CENTRE FOR ECOLOGY AND HYDROLOGY
NATURAL ENVIRONMENT RESEARCH COUNCIL

Drivers of Countryside Change

Final Report

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Drivers of Countryside Change: Final Report

Executive Summary

Introduction

1. An understanding of the drivers of countryside change is essential if we are to interpret the growing body of information that is becoming available about the rural environment. In this study we focus on Countryside Survey 2000 (CS2000), and explore what it can contribute to our understanding of the social and economic factors that have influenced the character of the wider countryside during the 1990s. We also look to the future and ask what kinds of data and analysis might be relevant for understanding current trends and policy directions.

2. This work has been commissioned at a time when the data collection phase of CS2000 has been completed. These data are now being analysed and the first results of the survey will be published in November 2000. This project seeks to assist and extend these activities.

3. The specific aims of the project are to:

    i Support the presentation of the first outputs from Countryside Survey 2000 with a detailed review and analysis of the social, economic and policy drivers relevant to understanding the patterns of change detected since the earlier surveys; and,

    ii Shape DETR's long term research strategy in relation to the social, economic and policy drivers of countryside change, so that more effective and integrated policies for achieving sustainable development can be achieved.

4. As these aims indicate, the initial focus of the work is on the immediate outputs from CS2000. However, as recommended in the CS2000 Scoping Study, work such as this is needed to look at Countryside Survey in the wider context of countryside policy. In order to realise the value of these data we need to understand not only what they can tell us directly, but also how we can link them to other sources of information to gain a wider view of changes in rural areas.

Work Programme

5. This study is made up of three substantive modules. The first concerns the general issues of Rural Change and Sustainability. This element of the work develops a conceptual framework in which the general socio-economic trends and pressures in rural areas can be understood. The outputs provide information on the changing policy context in which the outputs of CS2000 must be set, and make

recommendations on how these data can be used in relation to DETR's broader research needs.

6. The other two modules, which focus on agriculture and forestry, have been designed to examine some of the general themes covered in the first module in greater depth. By reviewing changes in each of these sectors the work explores how we might pick up the consequences of these drivers in the outputs from CS2000. In the long term, the goal is to focus on how other research or other data on agriculture and forestry can be used alongside CS2000 to develop and broaden its policy relevance.

7. The scope of this study was confined to the agriculture and forestry because of the limited time available for this work. Although these two drivers are amongst the most important in terms of understanding countryside change, it must be recognised that there are other issues that also need to be considered in the long term. The relationship between socio-economic and policy processes and changing pollution loads on terrestrial habitats and freshwater ecosystems, for example, must be an important area of future work.

8. In order to test the robustness of our findings, we presented the results of our reviews and some of our initial ideas for further work at a seminar attended by policy advisors, researchers and academics. They were invited on the basis of their interest in the socio-economic and policy issues that are relevant to understanding countryside change. Their comments and ideas have helped to shape the outcome of this study.

Rural Sustainability and Countryside Change

9. A key policy driver to emerge during the 1990s has been that of sustainability. This study traces the uptake and development of the concept at both EU and UK levels during the last decade. The analysis suggests that while the concept has been a major factor shaping environmental and other economic and social policies that are relevant to the countryside, the extent to which the concept has resulted in major changes in character of our rural areas is more limited. In the context of this study, the degree to which such policies have impacted on patterns of land cover and the stock and quality of habitats in the wider countryside is unclear. A major factor was that many of the institutional changes that arose in relation to the sustainability debate took place too late in the decade for any widespread effects to be detectable.

10. Our review suggests, however, that with the evolution of more holistic, socially based thinking about rural sustainability, and the development of new institutional structures within the UK, there is a need to broaden our approach to monitoring countryside change. **While CS2000 currently provides an insight into ecological change, we suggest that in the future such work must be better integrated with other sources of information about the structure and dynamics of rural communities if we are to gain an understanding of the broader drivers of change.**

11. The review of rural sustainability and countryside change traces several key, inter-linked developments that suggest that we need to rethink the role of studies such as CS2000:

    - A shift away from a paradigm in which policies towards farming are seen the main vehicle for rural development, to one in which the countryside is seen as a 'rural as opposed to an agricultural space'.

    - Growing emphasis on the importance of 'locality', and recognition of the need to target specific problems in specific areas rather than focusing effort on individual sectors.

    - The need to promote bottom-up, community-based, voluntary approaches to rural development, rather than the imposition of 'solutions' from outside.

12. Detailed consideration of how the impact of policies towards agriculture and forestry can be explored using CS2000 data are considered separately in later sections of this Report. In the context of testing more general ideas about rural development using these data the specific recommendation that arose from the review of rural sustainability was **that a much better understanding of the *rural context* of the individual CS2000 survey squares is required.**

13. If we are to gain an insight into the causes of change recorded by CS2000 and any future surveys of its kind, then we need to understand the position of the survey squares in both 'environmental' *and* 'rural' space. It is suggested, therefore, that further work is needed to characterise the survey squares in relation to different dimensions of rurality.

14. Such work would potentially enable CS2000 data to be stratified in ways other than that involving the Land Class System, so that the character and dynamics of the landscape mosaic could be described in relation to a wide range of models of rural development. It is suggested that social and demographic information about the local area in which the sample square occurs could be used for this work.

15. The availability of the 2001 Census will provide an important opportunity for a long-term study of social and demographic change to be made. Earlier census information can be used to characterise change up to 1990. The work could also draw upon other rural information, such as DETRs Land Use Change Statistics in England, to characterise the dynamics of the land cover in and around the survey squares.

16. The CS field survey squares were selected in relation to an environmental stratification of GB and so they may not be representative of the range of social and economic conditions associated with the wider countryside. Such work will however, place the survey data in context and enable the relationships between environmental change and these other drivers to be better understood. It may also enable new indicators of sustainability to be developed.

17. **It is further recommended that such work is developed in relation to any follow-up socio-economic survey of farm enterprises within the survey**

squares (see below) so that a more complete picture can be established of the rural community and its economy in the areas covered by Countryside Survey.

Agriculture as a Driver of Countryside Change

18. The work within this project that focused on agriculture as a driver of countryside change consisted of a number of elements, namely:

    i To include all the primary data collected during the *Processes of Countryside Change* Study in the CS2000 database;

    ii To review *Processes of Countryside Change* Study and the possibilities for further analysing these data in the context of CS2000.

    iii To review the changing structure of agriculture 1990-98 and the possible impacts on the stock and condition of the different land cover and habitat types in the wider countryside;

    iv To review the use of MAFF June Census at the Local Authority and District level and Farm Business Survey (FBS) data, and consider how they might help with the detailed interpretation of CS2000 results; and,

    v To develop recommendations in relation to the agricultural driver, both in the context of CS2000 and DETR's wider research programme.

19. Following the recommendations of the CS2000 Scoping Study, it was proposed that the data acquired by Potter and Lobley (1996), as part of their *Processes of Countryside Change Study,* be integrated with other information being brought together in the CS2000 database, and that CEH become their custodians. We considered such work to be important because it provided the basis for further analysis of the survey data collected in 1998. **The data from Potter and Lobley's survey are now part of the CS2000 database.**

20. In order to develop a programme for further work in relation to the agricultural driver, analyses of information from the June Census and Farm Business Survey (FBS) were made. This work formed the basis of our recommendations in this area.

21. Some commentators have described the general changes that occurred in the structure of British agriculture during the 1980s as one of geographical 'polarisation'. Although the term is often used imprecisely, it involves the idea that we observed during this period the increasing regional specialisation of farming activities. In part the process was manifested by reduction in area and number of mixed farms and the increasing dominance of intensive arable farming in those areas of the east and south east of England, where the economic returns from such activities were most profitable. The structure of farming in such areas is contrasted with that of the west and north, where mixed farming gave way to more exclusively pasture-based systems. We asked: *To what extent has such polarisation been maintained and continued during the 1990s?*

22. In the analysis presented it is argued that the pattern of spatial differentiation of farming activities has been maintained, but the processes of polarisation that typified the 1980s had been overlain in England[1] at least, by those of :

    - ***Consolidation***, that is the tendency towards fewer, larger farms.
    - ***Specialisation,*** that is the tendency for farms to concentrate on a narrower range of activities so that labour requirements and other inputs may be easier to predict and control.
    - ***Diversification***, that is the tendency for farm enterprises to develop other sources of income from on-farm, non-agricultural activities and off-farm sources.

23. It is suggested that although these changes indicate some restructuring in the agricultural industry, there is little evidence that they have been associated with any significant lessening in ***management intensity***. Indeed, there are some signs that the consolidation and specialisation processes have combined to concentrate such management pressures in some areas, despite the development of policies to encourage better ***environmental practice*** in farming.

24. The material we present in this report provides useful contextual information in which the initial results of CS2000 can be reported. Table 1 sets out our recommendations for further more detailed analysis that can be made in relation to this important driver of countryside change. **These recommendations allow the hypotheses about the processes of 'polarisation', 'consolidation', 'specialisation', 'diversification', 'management intensity' and 'environmental practice' to be tested more rigorously and their environmental consequences explored in detail using data from CS2000.**

25. The Table identifies work that could be undertaken in the short-term, that is once CS2000 have been launched in November 2000. **We recommend that such work be taken forward as part of any post-launch research programme, such as that which followed CS1990.**

26. Table 1 also identified work of a more long-term nature. Our review, and feedback from the workshop held to comment on the outputs from this study suggests that there is considerable justification and support for a socio-economic survey within the CS2000 sample squares. This work would clearly build on Potter and Lobley's *Processes of Countryside Change* Study. **However, we recommend that its scope be extended to include a wider range of factors affecting rural areas.** In Table 1 we describe only those issues related to agriculture. In the next section we consider how such a survey could be developed to take better account of forestry.

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[1] Because of the limited time available for this desk study, analysis was confined to June Census and FBS data for England, because the former were available at a disaggregated, district level from another project. National level information about Scotland and Wales was included, where relevant. Clearly, the detailed regional analysis provided for England could be extended to these other country units in any follow-up work.

Table 1: Summary of recommendations for further work on analysis of agricultural drivers using CS2000 data.

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Consolidation: *What effects does the trend towards fewer, larger farms have for the environment?*	Extend analysis of district level June Census data (1988-97) for holding number, size and mean size to Wales and Scotland.	Determine loss of farm area to non-agricultural cover types by SSR[2], PCC[3] typology and CSEZ[4]. *To what extent do patterns of loss of agricultural land recorded by CS2000 match June Census data?* *What geographical contrasts exist in the conversion of agricultural land to other uses?*	Use follow-up to PCC[3] to determine extent of consolidation by PCC typology. *What is the relationship between of quantitative and qualitative cover change to consolidation process?* *How do patterns of land cover change relate to changing patterns of ownership or tenancy?*
	Extend analysis of district level June Census data (1988-97) for labour inputs and use of contractors to Wales and Scotland. Refine FBS analysis for labour inputs.		Use follow-up to PCC to determine extent of changing labour inputs and use of contractors by PCC typology. *Is there any relationship between cover change and changing labour inputs on farms by region and zone?*
Polarisation and Specialisation: *To what extent are the regional/zonal patterns in farming observed during the 1980s being maintained and what are the environmental consequences?*	Extend analysis of district level June Census data to cover both Scotland and Wales and the period 1984-90 in each country. *Are regional/zonal contrasts in farm structure being maintained, reducing or increasing in 1990s?*	The analysis in the shifts between major agricultural cover types and changes in diversity of cover and vegetation types within the farmed landscape by SSR and CSEZ using CS1990 and CS2000. *Is the structure of the farmed landscape becoming more or less similar between regions and CSEZ post 1990?* *How does environmental stock change by 1993 PCC typology?*	Use follow-up to PCC to determine extent of changes in structure of farm enterprise in relation to EC Farm Type[5] and PCC typology. *Are regional and zonal contrasts maintained or increasing?* *To what extent are farm enterprises becoming more specialised in terms of the range of activities?* *How do changes in farm structure relate to 1993 PCC farm types?*

/cont.

[2] SSR= Standard Statistical Region
[3] PCC=Processes of Countryside Change Study; PCC Typology = Typology of farmers defined by Potter and Lobley (1996).
[4] CSEZ = Countryside Survey 2000 environmental zone.
[5] Categorisation of farm types used in June Census and FBS

Table 1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Diversification	Analysis of recent census data on diversification by SSR and CSEZ. Extend analysis of 'local economy' by using data such as *EC Farm Structures Survey, Annual Employment Survey, Labour Force Survey, and ONS classification of local authority districts.*		Use follow-up to PCC to determine extent of off-farm diversification by PCC typology and EU Farm Type. *How have different types of enterprise responded to changed economic circumstances via diversification? What role does off-farm income have in triggering/preventing land cover change?* *What is the impact of part-time working on levels of 'environmental management'?*
Management Intensity			
Fertiliser and pesticides	Extend FBS analysis of ***fertiliser and pesticide*** inputs using other data sources (e.g. Survey of Fertiliser Use). Attempt regional disaggregation and use levels by farm type	***Expectation:*** little change in impacts of fertiliser and pesticide use. Analysis of the relationship between changes in relevant IBDs within the farmed landscape by SSR and CSEZ. Extend CS2000 IBD system to formally include measures of biological condition of freshwaters. Disaggregate by SSR and CSEZ to examine response in relation to character of farmed landscape.	Use follow-up to PCC to determine changing use of fertilisers and pesticides.
Grazing intensity		***Expectation:*** Little overall change, but developing regional contrasts. Analysis of the relationship between changes in relevant IBD scores by SSR, CSEZ and especially LFA/non-LFA areas.	Use follow-up to PCC to examine changes in intensity of pasture management
Other aspects of farm management	There are other aspects of farm management not captured by JC and FBS – direct analysis using CS2000?	Extend CS2000 system of IBDs to develop composite agricultural intensification index; disaggregate by SSR and CSEZ. Index should include information on level and quality of environmental stock.	Use PCC follow-up to assess how farm types have responded generally to economic changes via intensification of on-farm operations.

/cont.

Table 1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Environmental practice/policy	Extend regional analysis JC data for LFA/non-LFA districts to include ESA/non-ESA districts.	Comparison of stock and quality change in 'policy-on' vs 'policy off' situations. Will require access to MAFF Countryside Stewardship and ESA monitoring data. Exploitation of CS2000 as contextual data for agri-environmental monitoring	Use PCC follow-up to look at take up of environmental advice/information, levels of environmental awareness and response agri-environmental schemes by farm types.
		Use CS2000 results to define environmental potential and/or targets for farmed landscape.	Use PCC follow-up to develop 'sustainability profiles' of farm managers and farm enterprises and relationships between profiles and 1993 PCC farm typology and change 1990-98.

Forestry as a Driver of Countryside Change

27. Throughout the 1990s it was the policy of successive governments to support the extension of the woodland area. The initial aim was to afforest 33,000 ha a year, including 12,000 ha a year under the Farm Woodland Scheme. These have been expressed in terms of longer-term targets by the subsequent Rural White Papers.

28. An important driver of this policy shift was the problem of surplus agricultural land in Europe. The 2nd Report of the Agriculture Committee of the House of Commons reported that there could be anything from one million to five million hectares of surplus agricultural land by 2015 (House of Commons 1990). It went on to suggest that "the most significant alternative land use in the next twenty years is likely to be forestry" and that there was now "the scope, if not the necessity, for a far greater emphasis on the role of woodlands and forestry in the process of rural development" (House of Commons 1990 xv). The process of change is, however, likely to vary regionally with, for example, conversion in Wales being limited by the need to retain the small area of high quality agricultural land found here.

29. These ideas about the perceived surplus of agricultural land meant that one of the principal locational factors affecting forestry throughout the twentieth century, that afforestation should only take place on 'unimproved land' of low agricultural value, was no longer of paramount importance. This change underlay many of the detailed policy changes that took place through the 1990s.

