

## **New initiatives for maintaining on-farm environmental protection**

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### **Summary**

Modern farming has brought many benefits to society but it is also considered to have had many detrimental effects on the environment including decreasing water quality, loss of biodiversity and greater demand for non-renewable resources. The negative impacts have been evident for some time and regulators have sought to introduce policies and initiatives aimed at monitoring and remediating these effects, and to boost farmer and grower awareness of how on-farm practices influence the quality of our environment. This paper provides a brief overview of how on-farm environmental protection has developed and brings the situation up to date by examining the new initiatives currently being put into place.

**Key words:** Environmental protection, agricultural sustainability, environmental monitoring, environmental auditing, environmental appraisal

### **Introduction**

Modern farming has brought major benefits for society, but has also added new pressures on the environment. Agriculture's long-term success and prosperity depend on its ability to co-exist sustainably with the natural environment. This involves ensuring a balance between environmental quality, societal needs and opportunities for economic growth to meet the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1993).

Meeting the needs of the present is no easy task. We have an increasing and more informed population that is more demanding with respect to food quality, safety, availability, choice and cost. The demands we make on our farmers are continuously increasing as we expect them to be more proactive in protecting the countryside they farm. We should also remember that the industry is under severe financial pressure and in a flux of change.

Agriculture has a complex relationship with the environment because of its dependence on natural resources and natural processes. Farm practices have an impact on the environment within the farm itself, but they can be felt well beyond the farm gate. The potential impacts are well documented in the literature (e.g. Schroder *et al.*, 2004, van der Werf *et al.*, 2004; Skinner *et al.*, 1997;) but to summarise they are very diverse (e.g. water, air and soil pollution, loss of biodiversity) and result from farm inputs (e.g. fertilisers and pesticides, non-renewable resources such as fossil fuels) and farming practices (e.g. cropping patterns, land management, cultivations).

Pressures for farmers to demonstrate environmental protection has grown steadily over the last 15 to 20 years, spurred on by events such as the Rio de Janeiro World Summit in 1992, increasing regulation, especially that from Europe, and various well documented food safety scares (e.g. salmonella in eggs, BSE). However, many people will regard the publication of Rachel Carson's *Silent Spring* (2002 40<sup>th</sup> Anniversary Edition), which in 1962 exposed the hazards of the pesticide DDT as being the one event that alerted the general population to the pressures facing the global environment. Even 40 years on pesticides are still one of the general public's main concerns.

Many initiatives have been introduced in recent years to monitor on-farm environmental quality and promote good farming practice. These have varied in their approach and their objectives, but all have recognised that the only way to prevent environmental damage is to identify the significant environmental risks and take precautionary measures to prevent or, at least, minimise their impact.

### **Agri-Environmental Management**

The objectives of monitoring environmental quality on-farm are to ensure that the integrity of the local environment is not compromised by agricultural activities, to demonstrate the effectiveness of environmental strategies, or to inform and drive related policy decisions. Often the techniques used are referred to as auditing. The word audit is generally associated with financial reviews, carried out by accounting professionals under strict rules that establish the responsibilities and liabilities of the auditors. Environmental auditing has no rules as such. The principal aims of an environmental audit are to identify and evaluate potential problems, liabilities, risks and hazards. This in turn will assist in assessing the viability of operations, after including the cost of reducing environmental risks and liability to acceptable levels. There is no single environmental audit procedure applicable to all situations as it can take different forms to achieve different objectives. The reason for undertaking an audit and the agreed outcomes are the deciding factors.

The UK was at the forefront of environmental management when in 1992 it published the World's first standard in environmental management – BS7750. EMAS (Eco-Management and Auditing Scheme), the slightly broader European system, first opened to participants in 1995. An international version, ISO14001, was also first published in 1995. However, uptake by the UK agricultural industry has always been minimal, mainly because of the prescriptive nature of such standard systems and the necessary manpower burden they impose. Techniques for environmental management used within the UK farming industry have evolved gradually over the last decade rather than via a rapid adoption of a standardised approach. Early attempts to introduce agri-environmental and/or health risk monitoring involved record keeping and simple management tools rather than the more sophisticated auditing in the form we would recognise today.

