOME				1,095	1,095
MILK	No.	yield	price/unit (£)		
	202	6408	0.2036	263,543	263,543
Quota compensation					
CATTLE					
Non-beef output				32254	32,254
Beef output				14,834	14,834
Support				2,860	2,640
Eligible avg. nos					
Suckler cows					
Suckler extens					
BSP steers	25*84.32			2,108	
BSP bulls					
Adult slaughter premium					
Other extensification				837	
One off payment					
OTHER OUTPUT				66,524	66,524
MISC - FORAGE					
TOTAL FARM OUTPUT				536,075	531,802
TOTAL VARIABLE COSTS				215,410	215,410
TOTAL FIXED COSTS INCL RENT				295,765	295,765
NET PROFIT				24,900	20,627

MIXED ARABLE AND DAIRY FARM **WITH COMP** (based on 24 farms av. size adj. 352.9 ha)

				E=65	E=60
CROPPING		(area found by output/output/ha)			
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	157.17		242	38,035	35,106
yield	157.17	6.43	61.7	62,354	62,354
				100,389	97,460
OSR	area (ha)	yield (t/ha)	price/unit (£)		
support	25.7		242	6,219	5,741
yield	25.7	2.31	150	8,905	8,905
				15,124	14,646
LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	5.78		242	1,399	1,291
yield	5.78	1.24	130	932	932
				2,330	2,223
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	4.24		277	1,174	1,084
yield	4.24	3.8	80	1,289	1,289
				2,463	2,373
SETASIDE	area (ha)	rate/ha			
	11.29	242		2,732	2,522
OTHER CASH CROPS				13,251	13,251
OTHER INCOME				1,095	1,095
MILK	No.	yield	price/unit (£)		
	202	6408	0.1731	224,063	224,063
Quota compensation		tonnes	euro/t		
	202	6.6	17.24	22,984	21,215
Quota increase		yield l	price/unit		
	202	288	0.1731	10,070	9,295
CATTLE					
Non-beef output				32,254	32,254
Beef output	down 20%			11,867	11,867
Support				9,040	8,344
Eligible avg. nos					
Suckler cows					
Suckler extens					
BSP steers	25*195			4,875	
BSP bulls					
Adult slaughter premium					
Other extensificatio	64*52			3,328	
One off payment				837	
OTHER OUTPUT				66,524	66,524
MISC - FORAGE					
TOTAL FARM OUTPUT				514,189	507,132
TOTAL VARIABLE COSTS				215,410	215,410
TOTAL FIXED COSTS INCL RENT				295,765	295,765
NET PROFIT				3,014	-4,043

MIXED ARABLE AND DAIRY FARM **WITHOUT** (based on 24 farms av. size adj. 352.9 ha)

				E=65	E=60
CROPPING		(area found by output/output/ha)			
CEREAL	area (ha)	yield (t/ha)	price/unit (£)		
support	157.17		238	37,406	34,526
yield	157.17	6.43	61.7	62,354	62,354
				99,761	96,880
OSR	area (ha)	yield (t/ha)	price/unit (£)		
support	25.7		242	6,219	5,741
yield	25.7	2.31	150	8,905	8,905
				15,124	14,646
LIN	area (ha)	yield (t/ha)	price/unit (£)		
support	5.78		242	1,399	1,291
yield	5.78	1.24	130	932	932
				2,330	2,223
BEANS	area (ha)	yield (t/ha)	price/unit (£)		
support	4.24		277	1,174	1,084
yield	4.24	3.8	80	1,289	1,289
				2,463	2,373
SETASIDE	area (ha)	rate/ha			
	11.29	242		2,732	2,522
OTHER CASH CROPS				13,251	13,251
OTHER INCOME				1,095	1,095
MILK	No.	yield	price/unit (£)		
	202	6408	0.1731	224,063	224,063
Quota compensation					
Quota increase					
CATTLE					
Non-beef output				32,254	32,254
Beef output	down 20%			11,867	11,867
Support				2,860	2,640
Eligible avg. nos					
Suckler cows					
Suckler extens					
BSP steers	25*84.3			2,108	
BSP bulls					
Adult slaughter premium					
Other extensification					
One off payment				837	
OTHER OUTPUT				66,524	66,524
MISC - FORAGE					
TOTAL FARM OUTPUT				474,326	470,338
TOTAL VARIABLE COSTS				215,410	215,410
TOTAL FIXED COSTS INCL RENT				295,765	295,765
NET PROFIT				-36,849	-40,837