Table 2: Expected trends and potential analyses using CS2000 for the forestry driver

Woodland type & context	*Expected trend*	CS2000 Analysis
Coniferous afforestation of semi-natural habitat	*This declined through the 1990's. There were considerable regional variations with most taking place in upland Scotland and to a lesser extent, Wales. Virtually non-existent in upland England. Negligible in the lowlands on heaths and semi-natural grassland. Particular attention should be paid to measuring the success of policies designed to encourage native Scottish pine woodland.*	Change in stock of Coniferous Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Coniferous afforestation of 'improved' habitat	*Although policies were designed to encourage this type of afforestation, relatively little took place in the decade because the level of grants did not outweigh the decline in the capital value of farmland upon planting. Small patches of this afforestation occurred in the lowlands. There may be a concentration in areas designated as Community Forests.*	
Broadleaved/mixed afforestation of semi-natural habitat	*There may well have been an increase in this type of afforestation in response to special schemes designed to encourage the establishment of native mixtures of broadleaves, such as upland birch woodlands in Scotland. Many new small farm woods may have been established on remaining fragments of semi-natural grassland.*	Change in stock of Broad-leaved Mixed and Yew Woodland Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Broadleaved/mixed afforestation of 'improved' habitat	*If policies have been successful, one would expect a considerable increase in the establishment of new broadleaved mixed woodland on improved land. This is likely to consist of many new small farm woodlands, used primarily for game or landscape purposes. These may well be concentrated in areas where game shooting is particularly important (i.e. parts of East Anglia; Gloucestershire). There may also be concentrations in specially designated areas such as Community Forests and the National Forest.*	
Natural regeneration of woodland on semi-natural habitat	*This will occur in relatively small patches across the UK. It is particularly likely on ungrazed, steeply sloping valley sides in the uplands of Scotland, Wales and northern England; on lowland ungrazed heaths and commons; and on ungrazed patches of semi-natural grassland such as steep slopes in the Downs and Cotswolds.*	Separate analysis of shrub category within Broad-leaved Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which regeneration has occurred.
Natural regeneration of woodland on 'improved' habitat	*Generally very small-scale. There will be a tendency for some areas of managed natural regeneration to be found adjoining existing semi-natural woodland if policies designed to increase the size of such woods are working.*	
Loss of woodland to improved agriculture	*This is likely to be rare in England, with the conversion of woodland to arable land virtually halted. It is most likely to take place in heavily grazed parts of the uplands.*	Use flow accounts to identify types of land on which deforestation has occurred.
Loss of woodland to semi natural habitat	*This will have taken place frequently, but usually on a small scale. It is most likely to occur where there are specific conservation schemes to remove plantations and natural regeneration in order to restore lowland heaths, chalk grassland, sand dunes and other valued habitats.*	
Woods showing little change	*Many areas of woodland will show little change over the decade. This may be because of the stage in the rotation, i.e. even-aged plantations may show little discernible change from pole stage onwards until perhaps a major thinning. Some mixed broadleaved woods that are carefully managed under say a continuous cover system, will show little change even though valuable timber may have been removed. Other woods may show no change because they are unmanaged. With the move to more subtle forms of woodland management there is a strong likelihood that woods which are managed, but which show no discernible change, will be increasing in number.*	Analysis of CS2000 Indicators of Biodiversity for woodland broad-habitat, with linked analysis to structural information provided by NIWT.
Conversion of coniferous woodland to broadleaved woodland	*This should be taking place on a fairly extensive scale as formerly mixed plantations made up to the 1970's have their coniferous element removed. This is particularly likely on woods on traditional landed estates where mixed plantations have been very popular. It will also take place in mixed plantations made on ancient woodland sites.*	Use flow accounts to identify pattern of exchange of stock between Broad-leaved and Conifer Broad Habitats. Change in frequency of CVS classes.
Conversion of broadleaved/ mixed woodland to coniferous woodland	*This should be a rare occurrence especially in England. It is most likely to take place in larger upland plantations where extensive restructuring is taking place at the end of the first rotation.*	

30. In the 1980s there had been there had been a resurgence of interest in the management of broadleaved woodland. This renewed interest continued through the 1990s, which moreover saw an increased emphasis on the management of all types of woodland in the interests of nature conservation, landscape, recreation, shooting and the provision of public access. The shift in aims of management reflected changing demands of the public and was reinforced by a range of new and modified policies introduced by the Forestry Commission, English Nature, the Countryside Commission and their successor organisations. This shift has affected, to differing degrees, all types of woodland owner from large commercial forestry concerns through to the owners of small woodlands.

31. The physical manifestations of this general shift in management aims included subtle changes to the size and shape of individual woodland stands; changes in the mixtures of species established; changes in establishment techniques, with a move away from plantations towards the use of natural regeneration; and changes in thinning regimes. **We consider that several of these changes could be explored using CS2000 data, and in Table 2 we set out our recommendations for further work using these data.**

32. In addition to the analytical opportunities set out in Table 2, we also recommended that the analysis of CS2000 data be undertaken in conjunction with the analysis of the Forestry Commission's *National Inventory of Woodland Trees* (NIWT). The latter is a particularly useful source of information on the structural properties of woodland and their use, which can be used alongside CS2000 to make a more complete analysis of the qualitative characteristics of the woodlands at national and regional scales.

33. Finally, we considered how the analysis of woodland characteristics within the CS sample squares might be improved. It was noted that over the decade there has been a marked trend for woodland ownership to become increasingly distinct from farm ownership. More woodland areas are in the possession of specialist organisations such as the Woodland Trust, wildlife and other conservation trusts, as well as small private owners. **It was recommended therefore that, if a follow up study to the *Processes of Countryside Change* study is undertaken, then its scope should be extended to include interviews with all woodland owners in a survey square, as well as farmers.** This would enable changes within farm woodlands to be separated from those taking place in other types of woodland, and a better understanding of the factors shaping woodlands to be developed.

Next Steps

34. Countryside Survey 2000 has not been designed to look explicitly at the *causes* of change. Rather, its purpose is to *describe* change in terms of a large number of important ecological features associated with the wider countryside. The survey data can, nevertheless, give us some important insights into some of the drivers of change, particularly where it can be combined with other information.

35. This study focused mainly on socio-economic and policy issues relevant to the agricultural and forestry sectors. Although other types of driver have to be considered, it is clear that even taking these two areas alone, there is scope for further, more detailed analysis of CS2000 information.

36. In the short term it would be valuable to explore how the key trends in agriculture and forestry agricultural and forestry that occurred during the 1990s are picked up in the results of CS2000. The extent to which one may make a 'read-across' with other information sources such as the June Census, the Farm Business Study and the National Woodland Inventory, for example, would clearly be helpful for the CS2000 user community. Not only would such work inform users about the types of change detected by the Survey. It would also help us define a wider range of indicators that could be used to describe the condition of the wider countryside that would be useful for policy purposes. **We recommend that such work can be taken forward in the short to medium term, once CS2000 has been launched in November 2000.**

37. In the longer term it is also clear that there is a strong justification for undertaking a follow-up to the socio-economic survey carried out in the CS sample squares in 1993. Although an important element would be to collect information about the farm enterprises within the survey squares, we have argued that any further work should taken in a wider range of issues that those affecting agriculture. **We recommend that *all* types landowners and managers are interviewed. The goal should be to build up a much better understanding of the rural context of the CS sample squares, and hence the socio-economic and policy factors likely to shape change within them.**

38. CS2000 is the fourth of its kind. With each successive survey the scope of the work programme has been enlarged and its concepts refined, to ensure that the outputs are relevant to current science and policy needs. This study has shown that the framework in which we seek to understand countryside change is evolving rapidly. Previous Countryside Surveys have been based on a rigorous understanding of the environmental setting in which the survey data have been collected. As we look to the future, it is clear that we also need to understand more completely the social and economic situation in which that change is occurring.

39. Agriculture and forestry will remain important drivers of countryside change. Current trends suggest, however, that many other factors, including the growth of rural industry, social and demographic change, and the relationship between town and country, will control the stock and quality of the habitats and associated landscape features that make up the wider countryside. This study, and the work we suggest should follow from it, will provide the foundation for helping us define our future monitoring needs. Ultimately, it may help us gain a better insight into the environmental consequences of these other, important socio-economic drivers of countryside change.

Chapter 1. Introduction

Background

1.1 An understanding of the drivers of countryside change is essential if we are to interpret the growing body of information that is becoming available about the rural environment. In this study we focus, in particular, on Countryside Survey 2000 (CS2000), and explore what it can contribute to our understanding of the social and economic factors that have influenced the character of the wider countryside during the 1990s. We also look to the future and ask what kinds of data and analysis might be relevant for understanding current trends and policy directions.

1.2 Countryside Survey will provide a rich body information about the rural environments of Britain[6]. It builds on earlier surveys undertaken by the Institute of Terrestrial Ecology[7] in 1990, 1984 and 1978 (see Barr *et al.* 1993), and will, for example, provide information on the current stock and recent changes in the extent of the broad terrestrial and freshwater habitats that make up the countryside. It will also allow us to say something about the changing quality of these habitats by reference to some of the species that we find within them.

1.3 In designing CS2000, it was always recognised that the problem of understanding the drivers of countryside is a key policy issue (Haines-Young and Swanwick, 2000). Following the 1990 Survey, the ECOFACT Programme was set up to begin to examine the ecological processes that underlay the previous changes detected. For CS2000, it was suggested that this type of analysis should be extended to include the major social, economic and policy drivers of change.

1.4 In order to understand how to take this work on the drivers of countryside change forward, DETR has let a contract to a consortium lead by CEH. This work will review what CS2000 can tell us in terms of understanding the underlying social, economic and policy factors that initiate countryside change. The consortium includes social scientists in CEH, the Universities of Nottingham and Cambridge, Wye College, and the Countryside and Community Research Unit (CCRU) at Cheltenham and Gloucester College of Higher Education.

Project Aims and Work Programme

1.5 This work has been commissioned at a time when the data collection phase of CS2000 has been completed. At the present time these data are now being analysed and the first results of the survey will be published in November 2000. This project seeks to assist and extend these activities.

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[6] See http://www.cs2000.org.uk

[7] Now Centre for Ecology and Hydrology (CEH)

1.6 The specific aims of the project are to:

i Support the presentation of the first outputs from Countryside Survey 2000 with a detailed review and analysis of the social, economic and policy drivers relevant to understanding the patterns of change detected since the earlier surveys; and,

ii Shape DETR's long term research strategy in relation to the social, economic and policy drivers of countryside change, so that more effective and integrated policies for achieving sustainable development can be achieved.

1.7 As these aims indicate, the initial focus of the work is on the immediate outputs from CS2000. However, as recommended in the CS2000 Scoping Study, work such as this is needed to look at Countryside Survey in the wider context of countryside policy. In order to realise the value of these data we need to understand not only what they can tell us directly, but also how we can link them to other sources of information to gain a wider view of changes in rural areas. Moreover, the scope and character of information being collected needs to be reviewed periodically to ensure that it continues to be relevant to current research and policy agendas.

Work Programme

1.8 In designing this project we have sought to strike a balance between the short-term review and analysis requirements, that will inform the initial phase of CS2000 reporting, and the more strategic aspects of DETR's research agenda.

1.9 The work programme is made up of three elements. The first concerns the general issues of Rural Change and Sustainability. This element of the study will develop a conceptual framework in which the general socio-economic trends and pressures in rural areas can be understood. The outputs will provide information on the changing policy context in which the outputs of CS2000 can be set, and make recommendations on how these data can be used in relation to DETR's broader research needs.

1.10 The other two modules, which focus on agriculture and forestry, have been designed to examine some of the general themes covered in the first module in greater depth. By reviewing changes in each of these sectors the work will explore how we might pick up the consequences of the changing social, economic and policy drivers in the outputs from CS2000. In the long term, the goal is to focus on how other research or other data can be used alongside CS2000 to develop and broaden its policy relevance.

1.11 In addition to the three substantive modules, there is a fourth covering the management and co-ordination of the project. An important aspect of this module was a workshop held in May 2000, that reviewed the first outputs from the study. The results of the workshop have been used to help prepare this Report. The discussions were valuable because they allowed the outputs

from the study to be subject to peer evaluation and thus ensure that the conclusions we draw are robust.

1.12 In addition to the formal consultation built into the work programme, this study draws upon the wider set of consultations that have been undertaken as part of the CS2000 reporting process. This has included input from members of the CS2000 Advisory Group, and the Policy Liaison activities undertaken as part of the CS2000 Work Programme (Module 16). A particularly valuable source of information from the latter has been the results of the consultations undertaken by Briggs (Briggs, 2000).

1.13 This Report also draws on the wider literature relating to countryside change. A key document in the context of this study is Firbank *et al.*, (2000), which sets out an analysis of the potential causes countryside change in relation to Countryside Survey 1990 (CS1990). Clearly an investigation of the factors that have shaped patterns of change during the 1990s must consider how the key drivers may have changed over time. Firbank *et al.* (2000) provide a useful summary of a range of issues.

1.14 The focus of the study by Firbank *et al.* (20000) was on the extent to which the 'Indicators of Biodiversity' (IBDs) developed for the analysis of CS vegetation data could be used to explore the impacts of the various drivers of countryside change. The present study partly develops and extends this work, in that the focus of this study has been on the analysis of changes in the post 1990 period. This study also goes more widely, however, in that it considers what types of analysis of the drivers might be attempted using both vegetation ***and*** habitat information.

Scope and Constraints of the Study

1.15 Analysis of the factors that have shaped the countryside during the last decade is complex. The issues that need to be considered clearly go much wider than those that are relevant to understanding the outputs from CS2000 itself. The dilemma to be resolved in a study such as this, is just where to set the boundaries of the work.

1.16 In order to constrain the work to that which might practically be achieved in the time available, the specification for project specifically excluded consideration of biophysical drivers such as pollution loads, even though they may have been modified by policy measures during the 1990s. It was felt that these issues could be more effectively dealt with as part of other work. Instead, it was decided to focus initially on understanding the social, economic and policy factors affecting agriculture and forestry since 1990 and therefore the types of change that might be detected by CS2000. In order to broaden the perspective, however, it was proposed that these drivers should be looked at in the context of the ideas about rural sustainability that had developed over the last decade.

1.17 Even though our study was constrained by considering what can be understood about the drivers of change using CS2000 data, it must be recognised that the analysis is problematic in several respects. As the

CS2000 Scoping Study emphasised (see Haines-Young and Swanwick, 2000, Chapter 7) three main factors combine to make the analysis the drivers of change complex:

(i) The various Countryside Surveys have not been designed to look at the *causes* of change, but to *describe* change in terms of a number of important features of the wider countryside. CS2000 is no exception. Although ideas about causation have been implicit in its design, much of the information that we would need to make a full causal analysis is not available from the Survey itself. Instead, if we are to build up a picture of the major drivers of change, we will often have to link CS2000 data with other sources of information to develop an understanding of causal mechanisms.

(ii) The Survey was not designed to look at *all aspects* of the wider countryside, so that it may only be possible to gain a partial insight into the causes of change. The effects of some drivers may be undetectable, and others may only be covered in a partial way.

(iii) The changes detected by CS2000 may be the result of the *combined* impact of several drivers so that it may not be possible to attribute change unambiguously to any one factor. As a result, although we may seek an understanding of the causes of the changes detected by CS2000, outputs from any analysis may at best only be 'indicative'. Certainly any results will require the application of considerable judgement before they can be used in a policy context.

1.18 Given these difficulties, three key questions of increasing generality formed the core of our investigation. The analytical strategy adopted was to consider first, what relationships might be established between the data collected by CS2000 and the socio-economic drivers affecting agricultural, forestry and the wider rural economy. The next step was to consider what insights might be developed by linking these data to other sources of information about the countryside. Finally, we asked to what extent CS2000 and these other data sources were adequate given current research and policy concerns.

1.19 These three questions provide the framework for this Report. In Chapter 2 we consider CS2000 in the context of ideas about rural sustainability. In Chapters 3 and 4 we make a more detailed investigation in relation to the agricultural and forestry drivers. In the final part of this report we consider possible directions for a wider research programme on the drivers of countryside that could be supported by DETR and its partners.

Chapter 2. Rural Sustainability and Countryside Change

Introduction

2.1 A key theme of environmental debates in the 1990s is that of 'sustainability'. In this chapter we trace both the way the concept has shaped rural policy and what impacts these policies might have had in the context of understanding the drivers of countryside change.

2.2 The review brings together the material provided by the commissioned study of Seymour (Appendix 1) with other sources. We will argue that while the concept has been a major factor shaping environmental, economic and social policies that are relevant to the countryside, the extent to which these policies have resulted in major changes in the character of rural areas is probably limited. This situation reflects the fact that major policy initiatives involving sustainability were not introduced until quite late in the decade, and that it will take some time for their effects to be observed. The chapter will conclude by making recommendations on how CS2000 information can be used in the context of present policies towards sustainability, and what might be done in the future in terms of additional data analysis and data collection.

Evolving Policy Frameworks

2.3 Our review of rural sustainability and countryside change suggests that there are three key issues that need to be considered if one is to understand the current policy and organisational contexts of CS2000. These are institutional change, the evolution of the sustainability paradigm itself, and the need to measure sustainability. Each is considered below. The discussion provides a framework in which the role of CS2000 can be explored.

Institutional change

2.4 As the review of Seymour (Appendix 1) suggests, in the 1990s uptake of the principle of sustainability into EU and UK policy was slow. As a result, it may be too soon to see the effects of policies in terms of real changes 'on the ground'.

2.5 At the European level, for example, the Single European Market Act of 1987 only 'urged' member states to incorporate environmental considerations into all aspects of policy. It was not until 1992, with the Maastrict Treaty, that this principle was amended so that states were 'required' to do so. Although the Fifth Action Plan for the environment was entitled 'Towards Sustainability', only in 1997 with the Amsterdam Treaty, did the EU finally commit itself institutionally to the principle of sustainable development.

2.6 In the UK, although the uptake of the sustainability concept proceeded a little faster than elsewhere, a similar situation prevails to that at the European level. The White Paper *This Common Inheritance*, which set out Britain's environmental strategy up to 2000 in preparation for the Rio Conference in 1992, was published in 1990. It was followed in 1994 by the publication of

Sustainable Development: The UK Strategy, which presented a policy framework on sustainability to fulfil part of the UK's commitment to reporting progress with Rio initiatives. However, while it accepted the demand management concept, established a land fill tax, and set up new institutions outside government departments to promote both the policy and its application, it lacked targets and budgetary commitments. It also relied heavily upon voluntary adoption of environmental best practice rather than legally based regulation. Local Agenda 21 responsibilities were, for example, given to local authorities but no extra funding was provided from Central Government. The voluntary approach to the implementation of sustainability was confirmed in the review of the *Strategy* in 1996.

2.7 Given the pace and scale of change resulting from the acceptance of the sustainability during the 1990s, it is hardly surprising that some commentators have argued that progress has been limited. The situation in the UK is summed up by Voisey and O'Riordan (1997) who suggest that by 1996 the White Paper process had had 'little real effect in terms of integrating environmental considerations into other policy areas, and even less with regard to sustainable development'.

