

3. Cost-effectiveness

3.1 Cost effectiveness of voluntary adoption of practical, farm-level measures

Chapters 4-12 of this report present a range of examples of farm-level measures that could be voluntarily adopted by farmers to minimise/reduce detrimental environmental impacts, or enhance the positive environmental benefits, associated with agriculture. The practicality of these measures will be determined, in part, by the cost-effectiveness of each measure (i.e. the relative costs to farmers of implementing the measure and its effectiveness in achieving the desired environmental objective). This chapter explores the application of cost-effectiveness in this context.

3.2 Costs to farmers

The costs to a farmer of adopting a specific management measure can be categorised between the capital and revenue costs of expenditures on labour and materials to implement the measure, and the opportunity costs in terms of production foregone.

The capital costs to farmers for some of the measures identified in chapters 4-12 are relatively easy to determine and will be similar for all farms, e.g. the costs of stock fencing. Where these costs are known the information is generally widely available. However, for many of the suggested measures, the costs for any individual farm will vary according to the farm sector and the individual circumstances and practices on that farm. For example, the costs of designing, constructing and maintaining livestock waste management systems will be highly farm specific.

The costs of production foregone from undertaking certain practices are also likely to be highly farm specific and will be heavily influenced by the system of agricultural subsidies. Much of the related economic research uses a case study approach to examine the costs to farmers of adopting specific agricultural practices (e.g. Sparkes *et al.*, 1998). Some studies examine the costs for 'representative' farms (see for example De Cara and Jayet, 2000). The cost functions produced by either approach may have limited transferability to other farms. Therefore, much of this information may be of limited direct relevance to the majority of individual farmers. However, the research is of policy relevance and can provide general guidance to the wider farming community.

3.3. Effectiveness

The effectiveness of any particular measure is defined in terms of its ability to achieve a pre-specified environmental objective. As with the costs, effectiveness is also likely to be highly specific to individual farms. Nevertheless, there is a clear role for research to identify the effectiveness of specific measures in a more general context.

From the range of literature covered by this Review, **there is little evidence that the effectiveness of many of the recommended measures is well understood.** There are a number of reasons why this may be the case, including the lack of clear environmental objectives and/or a lack of understanding of 'cause and effect' with

respect to a wide range of environmental issues. This is highlighted by the current emphasis on encouraging farmers to produce nutrient budgets with the objective of reducing diffuse nutrient pollution. The causal relationship between changes in farm nutrient surpluses and changes in diffuse nutrient pollution is assumed but has yet to be clearly determined through empirical research (see chapter 6).

An attempt has been made, within each of the individual commentaries on the environmental issues (Chapters 4-12), to identify where the gaps in our current knowledge base lie with respect to the evaluation of the cost-effectiveness of specific measures

3.4. Wider costs of motivating farmers to adopt farm-level measures

There is evidence to suggest that **a significant proportion of UK and Scottish farmers has not yet voluntarily adopted standards of good agricultural practice** (see for example Aitken et al., 2001; Falconer and Hodge, 2001). This contrasts with the wealth of available information on good agricultural practice and the range of emerging knowledge transfer mechanisms. The processes of farm intensification, with technology increasingly substituting for labour, are well known (Slee *et al.* 2001). However, **the reasons for the lack of adoption of specific management practices have not been well researched and are not fully understood**. There is some research being undertaken in this area (for example Lexmon A. and Andersson H. 1998), but further research may be required with respect to specific management practices.

Furthermore, there is a range of countryside or sustainability goods from agriculture that are under-supplied, principally due to their public good nature. In addition to information provision and education, there is a range of policy mechanisms available to Government to motivate farmers to adopt management practices that achieve the desired environmental outputs, generally classified as regulation and economic instruments. The full costs, the distribution of the costs and the effectiveness of the different policy interventions in achieving their objectives can vary considerably, and are important considerations in any discussion of achieving practical action at the farm level. There is a growing body of research that examines the costs and effectiveness of different policy mechanisms, some examples of which are listed in the Appendix 1.

3.5. References

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Giampietro, M. (1997). Socioeconomic constraints to farming with biodiversity. *Agriculture Ecosystems & Environment*, **62** (2-3): 145-167.

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Sparkes, D.L., Ramsden, S.J., Jaggard, K.W. and Scott, R.K. (1998). The case for headland set-aside: consideration of whole-farm gross margins and grain production on two farms with contrasting rotations. *Annals of Applied Biology*, V **133**, 2, 245-256.

Please see Appendix 1 for the related bibliography on cost-effectiveness