#### *Early initiatives*

Probably the first introduction UK farmers had to auditing, risk assessment and management came with the introduction of the Control of Substances Hazardous to Health (COSHH) Regulations 1988. All farmers who use pesticides, fertilisers or other chemicals will be familiar with the COSHH regulations which require simple risk assessments to be carried out, health records of workers to be kept and, where necessary, steps taken to reduce exposure to hazardous substances.

In the early 1990s (revised in 1998) Defra (as MAFF) introduced Codes of Good Agricultural Practice of Air, Water and Soil (Defra, 1998a, b & c respectively). These provided guidance on

meeting responsibilities under various sections of legislation and described best practice. These Codes are not audits. They are generic and do not gather information from the farmer, but the description of best practice contained within them is the benchmark against which most agri-environmental audits compare.

The first whole farm assessment, the LEAF audit, arrived in 1994 (Blake, 1994). The LEAF audit, as a collection of paper-based self-assessment checklists, does not measure environmental impact or environmental quality but serves as a simple management tool. It was designed to gather statistics on current farm practices and provide evaluation criteria on which the farmer/manager could base future practice and policies. The compiled statistics were then used as benchmarks for the industry as a whole.

In 1996 a more comprehensive whole farm audit 'EMA – Environmental Management for Agriculture' (Tzilivakis & Lewis, 1999) was introduced by the University of Hertfordshire and a consortium of other research organisations. This was the first computer-based environmental management tool for farming. The structure of EMA and its self-assessment approach was similar to the LEAF audit. However the software collated input data from the farmer to feed simple models and algorithms for a simplistic environmental impact assessment, something that could not be achieved with a paper-based tool. The results of these assessments were then used to prioritise areas for improvement on the farm. Other integrated software tools plus an extensive library helped identify practical and cost effective solutions to identified problems. In short, EMA was a full environmental management system based on the principles introduced by the formalised approaches of BS7750, EMAS and ISO14001. Both the EMA and the LEAF audits are still in use today.

Farm Assurance Schemes began to emerge in the early 1990s but it was several years before uptake became significant. These are voluntary systems that establish production standards covering food safety, animal welfare issues and other characteristics deemed to be important by consumers. They include regular, independent checks on the scheme-registered producers to ensure compliance with scheme protocols. They are designed to assure consumers that food production meets all legal requirements and define standards of good agricultural practice. Until recently, environmental protection was only minimally addressed by these schemes, but add-on modules, such as the LEAF Marque, have improved on this situation.

Around 1998/1999 Government policies emerged to minimise and optimise agricultural use of pesticides and the potential of economic instruments to deliver this was explored (Ecotec, 1999). Unsurprisingly, the imposition of a pesticide tax was not welcomed by much of the industry and a consortium of organisations led by the Crop Protection Association proposed a suite of voluntary measures designed to reduce pesticide pollution and improve farming practices. This proposal, known as the Voluntary Initiative (VI), was accepted on an initial fixed-term basis by regulators. One of the key elements of the VI was to establish a commitment from farmers and growers to consider the environmental impact of their activities and take steps to reduce it. This is encapsulated in the process of drawing up a Crop Protection Management Plan (CPMP). In reality this is not a planning process but an audit assessment of current practices and attitudes. Responses to a simple checkbox questionnaire are scored and weighted to give overall risk scores. Only if the findings of such an assessment are acted upon does it become a planning tool. As of April 2004 CPMPs had been completed for around 900,000 hectares in England.

In addition to those described above, there have been other initiatives designed to enhance environmental protection. These have included many training and education schemes seeking to boost awareness of risks and inform the industry of remediation actions and new technologies. For example:

- vast amounts of literature describing best practice;
- national monitoring of farm input use such as the Pesticide Usage Survey (e.g. Defra, 2003) and the fertiliser survey (AIC, 2002) and environmental status such as the Countryside Survey (Defra, 2000a);

- development and implementation of pilot ‘sustainability indicators’ (DEFRA, 2000b). Whilst these are policy tools and have a national perspective in many instances, improvements at farm level are needed before improvements in the national picture can be identified. They therefore form an indirect method of monitoring on-farm environmental status;
- numerous software packages which prescribe farm activities such as the application of nutrients (e.g. Glendining & Smith, 1999), pesticides (e.g. Lewis *et al.*, 2003) or to help schedule irrigation (e.g. Hess, 1999);
- agri-environment schemes that provide payments to farmers and land managers in return for following specified practices that protect the environment.