2.8 Although it may be too soon to see the effects of recent policy changes, the developments that have occurred during the 1990s are important for studies such as Countryside Survey. For, as Voisey and O'Riordan, (1997 p.29) also note, the White Paper process established a 'significant institutional structure for the implementation of sustainable development in the future'. **Thus, as we look towards the analysis and publication of CS2000 results, it seems clear that while we may not detect the effects of present policy, these data are likely to be an important base-line against which future change can be judged.**

2.9 A detailed account of the institutional changes that took place in the UK as a result of Governments' commitment to sustainability is provided by Seymour (Appendix 1). If we consider the role of CS2000 in this new institutional environment, three issues are significant:

(iv) **The number and range of organisations with an interest in environmental and/or rural issues has grown.** For example, a notable feature of the institutional changes that took place during the 1990s was the break-up of national organisations such as the Nature Conservancy Council into separate country level organisations. The process of devolution was formalised at the end of the decade with the creation of the Scottish Parliament, the Welsh Assembly and the establishment of Regional Development Agencies in the English regions. ***Thus the diversity of the potential 'user community' for Countryside Survey data has grown, as has the range of requirements and expectations.***

(v) **There has been an increased attention to local and regional character.** The importance of addressing policy issues at regional scales has clearly been recognised formally through the devolution process. However, even within the separate country units there is

growing recognition that local distinctiveness has to be considered in the development of countryside policy. In England, for example, we have seen the publication of the *Character Areas* Map, by the Countryside Agency and English Nature. The Map seeks to divide the country into 'coherent landscapes types, that pick out associated patterns of wildlife, natural features, land use, human history and other cultural values *that are important to people.*' (Countryside Commission & English Nature, 1996). Elsewhere we see the importance of regional character being emphasised though the delivery of the Biodiversity Action Plan though a series of local action plans and through the implementation of Local Agenda 21. ***The implication of such developments for a national exercise like CS2000 is that in the short term, these data must be presented in such a way that their local relevance can be understood. For the future, it may well be that the ability of the survey to provide information at local scales will have to be improved if such national scale surveys are to maintain their wider policy relevance.***

(vi) **There is a growing emphasis on the integration of policy across institutions and issues.** Some of the institutional changes that occurred during the 1990s were explicitly designed to provide a more holistic approach to the resolution of environmental issues. In 1996, for example, the National Rivers Authority was incorporated into the Environment Agency along with Her Majesty's Inspectorate of Pollution (HMIP), the Waste Regulatory Authorities and some small units from the DoE. This new cross-source agency was a major institutional step in facilitating government goals of integrated pollution control. Other key institutional changes that sought to promote more integrated approaches included the merger of the Countryside Commission and the Rural Development Commission to form the Countryside Agency in 1999. ***The implication of 'joined up government' for an exercise such as CS2000 is that, if these data are to be relevant to current policy concerns, then they must be capable of being linked to other sources of information so that effective integration can be achieved.***

Environmental, Economic and Social Sustainability

2.10 In parallel to the institutional changes that took place during the 1990s we also saw an evolution of the concept of sustainability itself. This conceptual change was just as fundamental as that involving our organisations, and like these institutional changes they force us to rethink the role of studies such as CS2000.

2.11 As Seymour (Appendix 1) suggests the UK interpretation of 'sustainable development' was strongly influenced in the late 1980s and early 1990s by neo-classical environmental economics approaches to reconciling environmental and economic concerns. The paradigm recast of parts of nature as 'natural assets' and suggested market-led mechanisms for giving them a price. The most prominent example was *Blueprint for a Green Economy* (Pearce, *et al* 1989).

This helped establish a strong trend of playing down the social aspects of sustainability.

2.12 Voisey and O'Riordan (1997) concur in this analysis. From their review of the situation prevailing in the mid-1990s they conclude that in the UK sustainable development was 'defined narrowly with little recognition of the implications for wider society and individual behaviour, and the radical agenda of equity, democracy and empowerment' (Voisey and O'Riordan 1997, p.27).

2.13 The situation at the end of the decade is however, quite different, as is illustrated by the approach set out in the Government's most recent statement of the UK strategy for sustainable development *A Better Quality of Life* (DETR, 1999a). The latter describes the new set of guiding principles and approaches to be applied in the UK, which reflect both the key themes from the *Rio Declaration on Environment and Development* and the wider debates that took place during the 1990s. The framework gives 'full weight' to economic, environmental ***and*** social aspects of sustainable development, stressing the need to maintain economic, environmental and social capital. It argues that 'people must be placed at the centre'.

2.14 The development of a stronger social dimension to policies for sustainable development can, in fact, be seen in the evolution of rural policy over the last decade. The 1990s also saw, for example, major changes in the Common Agricultural Policy (CAP) and they way it was used to promote rural development.

2.15 Until the 1980s, the Community had regarded the CAP as the main vehicle for promoting rural development strategies. Thinking was based on an 'exogenous model' of rural development and the idea that agriculture lies at the heart of the rural economy. Problems of rural development were to be addressed principally through agricultural industrialisation and specialisation and the encouragement of labour and capital movement from urban to rural areas.

2.16 From 1979 there was some modification of this approach through the pursuit of Integrated Development Programmes in Less Favoured Areas. However, by the late 1980s it was recognised that employment in agriculture and other primary industries was in widespread decline in rural Europe, and that new industrial and service sector jobs were increasing. This, together with mounting pressures to reform the CAP in the face of food mountains, emerging environmental criticisms and the Single European Act, led to a major new statement on rural policy in *The Future of Rural Society* in 1988.

2.17 *The Future of Rural Society* laid out the basis of EU rural policy for the 1990s. The statement highlighted the need to target specific problems in specific areas rather than focusing on individual economic sectors. The emphasis was strongly upon the locality and bottom-up development:

> *'Local rural development does not mean merely working along existing lines. It means making the most of all the advantages that a particular local area has: space and*

landscape beauty, high-quality agricultural and forestry products specific to the area, gastronomic specialities, cultural and craft traditions, architectural and artistic heritage, innovatory ideas, availability of labour, industries and services already existing, all to be exploited with regional capital and human resources, with what is lacking in the way of capital and co-ordination, consultancy and planning services brought in from outside' (Commission of the European Communities, 1988:48).

2.18 The major vehicle of this new rural regional development emphasis was a reformed and expanded European Structural Funds package and the introduction of some smaller Community Initiatives. The first round of Objective 5b funding in 1988 led to the designation of four areas: Dyfed-Gwynedd-Powys in Wales; the Scottish Highlands and Islands; Dumfries and Galloway; and parts of Devon and Cornwall. In 1994 the designations were extended to create 11 Objective 5b areas in the UK. In addition, the Scottish Highlands and Islands were redesignated as an Objective 1 region (Seymour Appendix 1). The growing emphasis on rural as opposed to explicitly agricultural, development was most recently reaffirmed in by the EU in the 1996 Cork Declaration, *Rural Europe - Future Perspectives.* Furthermore, the latest *Agenda 2000* reforms to the CAP have introduced a Rural Development Regulation and compulsory Rural Development Plans.

2.19 In the UK, the need for a strong social focus in rural policy has been most recently seen in the consultations leading up to the next Rural While Paper for England (DETR, 1999 b & c). The five main elements of the approach proposed by Government on which they sought comment are summarised in Table 2.1. Environment is seen as but one component. As the summary of responses showed (DETR 1999c) this vision was largely confirmed, although it was noted that opinions varied as to what the priorities should be. Views included the assertions that:

- Agriculture should have more prominence;
- Protection and enhancement of the countryside, conservation of protected landscapes and biodiversity should be the priority;
- Economic regeneration, community involvement, job creation, transport and access to services should be key elements.

Table 2.1: The framework for consultations leading up to a Rural White Paper for England (after, *Rural England: A Discussion Document*, DETR 1999b)

The five elements of the 'vision for the countryside' on which the Government sought comment were:

- *The Government believes in a **living countryside**, with thriving rural communities in which all residents are included, and in which there is access to services, such as healthcare, schools and shops.*
- *It should also be a **working countryside**, contributing to national prosperity as part of a competitive economy, with a balanced mix of businesses (including land-based industries) jobs and homes, reducing the need to commute long distances.*
- *At the same time, the Government recognises **the interdependence of town and country**, and wishes to strengthen the relationships between the two.*
- *The Government also wants a countryside in which the **environment** is properly protected and its qualities enhanced in a way which sustains the lives of those who live and work there or visit it.*
- *Finally, it should be a **countryside for all**, where there is plentiful access so that the character of the countryside can be enjoyed widely.*

2.20 At the time of this Report, the Government has not published the Rural White paper for England. Nor is the future shape of rural policy in Scotland and Wales clear, for their legislatures had yet to make decisions in this area. However, what does seem certain is that, notwithstanding differences in opinion about where the emphasis should lie, policy will have to take a more balanced approach to social, economic and environmental issues in rural areas. Although agriculture remains an important driver of countryside change, the contribution that this sector makes to the 'rural economy' is small and declining. For example, the Countryside Agency have reported that by 1991, rural areas in England had a 'similar mix of employment sectors' as the country as a whole (Countryside Agency, 1999; see also, Doyle, 2000). As Seymour (Appendix 1) points out, the dynamics of other drivers, such as the growth of rural industries and socio-demographic change are just as significant in shaping the character, if not the physical characteristics, of rural areas (Table 2.2).

2.21 The material provided in Table 2.2 and the more detailed discussion in Appendix 1, clearly points to some analyses that can be undertaken in the short term, once CS2000 results are available. In the main these would involve making regional comparisons in addition to those currently proposed for analysis of these data based on environmental zones. **In the longer term, however, it would seem worthwhile to explore how the rural context of the survey squares could be understood, so that more powerful statistical stratifications of the survey data could be attempted.**

2.22 The CS field survey squares have been selected in relation to an environmental stratification of GB and so they may not be representative of the full range of social and economic conditions associated with the wider countryside. **We recommend that a future study be undertaken to determine just what part of the 'rural spectrum' Countryside Survey actually samples.** Such work would be valuable because it would place the survey data in its wider rural context and enable the relationships between environmental change and other drivers of change to be better understood. It is suggested that the analysis of social, economic and demographic information about the local area in which the sample square occurs could be used for this work.

2.23 The work could build on the early typologies of rural areas devised by Cloke (1977), Cloke and Edwards (1988) and others (eg Webber and Craig, 1977, Dunn et al 1981). These studies used factors such as population density, distance from an urban centre and socio-demographic attributes to derive measures or indices of 'rurality'. However, given the time that has elapsed since this work was published, it seems clear that some revision of the approach would be necessary. In the design of future work, two aspects need to be considered.

2.24 First, the availability of the 2001 Census will provide an important opportunity for a long-term study of social and demographic change to be made. Clearly these data should be used in the construction of any typology that might form the framework for the analysis of CS2000 data. Earlier census information can be used to characterise developments up to 1990 and

Table 2.2: Summary of trends in population and land use within rural areas (After Seymour, Appendix 1)

Driver	Trend
Population	Strong counter-urbanisation trends observed in 1970s are dampened in the 1980s, but size of the rural population relative to urban areas continues to grow in the 1980s and 1990s; significant regional and local differences: ➢ *Most of this rural growth was confined to areas south of the Wash, in a belt extending from East Anglia through Northamptonshire and Oxfordshire to Wiltshire, Dorset and Hampshire.* ➢ *Outliers of significant rural growth found in parts of the South West, mid-Wales and the Welsh Marches.* ➢ *In Scotland similar patterns of higher growth in rural areas in 1990s, due to urban-rural migration in central belt. Such growth appears to reverse long-term trend of depopulation.*
Land use	By 1996, there were nearly 4 million dwellings in rural England. This constitutes a fifth of the country's total housing stock: ➢ *Five per cent of this stock was built between 1991 and 1996.* ➢ *Regional variations in house building are strong. For example major development has occurred in the South East (excluding London).* ➢ *The percentage of land for new residential development taken from rural land uses fell from about 53% in 1985 to 43% in 1997 (of this 37% was from agriculture, with the remaining 6% from a mix of other rural land uses).* ➢ *In terms of residential development in urban and rural areas in 1997, however, 54% of the land used had not been previously developed, but strong regional contrasts. In 1995 the figures ranges from 81% in London and 54% in the North West to 37% in the East Midlands and 32% in the South West.* ➢ *Evidence of a slowing trend of land moving from rural to urban land use classes; greater emphasis on re-use of land in planning guidance.* ➢ *Between 1985-94, agriculture was the greatest loser in terms of transfers of land from rural to urban uses. The largest loss was to residential use followed by transport and utilities, industry and commerce, and community services.* ➢ *A decline in traditional land-based rural industries and a growth in service industries in rural areas. Whereas nationally there has been a decline in manufacturing employment, rural England has experienced significant growth.* ➢ *Expansion of tourism in rural areas* In Scotland: ➢ *Demand for housing in more peripheral areas has mainly been met through the sale of vacant agricultural dwellings or the upgrading or conversion of older rural properties.* ➢ *However, in areas closer to the central belt, the stock of such buildings is limited and the greater rates of in-migration have resulted in increasing house prices and the need for increased provision of social housing.* ➢ *An increase of 36000 jobs in schools, hospitals and social services and of 5000 jobs in business services (excluding hotels and catering), and that evidence points to the continuation of these trends in the 1990s.* ➢ *Expansion of tourism*

Table 2.3: Driver-State-Response Indicator Model (After OECD, 1994)

Driving force indicators	State indicators	Response indicators
Describe what is causing environmental, economic or social conditions to change	Measure the quality of the environment in agriculture, the stock and quality of natural resources available to it and the wealth and welfare that agricultural businesses generate	Report the actions being taken by policy makers and farmers to respond to these driving forces

the changes that have taken place since the time of the last census. The work could also draw upon other rural information, such as DETRs Land Use Change Statistics in England, to characterise the dynamics of the land cover in and around the survey squares.

2.25 Second, the work should be undertaken in the context of any response to the Performance and Innovation Unit's (PIU) recent report on *Rural Economies*. This drew attention to 'the lack of a consistent definition of rural areas' and recommended that the Countryside Agency, ONS, DETR and MAFF 'agree a small set of rural definitions', which they will adopt themselves and promote to other organisations. At the time of this Report no definitions have been agreed, but preliminary consultations suggest that a typology could be constructed that would enable the classification of administrative areas, such as parishes, wards, local authority districts, Census enumeration districts, and post-code areas. **Such work would also provide the basis for the analysis of structured sample surveys, such as CS2000, and allow the socio-economic context of the Survey to be better understood.**

Measuring sustainability

2.26 A third key feature of the recent evolution of policy in the area of rural sustainability has been the development of indicators. As is noted in the document *A Better Quality of Life* (DETR 1999a), sustainable development objectives are very broad, and to deliver them society must focus on specific issues and themes. It is argued that one way to do this is through finding ways of measuring sustainability that 'help identify areas for action and the connections between them (DETR, 1999a, p13.). Thus, in the UK in the 1990s, we have seen the development of a suite of indicators that can be used to characterise progress towards sustainability, both in general and within particular economic or environmental sectors.

2.27 The conceptual basis for the development of indicators in the UK and the EU has been the OECD's Driver-State-Response (DSR) Model (see Table 2.3, and OECD 1994, DETR 1998 and MAFF, 2000 for more detailed discussion). The most recent suite of general indicators at the national scale was that contained in *Indicators of Sustainable Development for the UK* 1996 (HMSO, 1996), and the further refinement of the approach involving the identification of 15 overview or 'headline indicators' in 1998 (DETR, 1998). In the rural sector, more specific indicators have been developed through the

Table 2.4: Indicators of Sustainable Agriculture (After MAFF, 2000)

	Indicator	Driving force	State	Response
1	*Agricultural assets and liabilities*		●	
2	Age of farmers		●	
3	Percentage of tenanted land		●	o
4	EU Producer Support Estimate (PSE)	●	o	
5	Payments to farmers for agri-environment purposes			●
6	Total income from farming	o	●	
7	Average earnings of agricultural workers	o	●	
8	Agricultural productivity			●
9	Agricultural employment		o	●
10	Adoption of alternative farm management systems			●
11	Area converted to organic farming			●
12	Knowledge of Codes of Good Agricultural Practice		●	
13	Pesticides in rivers		●	
14	Pesticides in groundwater		●	
15	Quantity of pesticide active ingredients used	●		
16	Spray area treated with pesticides	●		
17	Pesticide residues in food		●	
18	Nitrate and phosphorus losses from agriculture	●		
19	Phosphorus levels of agricultural topsoils	●		
20	Manure management			●
21	Ammonia emissions from agriculture	●		
22	Emissions of methane and nitrous oxide from agriculture	●		
23	Direct energy consumption by farms	●		
24	Trends in indirect energy inputs to agriculture	●		
25	Use of water for irrigation	●		
26	Organic matter content of agricultural topsoils		●	
27	Accumulation of heavy metals in agricultural topsoils		●	
28	Area of agricultural land		●	
29	Change in land use from agriculture to hard development	●		
30	Planting of non-food crops			●
31	Area of agricultural land under commitment to environmental conservation			●
32	Characteristic features of farmland		●	
33	Area of cereal field margins under environmental management			●
34	Area of semi-natural grassland		●	
35	Populations of key farmland birds		●	
	●:Primary type of indicator o: Secondary type of indicator			

work of MAFF, in the context of policies on sustainable agriculture (MAFF, 2000), and by the Countryside Agency in their assessment of the state of the *wider rural environment* (Countryside Agency 2000). Table 2.4 shows how the MAFF set of pilot indicators for sustainable agriculture have been grouped according to the DSR Model.

2.28 The selection of indicators has tended to be driven as much by the availability of data as by their theoretical significance, and it is in this context that studies such as the Countryside Survey are often considered particularly useful. Two of the current *Quality of Life Counts* (QLC) indicators, for

example, have been derived from Countryside Survey data, namely plant diversity (species richness) and landscape features (hedges, stonewalls and ponds).

2.29 With the publication of CS2000 data, these QLC indicators will be updated. Moreover, as ideas about how progress towards sustainability can be measured are developed, it may well be that CS can also be used to design new indicators of, for example, countryside quality. However, in the long term, if such measures are to be used effectively for the development and evaluation of countryside policy, the work must go beyond simply describing the state of countryside in ecological terms.

2.30 The DSR model, and its application by DETR, MAFF and others, clearly provides a useful framework in which we can begin to identify some of the factors causing change in the wider countryside. However, while certain drivers are highlighted as significant, there is usually no implication that the set of such indicators is exhaustive. Moreover, the so-called drivers often record only the 'immediate' causes of environmental change rather the underlying or 'ultimate' factors that lead to the modification of environmental quality (cf. Haines-Young and Swanwick, 2000). As a result, the characterisation of the drivers of change using the DSR Model is often quite shallow.

2.31 If a richer theoretical understanding of the drivers of change is to be achieved, we will have to find ways of linking CS2000 and any future surveys of its kind, to other sources of information about the structure and dynamics of the rural economy and society. **We recommend therefore, that such work be undertaken as part of DETR's longer-term research programme.** This work will not only provide the basis for developing new rural indicators, and facilitate modelling the environmental impacts of rural change. It will also ensure that CS2000 data can be considered in relation to the more holistic conception of rural sustainability that is shaping current policy agendas.

Conclusions and Implications

2.32 Our review of rural sustainability and countryside change traces several key, inter-linked developments that suggest we need to rethink the role of studies such as CS2000:

(i) A shift away from a paradigm in which policies towards farming are seen the main vehicle for rural development, to one in which the countryside is seen as a 'rural as opposed to an agricultural space'.

(ii) Growing emphasis on the importance of 'locality', and recognition of the need to target specific problems in specific areas rather than focusing effort on individual sectors.

(iii) The need to promote bottom-up, community-based, voluntary approaches to rural development, rather than the imposition of 'solutions' from outside.

2.33 With the evolution of more holistic, socially based thinking about rural sustainability, and the development of new institutional structures in the UK, there is a need to broaden our approach to monitoring countryside change. **While CS2000 currently provides an insight into ecological change, we suggest that in the future such work must be better integrated with other sources of information about the structure and dynamics of rural communities if we are to gain an understanding of the broader drivers of change.**

2.34 In the context of testing more general ideas about rural development using these data the specific recommendation that arose from the review of rural sustainability was that a much better understanding of the *rural context* of the individual CS2000 survey squares is required. If we are to gain an insight into the causes of change recorded by CS2000 and any future surveys of its kind, then we need to understand the position of the survey squares in both 'environmental' *and* 'rural' space. **Further work is therefore needed to characterise the CS sample squares in relation to different dimensions of rurality, so that a more refined analysis of the socio-economic drivers of countryside change can be attempted.** Detailed consideration of agriculture and forestry as drivers of countryside change and CS2000 is made in the next two chapters of this Report.

Chapter 3. Agriculture as a Driver of Countryside Change

Introduction

3.1 The work within this project that focused on agriculture as a driver of countryside change, consisted of a number of elements (Table 2.1), namely:

- To include all the primary data collected during the *Processes of Countryside Change* Study (Potter and Lobley, 1996) in the CS2000 database;
- To review *Processes of Countryside Change* Study and the possibilities for further analysing these data in the context of CS2000.
- To review of changing structure of agriculture 1990-98 and their possible impact on the stock and condition of the different land cover and habitat types in the wider countryside;
- To review the use of MAFF June Census at the Local Authority and District level and Farm Business Survey (FBS) data and consider how they might help with the detailed interpretation of CS2000 results; and,
- To develop recommendations in relation to the agricultural driver, both in the context of CS2000 and DETR's wider research programme.

3.2 In this chapter we describe the progress that has been achieved in each of these areas, and conclude by developing some working hypotheses that might be used to explored the influence of agriculture as a driver of countryside change. For economy of space, we first report on the data base aspects of the work. We then describe the outputs of the three review studies together, and present these in the context of an overview of the major social, economic and policy factors that have impacted on farming over the period since 1990. This material is then used as the basis of our discussion for future research agendas.

Processes of Countryside Change: Database Development

3.3 As part of the research that grew out of Countryside Survey 1990, Potter and Lobley (1996) undertook a socio-economic survey of 504 occupiers of land in 169 ITE sample squares during 1993. The data from this study are particularly useful because they were tied so closely to the sampling framework used by Countryside Survey. They provided the first detailed and systematic information on the structure of farming operations in the sample squares, and therefore represent a valuable base line against which future changes might be assessed.

3.4 Following the recommendations of the CS2000 Scoping Study, we proposed these data that were acquired by Potter and Lobley (1996) should be

integrated with other information being brought together in the CS2000 database, and that CEH become their custodians. Although the field survey and farm data were linked in the analysis made by Potter and Lobley (1996), there was at the time this study was undertaken, no capability for making such a linkage in the CS2000 database. We considered it essential that this deficiency be overcome in order to provide the foundation for further work.

3.5 Thus as part of this study we commissioned Potter and Lobley to prepare a copy of their survey data in a suitable format that would enable it to be transferred into the CS2000 database. This work has now been completed.

3.6 Appendix 2 describes the format and context of the data arising from the *Processes* Study. These data have been supplied in two formats *SPSS* (version 9.0.0) and Excel 97 file and have been based to the staff within CEH responsible for developing the CS2000 database.

3.7 The crucial step in this work has been to clarify and document how the data from the *Processes* study can be linked to CS data. Four variables can be used to make the association:

- LANDCLAS: ITE land class;
- LANDTYPE: Landscape type (note: the marginal upland and upland landscape have been merged due to low responses in the Upland group);
- SQNO: ITE sample square number; and,
- OCCID: ITE ownership/occupancy boundary unit

The OCCID variable related to a set of digital boundaries present within the 1990 field survey layer of the CS2000 database so that land cover or vegetation data from the various Countryside Surveys can be extracted by ownership unit to be used in the detailed analyses of these data.

Agriculture in the 1990s: Changing Contexts

Information sources

3.8 In order to understand the social, economic and policy factors that shaped agriculture during the 1990s, we commissioned three supporting studies:

- As part of their work on the results of the *Processes* Study, we also asked Potter and Lobley to consider the results of their earlier work in relation to the general changes in farming that had occurred since 1990. We also asked them to suggest what scope there was for further analysis in relation of new information from CS2000. The report arising from this work may be found in Appendix 3.

- To give a broader perspective on recent market trends and emerging issues, we commissioned Winter and Smith to reflect on and extend their recent work in this area (see for example Winter

et. al 1998). The aim here was to explore the environmental impacts of recent changes and those likely to be set in train by the reforms envisaged under Agenda 2000 reforms. The report arising from this work may be found in Appendix 4.

- Finally, to develop an understanding of the links that could be made between national sources of information, such as the June Census and the FBS, and CS2000, we commissioned McNally and Kiddle to provide a statistical summary of the major trends in farming during the 1990s. The work of McNally (Appendix 5) sought to use FBS data to describe changes in the intensity of farming practices over the last decade. Kiddle (Appendix 6) considered the extent to which the June Census data at Local Authority District scales could be used to look at performance and structural and changes in farming on a regional basis.

3.9 The outputs from these studies have been put into a wider context also by considering the key changes in agriculture in the period up to the last Countryside Survey (CS1990). Key sources of information on this earlier period of change were the reviews of Wilkinson (1997) and Little (1998), and the report on the causes of vegetation change undertaken as part of ECOFACT (see Firbank *et al.*, 2000).

Polarisation vs Consolidation, Specialisation and Diversification

3.10 Some commentators (e.g. Firbank, 2000) have described the general changes that occurred in the structure of British agriculture during the 1980s as one of geographical 'polarisation'. Although the term is often used imprecisely, it involves the idea that we observed during this period the increasing regional specialisation of farming activities. In part the process was manifested by reduction in area and number of mixed farms and the increasing dominance of intensive arable farming in those areas of the east and south east of England, where the economic returns from such activities were most profitable. The structure of farming in such areas is contrasted with that of the west and north, where mixed farming gave way to more exclusively pasture-based systems. To what extent has such polarisation been maintained and continued during the 1990s?

3.11 In the analysis that we present below, it will be shown that while the pattern of spatial differentiation of farming activities has been maintained, the processes of polarisation that typified the 1980s has been replaced across all regions by those of :

- ***Consolidation***, that is the tendency towards fewer, larger farms.
- ***Specialisation,*** that is the tendency for farms to concentrate on a narrower range of activities so that labour requirements and other inputs may be easier to predict and control.
- ***Diversification***, that is the tendency for farm enterprises to develop other sources of income though off-farm activities.

3.12 It will be argued that although these changes suggest restructuring in the agricultural industry, there is little evidence that they have been associated with any significant lessening in ***management intensity***. Indeed, there are some signs that the consolidation and specialisation processes have combined concentrated to increase such management pressures in some areas, despite the development of policies to encourage better ***environmental practice*** in farming.

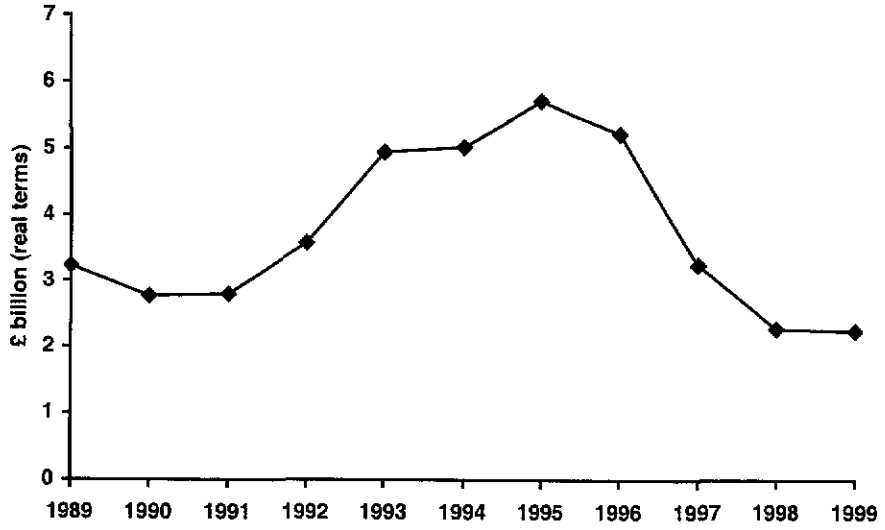
3.13 These changes can mainly be understood in terms of the response of farming to economic pressures during the 1990s. The period since 1993 was one in which a boom was followed, after about 1996, by a deep recession in farming (Figure 3.1). In real terms total farm income doubled between 1990 and 1995, before falling back by over 60% between 1995 and 1999. Faced with declining incomes, farmers appear to have sought strategies for overall cost reduction, efficiency gains and management flexibility. It will be suggested that such pressures appear to have overridden some of the potential gains sought by environmental policy towards agriculture during this period.

3.14 A key policy measure during the 1990s was the reform of the Common Agricultural Policy (CAP) in 1992. The final package of reform measures agreed included:

- a significant reduction in support prices for cereals and beef, with more moderate reductions in dairy price support;
- the introduction of a new system of compensation aids to arable farmers (in the form of the Arable Area Payment Scheme) and augmented livestock premium payments to beef and sheep producers together with a new premium payment to dairy farmers;
- the introduction of a set aside requirement for arable farmers, set at a rate of 15% for the first year; and,
- the introduction of a series of 'accompanying measures' designed to boost rural development and agri-environmental schemes.

3.15 As Potter and Lobley (1993) note, however, while a number of predictions about the impacts of these measures on farming were made (e.g. Oglethorpe *et al.*, 1993), they suggest the policy change has had little effect. They argue that the effects were 'eclipsed at the farm level' initially by the combined impact of movements in world market prices and then by fluctuations in the value of Stirling.

Figure 3.1: Total Income from Farming in UK



Source: MAFF Press Release (see Winter and Smith – Appendix 3)

3.16 The review of Winter and Smith (Appendix 4) also consider that the structural effects of the 1992 reforms of farming to have been modest, even though they fundamentally shifted the balance of the CAP from price support to direct payments. Their review suggests, however, that the scale of the effects varied from sector to sector, and took place against the impacts of a number of other drivers of change.

3.17 In Table 3.1 we bring together material provided by the commissioned studies, to explore both the extent to which changes within farming since CS1990 may be detected in the results of CS2000, and how we might use these survey data to explore possible environmental consequences. The Table is structured around the themes of 'consolidation', 'specialisation' 'diversification' and 'management intensity', and sets out a series of analyses that can be made using CS2000 data in conjunction with other sources of information about farming, such as the June Census and the FBS.

3.18 In the discussion that follows we focus on the period 1988-97, in that these are most likely to be reflected in the information collected during the CS2000 Field Survey in 1998. The longer term implications of the 'crisis' in agriculture at occurred towards the end of the decade will be considered at the end of this chapter, in the context of opportunities for developing the 'post CS2000 research agenda'.

Table 3.1: Summary of recommendations for further work on analysis of agricultural drivers using CS2000 data.

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Consolidation: *What effects does the trend towards fewer, larger farms have for the environment?*	Extend analysis of district level June Census data (1988-97) for holding number, size and mean size to Wales and Scotland.	Determine loss of farm area to non-agricultural cover types by SSR[8], PCC[9] typology and CSEZ[10]. *To what extent do patterns of loss of agricultural land recorded by CS2000 match June Census data?* *What geographical contrasts exist in the conversion of agricultural land to other uses?*	Use follow-up to PCC[3] to determine extent of consolidation by PCC typology. *What is the relationship between of quantitative and qualitative cover change to consolidation process?* *How do patterns of land cover change relate to changing patterns of ownership or tenancy?*
	Extend analysis of district level June Census data (1988-97) for labour inputs and use of contractors to Wales and Scotland. Refine FBS analysis for labour inputs.		Use follow-up to PCC to determine extent of changing labour inputs and use of contractors by PCC typology. *Is there any relationship between cover change and changing labour inputs on farms by region and zone?*
Polarisation & Specialisation: *To what extent are the regional/zonal patterns in farming observed during the 1980s being maintained and what are the environmental consequences?*	Extend analysis of district level June Census data to cover both Scotland and Wales and the period 1984-90 in each country. *Are regional/zonal contrasts in farm structure being maintained, reducing or increasing in 1990s?*	The analysis in the shifts between major agricultural cover types and changes in diversity of cover and vegetation types within the farmed landscape by SSR and CSEZ using CS1990 and CS2000. *Is the structure of the farmed landscape becoming more or less similar between regions and CSEZ post 1990?* *How does environmental stock change by 1993 PCC typology?*	Use follow-up to PCC to determine extent of changes in structure of farm enterprise in relation to EC Farm Type[11] and PCC typology. *Are regional and zonal contrasts maintained or increasing?* *To what extent are farm enterprises becoming more specialised in terms of the range of activities?* *How do changes in farm structure relate to 1993 PCC farm types?*

/cont.

[8] SSR= Standard Statistical Region

[9] PCC=Processes of Countryside Change Study; PCC Typology = Typology of farmers defined by Potter and Lobley (1996).

[10] CSEZ = Countryside Survey 2000 environmental zone.

[11] Categorisation of farm types used in June Census and FBS

Table 3.1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Diversification	Analysis of recent census data on diversification by SSR and CSEZ. Extend analysis of 'local economy' by using data such as *EC Farm Structures Survey, Annual Employment Survey, Labour Force Survey, and ONS classification of local authority districts.*		Use follow-up to PCC to determine extent of off-farm diversification by PCC typology and EU Farm Type. *How have different types of enterprise responded to changed economic circumstances via diversification? What role does off-farm income have in triggering/preventing land cover change?* What is the impact of part-time working on levels of 'environmental management'?
Management Intensity *Fertiliser and pesticides*	Extend FBS analysis of ***fertiliser and pesticide*** inputs using other data sources (e.g. Survey of Fertiliser Use). Attempt regional disaggregation and use levels by farm type	***Expectation:*** little change in impacts of fertiliser and pesticide use. Analysis of the relationship between changes in relevant IBDs within the farmed landscape by SSR and CSEZ. Extend CS2000 IBD system to formally include measures of biological condition of freshwaters. Disaggregate by SSR and CSEZ to examine response in relation to character of farmed landscape.	Use follow-up to PCC to determine changing use of fertilisers and pesticides.
Grazing intensity		***Expectation:*** Little overall change, but developing regional contrasts. Analysis of the relationship between changes in relevant IBD scores by SSR, CSEZ and especially LFA/non-LFA areas.	Use follow-up to PCC to examine changes in intensity of pasture management
Other aspects of farm management	There are other aspects of farm management not captured by JC and FBS – direct analysis using CS2000?	Extend CS2000 system of IBDs to develop composite agricultural intensification index; disaggregate by SSR and CSEZ. Index should include information on level and quality of environmental stock.	Use PCC follow-up to assess how farm types have responded generally to economic changes via intensification of on-farm operations.

/cont.