Although environmental regulation has increased significantly, to a large extent Government has preferred to adopt a voluntary and self-assessment approach. The success of these voluntary systems has been variable. Those that offer market opportunities or a financial incentive are the most successful. Whilst being part of an Assurance Scheme does not appear to provide much market advantage there do appear to be disadvantages of opting out as growers not registered with such a scheme may have difficulties in selling their produce. Only a tiny proportion of the agricultural holdings in England regularly use software to help manage environmental impacts.

### *New directions*

Government’s preference for the voluntary approach appears to be shifting. A new policy direction and new farming strategy emerged following the publication of the report of the Policy Commission on the Future of Farming (2002). The findings of the Commission, led by Sir Donald Curry, required Defra to improve accountability through a clearer separation of responsibility for policy and delivery functions. The way Defra communicated with farmers and growers needed to be improved and made far more efficient, minimising bureaucracy and duplication.

In addition, the reform of the CAP will decouple the bulk of subsidy from production. Instead, payments will be made subject to farmers meeting minimum standards, as defined by Statutory Management Requirements (SMRs), in environmental stewardship and ensuring their land is kept in Good Agricultural and Environmental Condition (GAEC). This poses regulators with a problem as the amount of information required to enable assessment of a farm’s environmental performance will be huge, variable from farm to farm, and will require checking, analysis and comparison with standards.

Other government agencies are facing similar problems. They need to improve their communication and image with farmers and the general public and at the same time, they need to improve environmental quality and compliance with regulation. Consequently, they will have increased data handling issues. Undoubtedly there will be an overlap in data requirements but annoying duplicate demands to farmers and growers must be avoided. Inefficiencies such as this and the lack of ‘joined up thinking’ have been criticisms directed at government departments for many years, and the revised policies arising from the Curry Report have started to address this seriously.

### *New regulations, initiatives and opportunities*

#### *Regulation*

In recent years agri-environmental problems using impact and risk assessments along the same lines as COSHH have been approached in more innovative way. For example ‘LERAPS - Local Environmental Risk Assessments for Pesticides’ were first introduced in 1999 and now apply to

both boom and air-assisted broadcast sprayers. Another example is the Environmental Impact Assessment (Uncultivated Land and Semi-natural Areas) England Regulations, 2001. These regulations require all projects which intend to use uncultivated land or semi-natural areas for intensive agriculture to undergo an initial screening exercise and, where deemed necessary, apply for approval before starting the project.

### *Indicators*

Little has done on updating the pilot sustainability indicators (Defra, 2000b). However, these have not had any real influence on farming practices. Many of the indicators are highly technical in nature and are presented from the policy, top-down perspective. The indicators all have a national focus with no breakdown by farm type or location, some are not measurable directly on farm, and few have direct links with on-farm management decisions. As a consequence the importance of these indicators and the underpinning messages have been lost at farm level, but in many instances changes in farm management practice are needed before improvements at national level can be seen. In an attempt to overcome this the *FarmSmart* (Tzilivakis & Lewis, 2004) software package was developed which recasts the national indicators to farm level alternatives and enables users to tailor the basic national indicators to a specific farm situation using a very simple description of the farm.