Table 3.1, cont: Summary of recommendations for agricultural driver

Process or Driver	Recommended Analysis		
	June Census/FBS/Other	**CS2000 'short term'**	**CS2000 'long term'**
Environmental practice/policy	Extend regional analysis JC data for LFA/non-LFA districts to include ESA/non-ESA districts.	Comparison of stock and quality change in 'policy-on' vs 'policy off' situations. Will require access to MAFF Countryside Stewardship and ESA monitoring data. Exploitation of CS2000 as contextual data for agri-environmental monitoring	Use PCC follow-up to look at take up of environmental advice/information, levels of environmental awareness and response agri-environmental schemes by farm types.
		Use CS2000 results to define environmental potential and/or targets for farmed landscape.	Use PCC follow-up to develop 'sustainability profiles' of farm managers and farm enterprises and relationships between profiles and 1993 PCC farm typology and change 1990-98.

a. Consolidation

3.19 The process of ***consolidation*** is evidenced by the fact that over the period 1988-97, all regions have experienced a decrease in the number of agricultural holdings and an increase in mean holding size.

3.20 Table 3.2 shows the information derived from the June Census for the change in farm area and number by SSR. These data show a loss in the total area of agricultural land in England by about 2% over the period 1988-97; this rate of loss maintains the trend observed throughout the 1980s. The highest rates of loss of area were in the North West, South East, South West and West Midlands.

3.21 **The loss of the tilled land and managed grass broad habitats to other broad habitat categories is clearly one that could be explored using CS2000 data, and we recommend that such analysis is undertaken (Table 3.1).** The analysis can be made at the scale of the SSRs and the CS2000 Environmental Zones[12], and should include Scotland, Wales and England. The analysis would establish the extent to which broad trends identified in the June Census could be 'read across' into CS2000. More importantly it would enable a detailed analysis of the exchange of

[12] The four landscape types used for publication of CS1990 have now bee replaced by six environmental zones that nest within the country units. For England and Wales the three zones are: (a) the flat lowlands in England and Wales typical of the south and west; (b) the nearly flat lowlands of the west and central parts of the country; and, (c) the uplands and upland margins. For Scotland the zones are: (d)lowlands; (e) intermediate and islands; (f) highlands.

Table 3.2: Regional changes in the area, number and mean size of holdings in the June Census, 1988-97

Region	Total area of holdings in JC			Total number of holdings in JC			Mean holding size		
	1997	Change 88-97	% *change*	1997	Change 88-97	% *change*	1997	Change 88-97	% *change*
North	1038383	-10784	*-1.03*	11398	-576	*-4.81*	87.62	3.48	*3.97*
North West	425419	-22063	*-4.93*	11177	-1619	*-12.65*	34.97	3.09	*8.84*
Yorks & H'side	1095544	-11277	*-1.02*	16042	-1516	*-8.63*	63.04	5.25	*8.34*
East Midlands	1227769	-18966	*-1.52*	15799	-1572	*-9.05*	71.77	5.94	*8.28*
West Midlands	935525	-24273	*-2.53*	18871	-1063	*-5.33*	48.15	1.43	*2.96*
South West	1802425	-35166	*-1.91*	35603	-1101	*-3.00*	50.07	0.56	*1.12*
East Anglia	989034	-20318	*-2.01*	11421	-1588	*-12.21*	77.59	9.01	*11.61*
South East	1657757	-73731	*-4.26*	24466	-2835	*-10.38*	63.42	4.34	*6.84*
All England	**9173853**	**-216569**	*-2.31*	**143955**	**-11194**	*-7.21*	**60.53**	**3.20**	*5.29*

agricultural land with other broad habitats to be made in a way that is not possible using June Census data alone.

3.22 A key element of this analysis of loss of agricultural land would be to explore geographical contrasts in conversions to developed land and woodland. The June Census data suggests a general increase throughout the decade in the area of farm woodlands in England, Scotland and Wales. However, unlike the June Census data, CS2000 information allows the exchange of land between agriculture and other, non-agricultural cover types to be documented. CS2000 thus potentially brings a new dimension to the analysis of changes to the farmed area.[13]

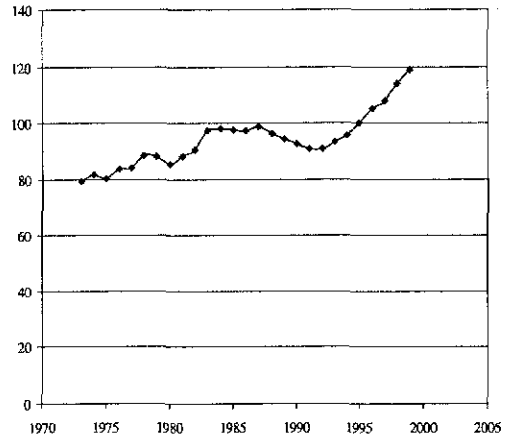
3.23 Table 3.2 shows that while the total area of agricultural land declined over the period 1988-97, the number of holdings also fell by 7%. The combination of these trends in farm area and number suggests that a process of farm amalgamations occurred throughout the period. The process of consolidation was most evident in East Anglia, Yorkshire and Humberside, the North West and the East Midlands.

3.24 Amalgamation is most likely on farm types that could benefit from economies of scale. Such changes may be part of larger structural transformations that include both reductions in labour inputs and a trend towards renting or contracting out the management of land.

3.25 Kiddle (Appendix 6) provides an analysis of changes in labour inputs recorded in the June Census. In England as a whole, there has been a slight fall in working family members per holding, whereas there has been a rise in both Wales and Scotland. However, all three countries have seen a steep

[13] It should also be noted that estimates of change in farm woodland from the June Census are problematic (See Watkins, Appendix 7, and Chapter 4 of this report).

Figure 3.1: Contract work (MAFF)



decline in full-time family workers per holding. While this has been matched by a rise in part-time family workers in Wales and Scotland, the rise in England is small. Full-time hired labour units per holding have fallen in all three countries, whereas part-time labour units per holding have only risen in Wales.

3.26 These changes in the level of labour inputs occur against a background of increasing use of contractors (Figure 3.1). MAFF estimates that as much of 10% of all farmed land in the South East is farmed under contract and; it is also significant in places of high arable production such as the Midlands.

3.27 While these effects of changing farm size cannot be investigated directly using CS2000 data they are clearly an issue that could be explored in any follow-up the 1993 *Processes of Countryside Change* Study.

3.28 Potter and Lobley (Appendix 3) suggest the renting out of land and use of contractors may be part of a process initiated by farmers who are on a trajectory out of agriculture, or who have elected to become part-time operators by taking up employment off the farm. It is not known, however, whether use of contractors, or the more general process of consolidation and reducing labour inputs has particular environmental consequences – although it is clearly an issue that could be investigated in any future socio-economic survey of farm enterprises in the CS2000 survey squares.

3.29 Potter and Lobley (1996) put the results of their earlier socio-economic survey in context by suggesting that at this time farmers decisions were still conditioned by the price support and a 'coupled' system of producer aid that had been available under the Common Agricultural Policy (CAP) up to this time. They felt that, with the 1992 reforms to the CAP, both their survey and CS1990 reflected conditions end of a major period of transformation in farming. They argued that changes, which had earlier been more widespread and less farm specific, had by the early 1990s, become confined to particular situations. The thesis they developed was that change was increasingly confined to situations where succession (generation change) was taking place

on farms, or where an occupier was striving to 'catch-up' through a programme of intensification of activities.

3.30 **Given the process of consolidation identified above, we recommend that a further survey be undertaken of farmer enterprises in the CS sample squares is undertaken, in a follow-up to the 1993 *Processes* Study (Table 3.1 section b). The aim would be to determine the extent to which consolidation has impacted upon the farms covered by the previous survey. The new study would enable the effects of consolidation, as a trigger of environmental change to be tested against the other identified as significant during the 1980s. The response of the different farm types identified by Potter and Lobley (1996) towards these consolidation pressures could also be investigated.**

3.31 The *Processes* Study identified different categories of farmer according to whether they were on an expansionary or contracting path. These classifications were useful in explaining past change but may be good predictors of future change. One distinction that could be considered would be between those who are able to react and even exploit policy change and recession and those who are forced to absorb such change if they are to stay in farming.

b. Specialisation

3.32 The process of ***specialisation*** within agriculture is suggested by data such as that presented in Table 3.3, which shows the changes in number of different farm types over the period 1988-97 by region. As Kiddle (Appendix 6) notes, the general decline in Mixed and General cropping holdings implies a move towards specialisation, where labour requirements may be easier to predict and control. The environmental effects of greater specialisation are unknown, but as Little (1998, p.108) notes, they could include:

- Reduction in the diversity of the 'on-farm' landscape.
- Abandonment of marginal land (eg. river valley grassland)
- Threat of dereliction to traditional farm buildings as they become redundant

3.33 In fact, as Table 3.3 shows, not only has there been a decline in Mixed and General Cropping, but also a decline in all those types of holding which can be regarded as the more labour intensive farm types. Hence Pigs and Poultry, Dairy, Horticulture, General Cropping and Mixed holdings have seen the greatest percentage decline, whereas Cereal, Lowland Cattle and Sheep and Other holdings are increasing in number. All regions have experienced the decline in Dairy, Pig and Poultry, Horticulture and Mixed holdings, and the rise in Other holdings. Increases in Cereals farm numbers were concentrated in the West Midlands and the South West, with the expansion in lowland cattle and sheep most marked in the North.

Table 3.3: Regional changes in numbers and proportions of EC farm types.

Region		CEREAL	GENCRO	HORT	P&P	DAIRY	LFA CS	LOW CS	MIXED	OTHER	ALL TYPES
East Anglia	1997	3019	3568	825	582	110	0	784	807	1519	11214
	Change 88-97	-208	-1049	-432	-277	-81	0	73	-36	327	-1683
	% change	-6.45	-22.72	-34.37	-32.25	-42.41	0.00	10.27	-4.27	27.43	-13.05
East Midlands	1997	3926	2212	773	450	1310	642	2646	1319	2324	15602
	Change 88-97	164	-1068	-188	-234	-563	-81	172	-147	318	-1627
	% change	4.36	-32.56	-19.56	-34.21	-30.06	-11.20	6.95	-10.03	15.85	-9.44
North	1997	1012	112	71	157	1902	3205	2390	760	1518	11127
	Change 88-97	35	-89	-106	-80	-617	-350	427	-187	272	-695
	% change	3.58	-44.28	-59.89	-33.76	-24.49	-9.85	21.75	-19.75	21.83	-5.88
North West	1997	477	637	792	433	2636	1021	1954	419	2621	10990
	Change 88-97	26	-313	-268	-307	-815	-28	-79	-148	286	-1646
	% change	5.76	-32.95	-25.28	-41.49	-23.62	-2.67	-3.89	-26.10	12.25	-13.03
South East	1997	5294	1126	2610	769	986	0	4968	1778	6046	23577
	Change 88-97	79	-556	-1288	-480	-611	0	-427	-398	751	-2930
	% change	1.51	-33.06	-33.04	-38.43	-38.26	0.00	-7.91	-18.29	14.18	-11.05
South West	1997	2584	610	1463	1002	6521	1886	10524	2751	7901	35242
	Change 88-97	365	-224	-331	-276	-2200	-653	791	-273	1583	-1218
	% change	16.45	-26.86	-18.45	-21.60	-25.23	-25.72	8.13	-9.03	25.06	-3.34
West Midlands	1997	1738	1303	980	525	2680	1000	5094	1761	3587	18668
	Change 88-97	192	-255	-222	-185	-879	-171	-11	-349	727	-1153
	% change	12.42	-16.37	-18.47	-26.06	-24.70	-14.60	-0.22	-16.54	25.42	-5.82
Yorkshire & Humberside	1997	2839	1799	518	815	1640	1879	2338	1501	2478	15807
	Change 88-97	-102	-492	-194	-315	-599	-274	114	-271	425	-1504
	% change	-3.47	-21.48	-27.25	-27.88	-26.75	-12.73	5.13	-15.29	20.70	-20.70
England	1997	20889	11367	8032	4733	17785	9633	30698	11096	27994	142227
	Change 88-97	551	-4046	-3029	-2154	-6365	-1557	1060	-1809	4689	-12660
	% change	2.71	-26.25	-27.38	-31.28	-26.36	-13.91	3.58	-14.02	20.12	-8.17

Key to farm types:

Type	Variable name
Cereals	CEREAL
General cropping	GENCRO
Horticulture	HORT
Pigs and poultry	P & P
Dairy	DAIRY
Cattle and sheep (LFA)	LFACS
Cattle and sheep (lowland)	LOWCS
Mixed	MIXED
Other	OTHER

3.34 Analysis of the way these changes in the number of different enterprise types are translated into changes in land cover within the agricultural landscape is complex. In the context of CS2000 the analysis is made more difficult because the year of the survey saw major economic changes that may have reversed earlier transformations. For example, as Winter and Smith note (see Appendix 4), the fall in profitability in the arable sector resulted in a small decline in the area under cereal cultivation in 1998, down 2.5% in the UK between 1997 and 1998, and a further 9.1% between 1998 and 1999. By

contrast the area under oilseeds rose by 13.7% between 1997 and 1998, but declined again by 14.9% between 1998 and 1999.

3.35 Major shifts were also observed during the decade in the livestock sector. Potter and Lobley (Appendix 3) observe that 1980s and early 1990s saw many lowland dairy farmers turning to semi-intensive beef production, after the imposition of milk quotas in 1984. During the 1990s profitability in the milk and livestock sector cattle numbers have fallen as the result of an appreciating currency, changing market conditions and more specific factors such as the beef export ban, However, the patterns of change vary between sector. Kiddle (Appendix 6), for example, shows that beef cattle numbers rose up until 1997, but dairy cattle numbers fell everywhere throughout the decade. Since the change in dairy outweighed the increase for beef, in aggregate there was a decline in total cattle numbers. The decline of beef since 1997 is described by both Potter and Lobley, and Winter (See Appendices 2 & 3).

3.36 Given such volatility, it is important to try to separate out short-term and more recent fluctuations from longer-term transformations of the character of the farmed landscape that are more likely to be picked up by CS2000. Using the MAFF June census returns for the period up to 1997, Kiddle (Appendix 6) reports the following trends:

- A decline in the area of cereals (Table 3.4), maintaining the trend observed in the period up to CS1990.

- A shift from arable land to 'other land'. This was mainly due to due to set-aside, but also partly due to development of farm infrastructure. In addition to set-aside, the 'other land' category includes land taken up by farm buildings. For the period up to 1997, the June Census data suggest that the larger the proportion of arable land in a region, the greater has been the decrease in that proportion over the decade, and the greater the subsequent rise in the proportion of other land. Thus the largest proportional shifts are observed in the South East and East Anglia. Table 3.5 shows absolute changes for other land.

- An increase in other crops[14], that include potatoes, crops for stock feeding, sugar beet, hops and rape for oilseed, especially in the South West and East Anglia.

- A decline in the area of temporary and permanent grassland in all regions except East Anglia (Table 3.6).

3.37 On the basis of these data Kiddle (Appendix 6) suggests that it is not entirely clear that farmers have halted expansion of arable area, even though total agricultural area may have fallen. The figures suggest a shift in the proportions of different cover types within the area of farmed land, which was itself declining. Table 3.7 summarises the absolute changes in area for the major cover types for the period 1988-97 by SSR.

[14] Note – other crops does not include set-aside

Table 3.4 Changes in cereal area in England, thousands of hectares

Region	Cereals as % of UAA 1988	Total cereals area 97	Change in area 88-97	*% change in area 88-97*
East Anglia	53.78%	509.1	-33.7	***-6.21%***
East Midlands	46.22%	531.4	-44.8	***-7.77%***
North	15.21%	153.6	-5.9	***-3.73%***
North West	14.57%	55.4	-9.7	***-14.99%***
South East	43.52%	647	-106.4	***-14.13%***
South West	23.26%	362	-65.3	***-15.28%***
West Midlands	30.58%	271.4	-22.1	***-7.53%***
Yorks. & H'side	39.02%	403.7	-28.1	***-6.51%***
All England	34.62%	2933.9	-316.2	***-9.73%***

Table 3.5 Changes in 'other' land in England, by region, 1993-97, Thousands of hectares

Region	Other land 1993	Other land 1997	Change 1993-7	% change
East Anglia	36.4	74.4	38.0	104.23%
East Midlands	25.4	67.9	42.5	167.25%
North	11.6	22.3	10.8	93.53%
North West	6.7	9.9	3.3	48.28%
South East	68.2	122.2	53.9	79.13%
South West	40.2	67.6	27.3	68.14%
West Midlands	18.7	39.2	20.5	109.77%
Yorks. & H'side	18.2	48.2	29.9	164.52%
All England	225.5	452.1	226.5	100.42%

3.38 The loss of temporary and permanent grassland to cereals and other crops, and its possible environmental consequences, was noted by Winter and Smith (Appendix 4). The trend is supported by the work of Andersons (1997), Winter and Gaskell (1998), and Robinson and Lind (1999) and seems to have occurred even though such land was ineligible for Arable Area Payments[15]. It would seem that these shifts were largely driven by the profitability of cereals, and crops such as potatoes and flax (see Winter and Smith, Appendix 4).

[15] Potter and Lobley – Appendix 2, page 5 – suggests that AAPS should/did have put a break on the trend towards the conversion of permanent grass. Check?

Table 3.6 Changes in grassland area in England, thousands of hectares

Region	Grassland as % UAA 1988	Total grassland area 97	Change in area 88-97	*% change in area 88-97*
East Anglia	10.40%	106.1	1.2	*1.12%*
East Midlands	27.97%	314.9	-33.7	*-9.67%*
North	50.01%	516.2	-8.5	*-1.62%*
North West	66.14%	277.8	-18.2	*-6.14%*
South East	31.75%	475.7	-73.9	*-13.46%*
South West	62.58%	1067.1	-82.8	*-7.21%*
West Midlands	54.09%	475.5	-43.6	*-8.41%*
Yorks. & H'side	32.46%	343.3	-15.9	*-4.43%*
All England	41.07%	3576.7	-278.9	*-7.24%*

3.39 Winter and Gaskell (1998) suggest that eligibility rules have fixed a rigid pattern of arable agriculture, resulting in an undesirable landscape that is ecologically unsustainable. They note that the eligible areas were established after many years of arable expansion, and particularly in eastern England, they may now contribute to keeping farming all-arable. They argue that have been a powerful disincentive to a return to more mixed farming systems so far.

3.40 Although set-aside was an integral part of the 1992 reform to the arable sector, commentators suggest that its positive environmental impact has been very limited (Winter *et al.*, 1998). The majority of farmers managed their set-aside for agronomic rather than for environmental reasons. Even though there was a requirement that certain landscape and environmental features should be protected on or adjacent to set-aside land the area affected has been small and declining. Overall, within the arable sector, Winter *et al.* (1998, p.71) have argued that 'policy.... was having a strong influence on land use, but not on the intensity of land use within that system'.

3.41 McNally (Appendix 5) shows that there is some clear differentiation of farm types, as defined by the FBS, by SSR and CS2000 Environmental Zone. These data suggest that these geographical contrasts might be used as the basis of further analysis of CS2000 data for the farmed landscape. **We therefore recommend that the following analyses be undertaken in relation to the changing structure of the farmed landscape and the trend towards increased specialisation (See also Table 3.1).**

- **The analysis in the shifts between major agricultural cover types by country, environmental zone and SSR, to determine whether the trends suggested by June Census data can be observed in CS2000.** A key feature of CS2000 is the potential it has to link observations for the

Table 3.7: Summary of major land use changes within the farmed landscape, 1988-97 (thousands of hectares)

Region	Cereals	Grassland	Other crops	Horticulture
East Anglia	-33.7	1.2	69.2	-9.1
East Midlands	-44.8	-33.7	17.6	-5.0
North	-5.9	-8.5	2.6	-0.2
North West	-9.8	-18.0	4.7	-1.7
South East	-106.0	-82.8	40.1	-9.8
South West	-65.3	-82.3	73.5	0.0
West Midlands	-22.1	-43.6	17.7	-1.4
Yorks. & H'side	-28.0	-15.9	-3.1	2.9
All England	-316.2	-278.9	153.0	-24.3

stock land cover and to patterns plant biodiversity. Changes in the proportions and representation of the different Countryside Vegetation System (CVS) classes could be considered in relation to the underlying changes in the structure of the farmed landscape.

- **Analysis of geographical contrasts in changes in the structure of the farmed landscape.** As Potter and Lobley note (Appendix 3), even in the absence of additional survey material from land managers, some understanding of the likely causes of the changes recorded by CS2000 may be achieved indirectly through analysis of already available secondary data, including re-analysis of the *Processes* data themselves. They suggest that a useful exercise would be to undertake a 'look forward' from the 1993 to identify farmers and situations most likely to have been affected by the market changes up to the time of the resurvey. The expansion of 'other crops', coupled with the gain in farm woodlands, suggest that we may see a more varied farmed landscape than in the recent past. CS2000 field survey and LCM2000 data could be used to develop an index of agricultural diversity, that could be compared for different regions, and (using field survey data) over time. The extent to which such diversity changes have any direct environmental consequences is not known. However, linked to the analysis of vegetation suggested above, and extended using the concept of 'environmental stock' previously used by Potter and Lobley (1993), this would seem an useful area of investigation. Potter and Lobley (Appendix 3) note, for example, that it would be interesting to see if the distribution of farm types identified in the earlier survey exhibited any association with

recorded changes in environmental stock[16]. Unfortunately only the 1990 ownership boundaries are available for the analysis of change recorded by CS2000. It would be valuable, and part of any follow-up the *Processes* Study to update ownership records (see recommendations for further work on 'consolidation', above),

- **The analysis of changes in farm structure within CS Survey Squares post 1993.** The most direct way to determine how changes in farm structure and processes such as specialisation might have impacted upon the stock and quality of land cover in the CS Survey Squares, would be to undertake a follow-up the *Processes* Study. The structure of the new survey could develop out of the 'look forward' analysis described above, and could explore how the different types of farm enterprise have responded to changing market conditions over the period since 1993.

c. Diversification

3.42 There is considerable debate over the extent of farm diversification in Britain. This is partly due to differences in definitions and partly due to the difficulty of obtaining reliable information on the process. Most workers suggests that farm diversification has been limited to date, with particular spatial concentrations relating to market opportunities, local opposition and planning policies (Ilbery and Bowler, 1993; Murdoch and Marsden, 1994).

3.43 Evans and Ilbery (1992), for example, estimated that only 6% of farms had accommodation enterprises and only 'a fraction' of these 'generated significant income' (Morris and Evans, 1999: 353). More recently, however, Gasson et al (1998) surveyed 491 English farmers in 1997 and asked about measures taken in response to the financial uncertainties of the 1990s. While most had relied on conventional 'productivist' responses, most notably increasing production from existing enterprises (65%), nearly a fifth (18%) had started *non-farming enterprises*.

3.44 The June Census now includes a question on farm diversification but it has not been set for sufficient time to examine changes in importance of the process to be measured directly. For the period 1988-97 more indirect evidence must be sought. The results form three areas of the census support the hypothesis of greater diversification in farm incomes:

i **There has, as we have seen, been a significant fall in full-time family workers per holding and an increase in use of contract labour** (paras 3.25 and 3.26). While such changes do not, in themselves, establish that income diversification is taking place, they are consistent with such a trend.

ii **There has been an increase in the number of those types of holding, where off-farm enterprises may be more easily taken up.** For example, numbers of Cereal holdings, where activity tends to come in

[16] Potter and Lobley (1996, p. 26) define environmental stock to be the area of extensive grass plus the area of deciduous wood and semi-natural vegetation on a farm holding

short intense bursts during the year, have increased in all but two regions, East Anglia and Yorkshire and Humberside. Changes in Lowland Cattle and Sheep holdings have varied between a rise of over 20% in the North to a fall of nearly 8% in the South East. However, where there have been rises in the numbers, Kiddle (Appendix 6) suggest that this may reflect a change of enterprise from dairy to beef.

iii **Increases in the 'Other' category within the classification of EC farm types.** This is used as a 'catch-all', for enterprises that do not fit well with mainstream agriculture. The category includes, for example, specialist mushroom growing enterprises, goat or equine enterprises. It also include holding of limited economic importance, such as specialist set-aside, specialist grass and forage (only grass or rough grazing, with no livestock held) or non-classifiable holdings (fallow or buildings and other areas only where no Standard Gross margins are calculated. The expansion in number of holdings is widespread, with the largest shifts in the North, Yorkshire and Humberside, West Midlands, South West and East Anglia. It should be noted, however, that the area covered by such holding is small.

3.45 The extent to which these changes can be traced through to changes in the stock and quality of habitats associated with the farmed landscape is unclear. They are likely to be small scale and localised. Certainly they would be difficult to disentangle from some of the effects of specialisation noted above, although they may result in a more diversified farm landscape. However, Little (1998 p. 108) notes that the effects are likely to include:

- The poor utilisation of grassland, particularly by horses leading to weed invasion and boundary neglect.
- Increased use of ranch-style fencing giving rural areas 'inappropriate urban finishes'.
- Poor conversion of barns to dwellings, disrupting the integrity of traditional farmstead patterns.

3.46 Diversification is clearly an issue that could be usefully explored in a follow-up survey to the 1993 *Processes* Study, because the process may, in the long term, impact on patterns of land management and rural change. Opportunities for off-farm income, for example, may profoundly affect the ability of some farmers to remain in some form of agriculture, albeit part-time, and thereby affect the rate of environmental change in the farmed landscape.

3.47 **We therefore recommend that the issue of diversification and the role of 'off-farm' income in maintaining the integrity of the farm enterprise is one focus of any future social survey in the CS sample squares (Table 3.1).** As with the investigation of the process of specialisation described above, the extent to which diversification has occurred could be related to the type of operation found by the 1993 study, to determine how different enterprises have responded to changed economic circumstances. The impact

of part-time working on levels of 'environmental management' within the farm could also be assessed.

d. Management Intensity

3.48 The environmental impact of changes in farming practice and the general level of the intensity of farm management have been widely discussed. Little, (1998) provides a recent review. In this study we focus on those general measures of management intensity that can be derived from sources such as the June census or the FBS, and ask how might changes be detected by CS2000.

3.49 McNally (Appendix 5) provides an analysis of the intensity of farming using the FBS. Within the arable sector she shows an average annual increase in fertiliser and pesticide expenditure per ha of main products on Cereals farms, General Cropping Farms and Mixed farms between 1988 and 1997. The increase coincides with the period in the mid-'90s when returns for these farms were particularly high, as indicated by Net Farm Incomes. The data used by McNally have been deflated by the fertiliser price index and so reflect changes in volume.

3.50 The environmental impacts of these changes are difficult to interpret, however, since impacts will be dependent on application levels and location. The implication of the increase in pesticide expenditure is particularly difficult to determine, because in the FBS it is referred to as 'crop protection expenditure'. Thus a farmer purchasing a more expensive but less environmentally damaging product would appear to be a more intensive user than a farmer using a less damaging product on the same area. For present purposes, however, it is assumed that 'pesticide expenditure per ha' does reflect intensity of use, rather than the character of the products purchased.

3.51 McNally's analysis of fertiliser and pesticide intensity extends up to 1997. Potter and Lobley (Appendix 3) note that recent farm surveys (e.g.Winter *et al.* 1998) suggest that fertiliser use and the application of farm chemicals has not noticeably declined on many farms, and in some cases may actually have increased. Thus the situation at the time of the CS2000 Field Survey may not have been very different to the early part of the decade. As Potter and Lobley (Appendix 3) suggest, it will be interesting to see if these trends in rotations and farming practice have translated into measurable gains or losses of biodiversity.

3.52 Within the livestock sector, various measures of intensity can be constructed. Kiddle (Appendix 6), for example, suggests that by matching change in livestock numbers to area of grassland and rough grazing, it is possible to give a picture of the stocking density. The pressure on grassland can be followed by looking at the change in livestock units per 100 ha of grassland and rough grazing[17].

[17] This includes temporary grassland under 5 years, permanent grassland over 5 years and sole rights rough grazing.

Table 3.8: Livestock units per 100ha of grass and rough grazing

SSR	88	97	change	%change
East Anglia	**141**	**24**	**-17**	**-12.05**
East Midlands	**171**	**174**	**3**	**1.75**
North	**154**	**165**	**11**	**7.14**
North West	**165**	**177**	**12**	**7.27**
South East	**148**	**145**	**-3**	**- 2.02**
South West	**167**	**169**	**2**	**1.20**
West Midlands	**195**	**201**	**6**	**3.07**
Yorks & H'side	**162**	**165**	**3**	**1.85**
All England	**165**	**168**	**3**	**1.82**

Table 3.9: Livestock units per 100ha grass and rough grazing for England, Wales and Scotland

Region	1988	1997	change 88-97
England	165	168	3
Wales	178	206	28
Scotland	58	63	5

3.53 The idea of a livestock unit is based on the relative metabolic energy requirements of different types of livestock in a yearly period. If a dairy cow represents one unit, then a beef animal represents 0.75 units, all other cattle represent 0.5 units and sheep represent approximately 0.15 units. Using these figures, it is possible to calculate the approximate livestock units per 100ha of grass and rough grazing for each SSR (Table 3.8). The data in Table 3.8 come from the review by Kiddle (Appendix 6); McNally (Appendix 5) provides a more detailed analysis of changes in grazing livestock units by farm type, using the FBS, together with an additional measure of intensity based on animal feed per livestock unit.

3.54 Table 3.8 suggests that in England there has been little overall change in grazing livestock units per unit area of grassland, but that there is considerable regional variation. There has, for example, been a substantial extensification of livestock production especially in East Anglia. This may in part be due to the substitution of beef for dairy cattle, and sheep for cattle, which will affect the calculations. On the other hand, the figures also suggest livestock production is becoming more intensive elsewhere, especially in the North and North West.

3.55 On the basis of her analysis of the FBS, McNally (Appendix 5) suggests that while the absolute changes in stocking density among all farm types have been small for England, there are larger differences between farm types than changes over time within farm types. It would appear that the mean grazing livestock unit per ha grazing land has increased for all farm types except mixed. The small overall change, she suggests, is to be expected, given the stocking density restrictions for claiming livestock subsidies imposed by

CAP, and the fact that farmers were very near to the limit anyway (see Potter and Lobley, Appendix 3, and Winter and Smith, Appendix 4). However, it is clear that while this intensity measure might not be changing markedly, this does not imply a static situation within farming.

3.56 The detailed analysis of livestock numbers provided by Kiddle (Appendix 6) suggests that while there was only a small increase in intensity for England, both cattle and sheep numbers declined at the country level. **The loss of cattle and sheep took place against in the context of a reduction of about 7% in total grazing area (Table 3.6). Thus we appear to be seeing the more intensive use of a smaller stock of grassland.** The situation appears to be very different in the beef and dairy sector.

3.57 Although cattle numbers in the beef sector generally increased in all English regions up to 1997, there has been a continuous decline in numbers of dairy cattle in all English regions and throughout the decade. East Anglia and the South East experienced the greatest percentage decline, each losing around 30% of their dairy cattle. The North and North West both lost over 10%, while the East and West Midlands and Yorkshire and Humberside were nearer the national average loss, between 14 and 16% lower. In spite of the impact of BSE between 1995 and 1997, not all regions had their greatest declines during that time; East Anglia and the South East in particular saw greater percentage losses between 1990 and 1993 than in the later period.

3.58 There has been little change in sheep numbers in England, but generally there has been a rise in numbers in the northern regions (e.g. 11% in the North West) and a fall in the south of the country (e.g. 15% in the South East) (Table 17). East Anglia has the smallest share of the national flock, and this is declining, while the North, which has the largest share of the national flock, is growing, indicating a concentration of sheep farming in certain regions.

3.59 Table 3.9 gives comparable for livestock production figures at the country level. While livestock intensity has changed little in England, Wales has seen an increase of 16% in livestock units per 100ha of grassland. This is probable due to the 6% increase in sheep numbers over the decade. Since Wales also showed a 6% increase in total grazing area, these figures suggest a significant increase in the intensity of use of the grazing resource. Figures suggest that Scotland has about the same area of grazing land in 1997 as in 1988. Thus the slight increase recorded in Table 3.9, probably reflects an increase in cattle, sheep and pig[18] numbers.

3.60 Kiddle's review (Appendix 6) notes an interesting contrast between LFA and non-LFA areas for livestock numbers and livestock units per 100 ha grass and rough grazing. She suggests that within LFAs pressure on grazing land appears to have increased as stocking densities have risen and the proportion of grazing land in these areas has fallen. She argues that this points to a

[18] Kiddle (Appendix 4) reports that while the numbers of pigs remained roughly constant over the decade in England, Wales lost 20% of its pig herd and Scotland increased its pig numbers by 38%.

different set of environmental pressures in these areas compared to non-LFA areas.

3.61 The reviews by Potter and Lobley (Appendix 3) and Winter and Smith (Appendix 4) suggest that within the dairy sector, the trends fostered by the quota system arising from the 1992 CAP reform, continued though out the decade. There was a further increase in the area devoted to forage maize and other cropping on farms with the capacity to intensify in this way. Farmers were able to purchase additional quota from outgoing producers expanded herd size.

3.62 Milk quotas are discussed at length by Winter and Smith (Appendix 4). High trading of quota continued in 1990s has appeared to result in the concentration of production on larger, more efficient holdings. Since there are economies of scale in this sector, production tends to be concentrated on larger farms. Winter and Smith suggest that such concentration is likely to have led to greater intensification of production. On farms large enough to remain viable, Potter and Lobley argue that trend towards more intensive grassland management observed up to 1990 is likely continued, with increased planting of forage maize and other arable crops displacing grassland, especially in England. This will have further eroded the grassland resource in the pastoral landscapes especially those of the South West and South Wales.

3.63 Dairy farms are noted for being very intensive, leading to higher estimated nitrogen and phosphorous[19] yields per unit area (Little 1998). However, the overall environmental effects of quota trading are ambiguous. Farms that lease out quota might become less intensive, if they do not substitute some other more intensive livestock enterprise for dairy. By contrast, farms that lease in quota could become more intensive, although they might have better facilities for storage and handling of animal waste and thus lead to a reduced overall environmental impact.

3.64 An important scientific advance that has taken place since the publication of CS1990 has been the development of the Countryside Vegetation System (CVS) and the range of ecological indicators (Indicators of Biodiversity) designed to assess vegetation condition (see Bunce *et al.* 1999, Firbank, 2000). Shifts in the representation of different vegetation types within the countryside, and their associated IBD scores can give insights into changes in management practice and intensity. The main Indicators of Botanical Diversity (IBD) that have been proposed for the analysis of CS2000 data are listed in Table 3.10.

3.65 It has been proposed (eg. Firbank, *et al.* 2000) that the system of IBDs can be used to make a qualitative assessment of habitat condition and the significance of changes in condition over time. In the context of CS2000, these indicators will be used to describe the condition of the BAP Broad Habitats that will be the focus of the initial report for the survey.