### *Regulatory Audits*

The Environment Agency believes that the environmental performance of farms in England and Wales needs to be improved and existing mechanisms are not sufficiently effective. Existing voluntary tools, such as Defra's Codes of Good Agricultural Practice (Defra, 1998a, b, c) have not succeeded in changing farming practices to the extent required. In response the Agency is developing an Environmental Management System for Farms (EMSF). The EMSF links to overall farm business planning to improve environmental management, seeking to put environmental protection at the heart of farm business thinking. It uses a self-audit questionnaire to collect information about activities on the farm. It also provides summaries and guidance on how improvements can be built into the farm business plan. Risk assessment techniques are used to ensure that specific environmental issues are addressed in a way that takes into account the particular circumstances and systems of an individual farm. If successful, the EMSF will help the Agency decide priorities for farm visits. It is probable that farmers and growers completing the audit will not be visited as frequently as those that do not. However, participation will be on a voluntary basis.

The Whole Farm Approach is a part of the Governments Strategy for Sustainable Farming and Food. It is a long-term project seeking to develop an integrated solution to support the farming industry across the entire range of its activities. An IT framework is planned which will provide a single gateway for farmers to interact with Defra and other national and local government departments. This would give access to Government information currently held in different databases: animal records, Integrated Administration and Control (IACS) information, habitat maps, water catchment area data, land designations, archaeological sites etc.

The initial step of the Whole Farm Approach is the Whole Farm Appraisal (WFA). This long-term project will provide tools for the farming industry that streamline regulation, demonstrate best practice and allow compliance information to be submitted easily. With grant applications and direct payments also becoming part of this new approach it will, eventually, be a step closer to creating a 'joined-up' way of interacting with farmers. A key element of the WFA is that it will be pre-populated from a range of Defra databases. The WFA is based on an audit compiling basic information about how farmers currently carry out their activities. It will also look at some of the wider aspects of farming activity, for example health and safety, and it helps to raise awareness of the range of current and planned legislation that may affect the farming industry. It

is expected that the module addressing cross-compliance will be used to assess if minimum environmental protection standards have been met by growers prior to subsidy payments.

The burden these new auditing systems potentially place on farmers is considerable, and this could be a barrier to their uptake and thus their influence on improving environmental quality. There has been considerable collaboration between the developers to try and overcome this with some success. The CPMP audit has been used as the crop protection module in both the EMSF and the WFA. Farmers completing a CPMP can directly transfer their scores into the EMSF and WFA avoiding the need to complete the module again. Similarly, many modules in the EMSF also appear in the WFA and data transfer can also be carried out between these. Pre-population from Defra databases will also help minimise the time required to complete them.

The Health and Safety Executive (HSE) have developed pilot auditing software to help farmers do a comprehensive health and safety assessment of their farms, and to help raise the levels of health and safety awareness in the industry. Along the same broad lines as the WFA and the EMSF, the HSE see this as a potential aid to reducing the worrying accident record of the industry. In the ten-year period from 1992 and 2002, 497 people have been killed as a result of agricultural work activities and many more have been injured or suffered ill-health. Whilst it is not confirmed at present, it is likely that this audit will form the H&S module in the WFA.

CPMPs, the EMSF and the WFA all use a questionnaire approach. Each question may have many references to key industry documents, codes of practice and legislation, but originally these documents are not included within any of the systems. These documents are 'owned' by a variety of organisations and are published in a variety of formats (hardcopy and electronic), which meant that inclusion was not easy for both copyright and technical reasons. It also carried a manpower burden, as the information therein required constant management and updating by each of the three systems separately. This highlighted a significant knowledge transfer issue within the industry. There is no paucity of information but it is scattered across a host of organisations and published in a wide range of formats both paper-based and electronic, which do not have the ability to 'talk' to each other. Some literature is free, some has a price attached and there was no central access point. How does a farmer or grower become aware of exactly what is available or by whom? How is he made aware of updates or outdated information? The solution to this problem arrived earlier this year with the launch of ADLib.

ADLib is the online Agricultural Document Library. It holds around 400 different documents produced by the industry in both HTML and pdf. The HTML versions of the documents are all electronically linked via traditional referencing, keywords and subjects. The documents are searchable, bookmarkable and downloadable. In addition, status information is provided regarding publication date, publisher and pending updates or out-dated information. ADLib is now being used as the technical support source to CPMPs, the EMSF and the WFA. Document linking can be done down to paragraph level deep within a document. Document management is no longer a problem as it is handled centrally. This also gives the added advantage of providing the same quality and guidance across all systems, and is another example of joined-up thinking and actions designed to reduce the burden on farmers.