[19] Also, especially, pigs and poultry

Table 3.10: Indicators of Botanical Diversity used to monitor CS2000 vegetation changes (see Firbank *et al.* 2000)

IBD	Full name
1	CVS Aggregate class
2	CVS Classes
3	Changes in Functional Attributes
4	CVS Classes unique to one plot type per 1 km square
5	Species richness
6	Ellenberg scores
7	Frequency of species groups
8	Frequency of aggregate class preferential species
9	Frequency of English Nature indicator species
10	Frequency of food plant for animal groups
11	Frequency of scarce plants in NVC categories
12	CVS classes per 1 km square

3.66 **Table 3.1 summarises our recommendations for further analysis of CS2000 data to explore the environmental impacts of changes in the intensity of agricultural management suggested by our review of the June Census and FBS data for the period 1988-97.** The section on management intensity is divided between fertiliser and pesticide inputs, grazing intensity, and 'other aspects'. Firbank *et al.* (2000) has set out in detail how different types of management pressure can be explored using the system of IBDs developed as part of the ECOFACT project. The analysis presented by these authors in the context of CS1990 results can clearly be extended using the results of the latest survey to determine how the situation has changed since the earlier survey. Table 3.1 sets out some general expectations.

3.67 In taking such work forward, however, it is important to note that there are many aspects of farm management that are not easily captured by data such as that provided by the June census and the FBS. Some these management impacts can be more directly investigated using CS2000 data. **In Table 3.1 we recommend that analyses such as those undertaken by Firbank *et al.* (2000) using CS1990 data, are extended to develop a more general indicator of the condition of the farmed landscape.** Such an indicator could draw upon the existing system of IBDs and information about the levels of 'environmental stock' present on farms. Given the structure of CS2000, such an indicator could be disaggregated by country unit and by CS2000 environmental zone. The robustness of such measures at the scale of Standard Statistical Regions could also be investigated.

Conclusions and implications for further work

3.68 The review presented in this chapter provides contextual information for the agricultural driver that can be used to help interpret the initial outputs from CS2000. Table 3.1 sets out our recommendations for this more detailed analysis. Collectively they allow hypotheses about the processes of 'polarisation', 'consolidation', 'specialisation', 'diversification', and 'management intensity' to be tested more rigorously, and their environmental

consequences explored. Table 3.1 mainly identifies work that could be undertaken in the short-term, that is once CS2000 have been launched in November 2000. **We recommend that such work be taken forward as part of a post-launch research programme, such as that which followed CS1990.**

3.69 Table 3.1 also identifies work of a more long-term nature. Our review, and feedback from the workshop held to comment on the outputs from this study suggests that there is considerable justification and support for a socio-economic survey within the CS2000 sample squares. This work would clearly build on Potter and Lobley's *Processes of Countryside Change* Study. **However, we recommend that its scope be extended to include a wider range of factors affecting rural areas.** In Table 3.1 we describe only those issues related to agriculture. In the next section we consider how such a survey could be developed to take better account of forestry.

3.70 A further socio-economic survey of farms within the CS2000 sample squares can be justified on several grounds:

(i) ***To maintain the continuity of the existing data series:*** The data from the *Processes of Countryside Change* study are of considerable value in the context of Countryside Survey, because they are tied so closely to the sampling framework used by the survey. They provide the first and only systematic information on the structure of farming operations in the sample squares. They therefore stand as an important baseline against which future changes can be assessed.

(ii) ***To refine and update the data series:*** As Potter and Lobley (Appendix 3) note, while the 1993 survey data can be used to develop a 'look forward', such analysis is limited unless the dynamics of land tenure and management are understood. A resurvey would allow decision-making histories to be constructed for farms in the sample squares. It would also provide the opportunity to explore the new issues that are presently impacting on farming to be understood and their likely environmental consequences explored. Winter and Smith (Appendix 4) provide a summary of recent work on the current 'agriculture crisis' and its short and medium term impacts. Tables 3.11 and 3.12 are drawn from their work and summarise the results of recent surveys that explore likely farmer responses. It would clearly be valuable to explore how the farms in the survey squares are responding and how they fit with the national picture. The review of Winter and Smith (Appendix 4) suggests there is evidence that farmers appear to show 'a strong commitment to increased production and to specialisation' as a strategy to cope with recent uncertainties. This hypothesis could be tested in the CS sample squares.

3.71 In their discussion of the case for further, work Potter and Lobley (Appendix 3) suggest an additional reason why a second survey might be justified. They argue that it would allow some of the limitations of the first to be overcome.

Table 3.11: Farmers' Perceptions of Likely Steps to Secure Future

Steps to secure future	*% of Respondents*
Expand or increase farm output	56
Withdraw from unprofitable enterprise	35
Continue as at present	30
Other family member take up paid work	22
Start non-farming enterprise	21
Self (the farmer) take up paid work	14
Intend to withdraw and sell up	12
Reduce costs or inputs	1
Sell or let land/building/assets	1
Other steps	1
Non response	4

Source: Prosper 1998: p21

Table 3.12: Response to Financial Uncertainties of the 1990s

Type of response	*% of Respondents*
Steps to increase income	
Increase output from existing enterprises	65
Cut out an unprofitable enterprise	32
Start a non-farming enterprise	18
Introduce a more profitable enterprise	15
Other family member takes off-farm employment	12
Intend to withdraw and sell up	12
Take paid employment outside the farm	5
Steps to cut direct costs	
Reduce amounts of inputs used	45
Reduce machinery costs	42
Reduce labour costs	38
Steps to cut the cost of borrowing	
Sell assets to pay off debts/overdraft	18
Borrow from cheaper interest sources	14
Lengthen repayment period of loans	6
Other steps	
Carry on as before	45
Take financial advice	30
Increase farm area to spread costs	26
Leave farming altogether	4

Source: Gasson *et al* 1998: p. 28

3.72 They note, in particular, the suggestion that the *Processes* study was limited because it was restricted to farmers and farm families as agents of change. They suggest that a resurvey would 'allow for a more comprehensive coverage of other types of occupiers and land managers of land in the sample squares, leading to a more balanced view of the drivers of change'. This suggestion is in line with the recommendations that we have made in chapter 2 of this Report, where we have argued that a more complete understanding of the rural context of the survey squares is required.

3.73 **We therefore recommend that a follow-up to the *Processes of Countryside Change* survey is considered as part of DETRs longer-term research programme.** We suggest, however, that its scope and purpose be revised to take account of the broader range of rural policy issues that now need to be examined. Our consultations indicate that the survey should aim to:

- Increase the coverage of the survey by surveying a larger number of squares to take account of the larger number of samples used for CS2000;
- Target additional samples on particular land classes important for environmental policy purposes such as those essential for delivering BAP target habitats;
- Improving farmer capture within the surveyed squares, particularly in cases where coverage was below 50% of the area farmed, and extend the survey to other land owners within the sample squares.
- Refining the measure of environmental stock used as the dependant variable in the subsequent data analysis.

3.74 In making such a recommendation we recognise that the cost of such a survey could be significant. Enlarging the survey to include other landowners and managers would require considerable extra resource, even if the number of sample squares visited was not increased. Given the complexity of such a survey, it may well be that it could be more efficiently undertaken as a series of linked socio-economic studies rather than as a single unified piece of work. Whatever option is selected, however, the goal should be to include the information in the CS2000 database so that integrated analyses of socio-economic and environmental change can be undertaken.

Chapter 4. Forestry as a Driver of Countryside Change

Introduction

4.1 In this chapter we consider how policy changes towards forestry have impacted on patterns of land cover during the 1990. The background to this review is the commissioned study by Watkins (Appendix 7). We consider this material here, together with information available from the Forestry Commission to develop recommendations on how CS2000 might be used to explore the impacts of forestry as an important driver of countryside change.

Evolving Policy Frameworks

Forest expansion

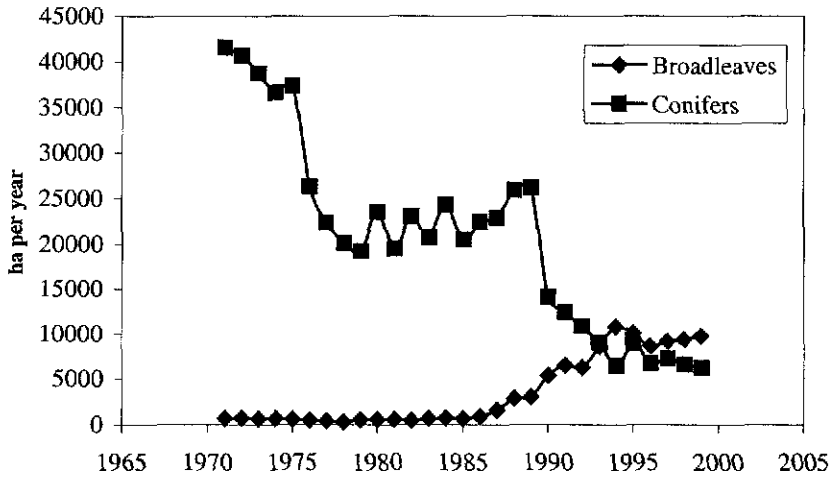
4.2 Throughout the 1990s it was the policy of successive Governments to support the extension of the woodland area. The aim initially was to afforest 33,000 ha a year, including 12,000 ha a year under the Farm Woodland Scheme.

4.3 An important driver of this policy shift was the problem of surplus agricultural land in Europe. The 2nd Report of the Agriculture Committee of the House of Commons reported that there could be anything from one million to five million hectares of surplus agricultural land by 2015 (House of Commons 1990). It went on to suggest that 'the most significant alternative land use in the next twenty years is likely to be forestry'. The Committee argued that there was now 'the scope, if not the necessity, for a far greater emphasis on the role of woodlands and forestry in the process of rural development' (House of Commons 1990 xv). The process of change is, however, likely to vary regionally with, for example, conversion in Wales being limited by the need to retain the small area of high quality agricultural land found here.

4.4 As Watkins (Appendinx 7) notes, however, the general support for forestry that had been present in the late 1980s and early 1990s was to some extent undermined by several policy changes. For example, the confidence of private commercial forestry was knocked by the 1988 decision to remove longstanding tax concessions that had originally been designed to encourage planting. The form and role of the Forestry Commission then came under scrutiny, and in 1992 it was separated into Forest Enterprise and the Forestry Authority from April 1. Later, in 1994, there was speculation about the possible privatisation of Forest Enterprise. Sales of former Forestry Commission plantations continued for much of the decade. In addition, there were many changes to the detail of the woodland grant schemes available.

4.5 As a result, although forest expansion occurred, it did not take place at anything like the rate initially envisaged (see below). Nevertheless, ideas about the perceived surplus of agricultural land meant that one of the principal locational factors affecting forestry throughout the twentieth

Figure 4.1 Rates of broadleaf and conifer planting in Great Britain, 1971-1999 (Source: Forestry Commission, Economics & Statistics Unit)



Note: planting rates are for new woodlands and do not include restocking
Source Forest Industry Council of Great Britain (1998)

century, namely that afforestation should only take place on 'unimproved land' of low agricultural value, was no longer of paramount importance. This change underlay many of the detailed policy changes that took place through the 1990s, and we have seen the marked expansion of broadleaved woodland in lowland, agricultural landscapes, and a decline in the rate of planting of non-native conifer plantations.

4.6 Figure 4.1 shows how planting rates for broadleaves and conifers have changed since the early 1970s in Great Britain[20]. The period since the last Countryside Survey has been characterised by a continuing fall in the rates of conifer afforestation, to around 6000-7000 ha/year, and an increase rate of broadleaf planting, which now stands at about 10000 ha/year. Forestry Commission data suggest that the total woodland area of GB in 1999 was about 2.58 million ha, or about 10.7% of the land surface (see Forestry Commission, 1999).

Woodland management

4.7 Watkins (Appendix 7) suggests that in the 1980s there was a resurgence of interest in the management of broadleaved woodland. This interest was maintained throughout the 1990s, and there was an increased emphasis on the management of all types of woodland with the aim to promote nature conservation, landscape, recreation, shooting and the provision of public access. Sustainable forest management and the importance of maintaining and promoting biodiversity became key elements of forest policy (Table 4.1).

[20] Planting rates do not include restocking. See Forest Industry Council of Great Britain (1998).

Table 4.1: Key elements of recent policy towards forestry in the UK

The UK Biodiversity Action Plan (UKBAP) contains several action points relating to forests. The most important is the implementation of the biodiversity aspects of the UK Sustainable Forestry Programme, published in 1994 as a sister document to the UKBAP, which set out the Government's forestry policies. These include:

- *Maintenance and appropriate enhancement of biodiversity in all woodlands*
- *Protection and expansion of our ancient and semi-natural woodlands*
- *Creation of new native woodlands and encouraging the planting of site-native trees and of broadleaved woodlands more generally.*
- *Research into methods of assessing and enhancing biodiversity in woodlands.*

And also the more general policies for:

- *Expanding woodland cover*
- *Regenerating existing woods*
- *Restructuring plantation forests*

Source: Forestry Commission, 'FORESTRY AND THE UKBAP', http://www.forestry.gov.uk/biodiversity/bionote1.html

4.8 The shift in aims of management reflected changing demands of the public and was reinforced by a range of new and modified policies introduced by the Forestry Commission, English Nature, the Countryside Commission and their successor organisations. This shift has affected, to differing degrees, all types of woodland owner from large commercial forestry concerns through to the owners of small woodlands.

4.9 The physical manifestations of this general shift in management aims included subtle changes to the size and shape of individual woodland stands; changes in the mixtures of species established; changes in establishment techniques, with a move away from plantations towards the use of natural regeneration; and changes in thinning regimes.

4.10 Large commercial woodlands, especially in Scotland and the uplands, have continued to be largely coniferous, though much more attention has been paid to the careful management of non-wooded land within plantations such as rides, fire breaks, watercourses, and transitional areas between woodland and semi-natural habitats. As the time came to replace first rotation plantations which had been established earlier in the century (1920s-1950s) the opportunity has been taken to improve the layout and design of plantations to make them fit more easily in the landscape and improve their potential for nature conservation and public access. The realisation of the devastating effects of windthrow on maturing coniferous stands in upland plantations encouraged the restructuring of plantations into separate permanent felling coupes, of different sizes depending on the topography, with wind firm edges.

4.11 Another key trend throughout this decade was the increasing level of acceptance of the importance of semi-natural woodlands and habitat. This was reflected in continuing support for the careful management of ancient

semi-natural woodlands throughout the UK. In practical terms this led to the protection of old areas of Scottish native pinewoods, and the encouragement of their extension through natural regeneration. It also led to the re-introduction on a fairly extensive scale of traditional management techniques such as coppicing and pollarding.

4.12 In lowlands woodland there was a move towards longer term less intensive management away from clear cutting and replanting. There was a change of emphasis towards small-scale working, the maintenance of diversity of structure and the use of a wider range of species. The careful management of natural regeneration through thinning, singling, freeing of natural regeneration, and coppicing became more common. Throughout the decade there was an increase in interest in the application of Continuous Cover Forestry.

Exploring the Forestry Driver using CS2000

4.13 On the basis of the expected impact of changes in forest policy during the 1990s, Watkins (Appendix 7) has suggested a number of trends that could be tested using CS2000 data. **These are summarised in Table 4.2, which sets out our recommendations for work that can be undertaken in the short-term using these data either alone or in conjunction with other key data sources.**

4.14 The availability of Forestry Commission woodland survey information clearly provides an important backdrop for the analysis of CS2000 data. These data both allow the robustness of CS2000 outputs to be tested and provide useful complementary information that can be used to extend and deepen our understanding of changes within woodland habitats. The National Inventory of Woodland and Trees (NIWT) is particularly useful in this respect.

4.15 Woodland Inventories have been undertaken by the Forestry Commission at roughly 15 year intervals since the First World War. NIWT is the most recent such survey. It aims to record the changing area and composition of woodlands since the last inventory that was carried out between 1979 and 1982 (Forestry Commission 1998).

4.16 The Inventory will provide information on woodlands over 2ha[21]. It consists of two components. First, a complete mapping of all woodland parcels at 1:25,000 scale, based on the analysis of aerial photography. Basic data on composition of the woodland will be recorded[22], and these data will be stored in a GIS. Second, a more detailed survey of a 1% sample of the area in these woodlands, based on a field visit. The data collected includes information on ownership and use, together with a range of structural information about the woodlands that enable aspects of its ecological and management status to be determined.

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[21] Woodlands less than 2ha, are covered in a separate exercise, the Survey of Small Woods and Trees.
[22] Woodlands are classified into seven basic types: conifer, broadleaved, mixed, coppice, coppice with standards, shrub, young tress, ground prepared for planting and felled.