Akin to ADLib is the 'Land Management Information System' (LaMIS). This is a website and CD-ROM for farmers and other rural land managers which provides access to publicly held Geographic Information System (GIS) data about their land, together with associated management advice and guidance. Its aims to provide land managers with easy access to data about their land held by all tiers of government. The aim is to support and inform land managers in whatever planning or decision-making process they may be following. This might be day-to-day decision-making, or one-off, longer-term planning such as the preparation of an agri-environment application or a diversification proposal. LaMIS is the only initiative that brings together national and local GIS data specifically for the benefit of the rural land manager. Links between LaMIS and ADLib are being developed.

### *Other initiatives*

The Policy Commission on the future of Farming and Food (2002) identified demonstration farms as a good and cost-effective way of bringing about change. These farms show visitors first hand how best practice and new technologies can be put into practice. Demonstration farms are popular but evidence they provide real environmental benefits is scarce. Government set up a pilot network of demonstration farms in early 2003 in response to the recommendations of the Curry Report. The aim is to test their effectiveness in improving the economic and environmental performance of farms and their integration into the food chain and rural economy. The project will be evaluated during 2004 when recommendations will be made about Defra's future involvement in demonstration farms.

In response to the Curry report, the Government announced in the Strategy for Sustainable Farming and Food (2002) that, subject to a successful pilot, an Entry Level Agri-Environment Scheme, open to all farmers in England, will be rolled out in early 2005. The aim of the Entry Level Scheme is to encourage a large number of farmers across a wide area of farmland to deliver simple yet effective environmental management. The scheme is currently being piloted in a number of areas. It works by farmers selecting activities and practices to implement from a list of 55 options. Each option earns points that contribute towards a farm specific target, which must be met in order for payments to be received.

Higher Level Stewardship, the more demanding version of the ELS will be based on the existing Countryside Stewardship Scheme (CSS) and Environmentally Sensitive Areas (ESAs). It is likely to be launched across England in early 2005. It seeks to broaden coverage of agri-environment schemes and build on the achievements of the CSS and ESAs. Existing agreement holders will progressively transfer to the new scheme from 2005. This transfer will need to be managed over time in order to ensure that the transition goes smoothly.

## **Discussion**

Farming is probably the most significant factor shaping the countryside and rural sustainability. Modern farming methods, encouraged by the Common Agricultural Policy, with its initial push towards greater intensification, have contributed to a decrease in environmental quality leading to the loss of wildlife habitats and landscape features. However, there have also been a significant number of initiatives seeking to reverse the damage and policy measures and the efforts of farmers have significantly improved the situation in recent years. There is still much to be done, but there are many good news stories emerging.

Whilst some species of birds are still declining rapidly, for many species the decline has slowed and populations are levelling out (e.g. grey partridge, tree sparrow, linnet). For other species there is some evidence that the trend is beginning to reverse (e.g. song thrush, white throat). There are also a number of species that have shown significant increases in populations, for example green woodpeckers and buzzards.

Water quality is often seen as a good indicator of the state of our environment. Levels of two herbicides, isoproturon and simazine, which have been causing the water industry serious problems have fallen significantly in the last two years. In addition, data from some water authorities (e.g. Severn Trent) suggests that the total pesticide load in their area has dropped dramatically. There has also been a significant improvement in the biological and chemical quality of rivers since 1990. Much of this is due to new regulation and the stricter enforcement of discharge consents. There are still many rivers with high levels of nutrients and frequent examples of poor and bad aesthetic quality. However in 2002, 95% of rivers were of good or fair quality, compared with 90% in 1990; less than 1% were classified as bad. In 2002, 54% of rivers had high concentrations of phosphate (>0.1mg/l), compared with 64% in 1990.

It may well take several years before many of the new initiatives discussed above begin to demonstrate their effectiveness. Nevertheless we have evidence to suggest that significant improvements have already been seen and the industry should be pleased with its achievements so far.

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