Table 4.2: Expected trends and potential analyses using CS2000 for the forestry driver

Woodland type & context	*Expected trend*	CS2000 Analysis
Coniferous afforestation of semi-natural habitat	*This declined through the 1990's. There were considerable regional variations with most taking place in upland Scotland and to a lesser extent, Wales. Virtually non-existent in upland England. Negligible in the lowlands on heaths and semi-natural grassland. Particular attention should be paid to measuring the success of policies designed to encourage native Scottish pine woodland.*	Change in stock of Coniferous Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Coniferous afforestation of 'improved' habitat	*Although policies were designed to encourage this type of afforestation, relatively little took place in the decade because the level of grants did not outweigh the decline in the capital value of farmland upon planting. Small patches of this afforestation occurred in the lowlands. There may be a concentration in areas designated as Community Forests.*	
Broadleaved/mixed afforestation of semi-natural habitat	*There may well have been an increase in this type of afforestation in response to special schemes designed to encourage the establishment of native mixtures of broadleaves, such as upland birch woodlands in Scotland. Many new small farm woods may have been established on remaining fragments of semi-natural grassland.*	Change in stock of Broad-leaved Mixed and Yew Woodland Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which afforestation has occurred.
Broadleaved/mixed afforestation of 'improved' habitat	*If policies have been successful, one would expect a considerable increase in the establishment of new broadleaved mixed woodland on improved land. This is likely to consist of many new small farm woodlands, used primarily for game or landscape purposes. These may well be concentrated in areas where game shooting is particularly important (i.e. parts of East Anglia; Gloucestershire). There may also be concentrations in specially designated areas such as Community Forests and the National Forest.*	
Natural regeneration of woodland on semi-natural habitat	*This will occur in relatively small patches across the UK. It is particularly likely on ungrazed, steeply sloping valley sides in the uplands of Scotland, Wales and northern England; on lowland ungrazed heaths and commons; and on ungrazed patches of semi-natural grassland such as steep slopes in the Downs and Cotswolds.*	Separate analysis of shrub category within Broad-leaved Broad Habitat by country unit and CS environmental zone. Use CS2000 flow accounts to identify types of land on which regeneration has occurred.
Natural regeneration of woodland on 'improved' habitat	*Generally very small-scale. There will be a tendency for some areas of managed natural regeneration to be found adjoining existing semi-natural woodland if policies designed to increase the size of such woods are working.*	
Loss of woodland to improved agriculture	*This is likely to be rare in England, with the conversion of woodland to arable land virtually halted. It is most likely to take place in heavily grazed parts of the uplands.*	Use flow accounts to identify types of land on which deforestation has occurred.
Loss of woodland to semi natural habitat	*This will have taken place frequently, but usually on a small scale. It is most likely to occur where there are specific conservation schemes to remove plantations and natural regeneration in order to restore lowland heaths, chalk grassland, sand dunes and other valued habitats.*	
Woods showing little change	*Many areas of woodland will show little change over the decade. This may be because of the stage in the rotation, i.e. even-aged plantations may show little discernible change from pole stage onwards until perhaps a major thinning. Some mixed broadleaved woods that are carefully managed under say a continuous cover system, will show little change even though valuable timber may have been removed. Other woods may show no change because they are unmanaged. With the move to more subtle forms of woodland management there is a strong likelihood that woods which are managed, but which show no discernible change, will be increasing in number.*	Analysis of CS2000 Indicators of Biodiversity for woodland broad-habitat, with linked analysis to structural information provided by NIWT.
Conversion of coniferous woodland to broadleaved woodland	*This should be a rare occurrence especially in England. It is most likely to take place in larger upland plantations where extensive restructuring is taking place at the end of the first rotation.*	Use flow accounts to identify pattern of exchange of stock between Broad-leaved and Conifer Broad Habitats. Change in frequency of CVS classes.
Conversion of broadleaved/ mixed woodland to coniferous woodland	*This should be taking place on a fairly extensive scale as formerly mixed plantations made up to the 1970's have their coniferous element removed. This is particularly likely on woods on traditional landed estates where mixed plantations have been very popular. It will also take place in mixed plantations made on ancient woodland sites.*	

4.17 The opportunities for analysis of the woodland resource, which the availability of information from CS2000 and the NIWT provide, have recently been considered in a study undertaken for English Nature (Haines-Young *et al.* 2000). This work suggests that while there is some duplication between these data sources, much can be gained by linking them.

4.18 Previous work on the analysis of woodland characteristics using CS1990 data (Stark *et al.* 1996) suggested that the field survey methods used for Countryside Survey do not yield reliable structural information for woodlands. The survey does, however, give a good picture of the botanical characteristics of woodlands, particularly for the ground layer. By contrast, structural data for woodlands from the NIWT is good, while the range of botanical information collected as part of the Inventory, is more limited. As a result, Haines-Young *et al.* (2000) suggested that these two data sources might be combined to derive a more complete picture of woodlands than is available from either of the datasets if considered in isolation.

4.19 The information on woodland structure that is available from the NIWT is derived from a sample, and estimates are made for the population of woodlands in a given area using a statistical algorithm. The results of NIWT will mainly be published the country and county levels. The field sample data could, however, be aggregated in other ways. **We recommend, for example, that work be undertaken to aggregate the Inventory plot data at CS2000 land class level.** This would enable estimates of the structural properties of woodlands to be derived using the Countryside Information System (CIS), and used alongside other woodland data that can be obtained from CS2000.

4.20 We suggest that this additional work on the joint analysis of CS2000 and NIWT data is considered as part of DETR's medium term research programme. Information from the NIWT is unlikely to be available for the whole of GB until early in 2001 (Smith, pers comm.). This work could be undertaken as part of a larger study that also looked at the relationship of the NIWT and CS2000 woodland polygons in the CS2000 sample squares. The CS2000 data could include both that derived from the field survey and LCM2000. Information on the transfer of land between broad habitat categories in CS2000 would bring a useful new dimension to the analysis of the NIWT, because the latter does not record information about the character of the land on which new planting has occurred. Only the nature of the loss of is recorded.

4.21 Thus analysis of CS2000 and NIWT data within the CS field survey squares would assist in the cross-calibration of each data source. It would also provide the framework in which to undertake a more detailed, longer term analysis of ownership patterns within the sample squares, that could help us better understand the 'rural context' in which CS2000 data had been collected (cf. Chapter 2).

4.22 As Watkins (Appendix 7) notes, during the 1990s there has been a marked trend for woodland ownership to become increasingly distinct from farm ownership. More woodland areas are in the possession of specialist organisations such as the Woodland Trust, wildlife and other conservation

trusts, as well as small private owners. **It is recommended therefore that, if a follow up study to the *Processes of Countryside Change* study is undertaken, then its scope should be extended to include interviews with all woodland owners and managers in the survey squares.** This would enable changes within farm woodlands to be separated from those taking place in other types of woodland, and a better understanding of the factors shaping woodlands to be developed.

Conclusions

4.23 Our review of woodlands suggests that the 1990s have been significant in terms of encouraging new broadleaved planting and promoting the restructuring and better management of the existing woodland stock. In many ways the problem of tracing the key policy changes though to their impacts on the ground is more tractable than for agriculture, but the exercise is no less interesting. Woodlands are important components of our landscapes. They are a significant habitat because they provide a range of economic and recreational opportunities for people. They are also reservoirs of biodiversity and contribute much to the character of the countryside.

4.24 In the context of taking forward the use of CS2000 data, in the short to medium term there are a number of avenues for analysis that could be attempted. These have been set out in Table 4.2. Rather than approach such analysis in an *ad hoc* manner, however, we suggest that it might be advantageous to undertake this work in more focused and policy relevant way. For example, English Nature has recently considered the opportunity that CS2000 provides for the construction of habitat accounts for nature conservation (Haines-Young *et al.* 1999, 2000). This work showed that woodlands would be a useful focus for the development and application of the approach. **We therefore recommend that DETR consider the possibility that further analysis of the woodland driver be taken forward using the habitat accounts approach in partnership with others.**

4.25 Our review suggests that there much that can be done in terms of further analysis by linking CS2000 with other national data sources such as the National Inventory of Woodland and Trees. In the longer term, however, there is also scope for gaining further information about woodland ownership and management. **We have therefore also made recommendations in terms of broadening the scope of any follow-up socio-economic survey of landowners and managers within the CS sample squares.** A survey of woodland owners and managers within the CS2000 sample squares is seen as part of the important process, described in Chapter 2, of developing a better understanding of the 'rural context' in which Countryside Survey is set.

Chapter 5. Exploring the Drivers of Countryside Change: Next Steps

5.1 Countryside Survey 2000 was not designed to look explicitly at the *causes* of change. Rather, its purpose is to *describe* change in terms of a large number of important ecological features associated with the wider countryside. The survey data can, nevertheless, give us important insights into some of the drivers of change, particularly where it can be combined with other information.

5.2 This study has focused mainly on socio-economic and policy issues relevant to the agricultural and forestry sectors. Although other types of driver have to be considered, such as those relating to the changing economic and social structure of rural communities, it is clear that even taking these two areas alone, there is scope for further more detailed analysis of CS2000 information.

5.3 In the short term it would be valuable to explore how the changes in agriculture and forestry policy that took place during the 1990s are picked up in the results of CS2000. The extent to which one may make a 'read-across' with other information sources such as the June Census, the Farm Business Study and the National Woodland Inventory, for example, would clearly be helpful for the CS2000 user community. Not only would such work inform users about the types of change detected by the Survey. It would also help us define a wider range of indicators that could be used to describe the condition of the wider countryside that would be useful for policy purposes. **We recommend that such work should be taken forward in the short to medium term, once CS2000 has been launched in November 2000.**

5.4 In the longer term it is also clear that there is a strong justification for undertaking a follow-up to the socio-economic survey carried out in the CS sample squares in 1993. Although an important element would be to collect information about the farm enterprises within the survey squares, we have argued that any further work should taken in a wider range of issues that those affecting agriculture. **We recommend that *all* types of landowners and managers are interviewed. The goal should be to build up a much better understanding of the rural context of the Countryside Survey sample squares, and hence the socio-economic and policy factors likely to shape change within them.**

5.5 CS2000 is the fourth of its kind. With each successive survey the scope of the work programme has been enlarged and its concepts refined to ensure that the outputs are relevant to current science and policy needs. This study has shown that the framework in which we seek to understand countryside change is evolving rapidly. **Previous Countryside Surveys have been based on a rigorous understanding of the environmental setting in which the survey data have been collected. As we look to the future, it is clear**

that we also need to understand more completely the social and economic situation in which change is occurring.

5.6 Agriculture and forestry will remain important drivers of countryside change. Current trends suggest, however, that many other factors, including the growth of rural industry, social and demographic change, and the relationship between town and country, will control the stock and quality of the habitats and associated landscape features that make up the wider countryside. This study, and the work we suggest should follow from it, will provide the foundation for helping us define our future monitoring needs. Ultimately, it may help us gain a better insight into the environmental consequences of these other, important socio-economic drivers of countryside change.

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Appendix 1:
Drivers of Countryside Change
(Work Package 2.1)

Rural Sustainability and Countryside Change

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RURAL SUSTAINABILITY 1988-1998

(A) EU level developments

(1) Models of Sustainability

The integration of ideas of 'sustainable development' into EU policy has been slow, with an emphasis on environmental and economic rather than social aspects. Within the Single European Market Act of 1987, Article 130r "*urged*" the community to incorporate environmental considerations into all aspects of policy. The article was amended five years later in the 1992 Maastricht Treaty which "*requires*" the commission to do so (Cobb, *et al*, 1999:210). The Fifth Action Plan for the Environment 1992 was titled ***Towards sustainability***, and had 'sustainable development' as its guiding principle. Its aim was "to initiate changes in the current trends and practices which are detrimental to the environment, so as to provide optimal conditions for socio-economic well-being and growth for the present and future generations". The focus was on policy integration (economic, environmental and social objectives) in 5 key areas: agriculture, energy, industry, tourism and transport (Wilkinson, 1997). The principle of subsidiarity and shared responsibilities of stakeholders was stressed but the social aspects of sustainable development (such as poverty) were not substantially addressed. However, while this represented an important shift from policies responding to environmentally-damaging events to policies addressing fundamental causes of environmental damage and was the key vehicle to deliver on Rio commitments, it was not a legally binding document for either Member States or the Commission (Butt Philip, 1998; Collier, 1997). Only as late as June 1997 in the Amsterdam Treaty did the EU commit itself institutionally to the principle of sustainable development. Article 2 was amended to include a commitment to sustainable development of economic activities as well as sustainable and noninflationary growth and a new Article 3c strengthened the integration of environmental protection into all community policies and activities (Cobb, *et al*, 1999; Haigh, 1998). While it is generally agreed that these changes have emphasised environmental protection and sustainable development within the EU, the European Environment Agency review of the Fifth Action Plan was scathing, criticising the non-attainment of objectives across the board (ENDS, 1996; Cobb, *et al*, 1999)

(2) Land Use and Planning Policy

During this period land use planning was left to individual member states and a variety of approaches are found (Reynolds, 1998: 239). One important piece of legislation in this area is the 1985 EIA Directive (85/337) which applies to major development projects. However, Reynolds (1998) reports that "there have been more complaints to the European Commission about the failure to implement the EIA Directive than any other piece of European legislation" (p.241). There is no landscape policy as such in the EU, as Reynolds (1998) argues "not least because of the lack of a Europe-wide constituency for the concept of 'landscape'" (p.237). Wildlife legislation has developed from the Birds Directive of 1979 (79/409) (see Dixon, 1998). However, while the EU has been responsible for the development of a considerable amount of wildlife and other environmental legislation, implementation in member

states has been patchy due to a lack of commitment to directives by individual governments and a lack of enforcement powers within EU structures.

(3) Rural Development Policy

The EU has tended to regard the CAP as the main vehicle for rural development strategies, based on an exogenous model of rural development and the idea that agriculture lies at the heart of the rural economy. Problems of rural development were to be addressed principally through agricultural industrialisation and specialisation and the encouragement of labour and capital movement between rural and urban areas (Lowe *et al*, 1998). From 1979 there was some modification of this approach through the pursuit of Integrated Development Programmes in Less Favoured Areas.

However, by the late 1980s it was recognised that employment in agriculture and other primary industries was in widespread decline in rural Europe but that new industrial and service sector jobs were increasing. This together with mounting pressures to reform the CAP in the face of food mountains, emerging environmental criticisms and the Single European Act led to a major new statement on rural policy by the CEC *The Future of Rural Society* in 1988. This laid out the basis of EU rural policy for the 1990s. The statement highlighted the need to target specific problems in specific areas rather than focusing on individual sectors. The emphasis was strongly upon the locality and bottom-up development:

> "Local rural development does not mean merely working along existing lines. It means making the most of all the advantages that a particular local area has: space and landscape beauty, high-quality agricultural and forestry products specific to the area, gastronomic specialities, cultural and craft traditions, architectural and artistic heritage, innovatory ideas, availability of labour, industries and services already existing, all to be exploited with regional capital and human resources, with what is lacking in the way of capital and co-ordination, consultancy and planning services brought in from outside" (CEC, 1988:48).

The major vehicle of this new rural regional development emphasis was a reformed and expanded European Structural Funds package. This involved the evolution of the Structural Funds from its beginnings as a modest regional policy in the 1970s to a more substantial programme which aimed to meet specific, spatially-targeted, development objectives (Ward and Woodward, 1998: 4-5).[1] Five objectives dealing with specific aspects of uneven development were devised and three of these have had made available substantial funds for development in rural areas. These were Objective 1, aimed at the poorest regions of the EU; Objective 2, aimed at those regions suffering from de-industrialisation; and Objective 5b which was specifically targeted at the economic diversification of vulnerable rural areas (Ward and Woodward, 1998:5).[2] Two phases of funding were proposed: 1989-1993 and 1994-1999. The second phase

[1] The Structural Funds had three components: the Regional Development Fund (ERDF); the European Social Fund (ESF); and the European Agricultural Guarantee and Guidance Fund (EAGGF).

[2] To qualify for Objective 5b status, as Ward and Woodward (1998: 5) highlight an area had to demonstrate: "a below average level of economic development; employment dominated by the agricultural sector; and poor levels of agricultural incomes". Supporting secondary criteria included "problems of peripherality; depopulation; and a susceptability to economic pressures in the face of further CAP reforms".

involved the further enlargement of funds, accounting for about 30% of EU budget, and the spatial expansion of area designations (Ward and McNicholas, 1998:28). For example, the Objective 5b programme expanded to a budget of approximately £5.722 billion (ECU 6.869 billion), covered 32.7 million people (8.8% of the total EU population) and just over a quarter (26%) of the EU territory (McNicholas and Woodward, 1999:10). However, there have been questions raised over the environmental implications of Objective 1 and Objective 5b policies, with criticisms over the extent of integration of environmental and socio-economic aspects (Reynolds, 1998: 241).

At the same time as the Structural Funds were reformed and expanded, a smaller range of 13 Community Initiatives were introduced by the EC. These were deemed to be experimental and operated at a smaller scale. LEADER (Liaisons Entre Actions de Developpement de l'Economie Rurale) was the most important rural initiative of this type. However, LEADER was strongly linked to Objective 1 and Objective 5b as each designated LEADER territory must fall within an Objective 1 or 5b area and only 10% of resources can be spent outside these territories (McNicholas and Woodward, 1999:16-17). LEADER was also based on ideas of bottom-up/endogenous rural development. This led to new development structures in rural areas incorporating local community organisations, private interests and public agencies. The first programme ran to 1994 and has been judged to have been limited in scope and effectiveness but with some successes in rural participation (Lowe *et al*, 1998). The second programme, LEADER 2, ran from 1994-1999.

The profile of rural (as opposed to explicitly agricultural) development was also raised in EU circles by the 1996 Cork Declaration, *Rural Europe - Future Perspectives.* This set out a 10-point rural development programme to "promote rural development which sustains the quality and amenity of Europe's rural landscapes (natural resources, biodiversity and cultural identity) so that their use by today's generation does not prejudice the options of future generations", stating that "in our local actions we must be aware of our global responsibilities".

(B) British level developments

(1) Models of sustainability

The UK interpretation of 'sustainable development' was strongly influenced in the late 1980s and early 1990s by neo-classical environmental economics approaches to reconciling environmental and economic concerns which revolved around the recasting of parts of nature as natural 'assets' and suggesting market-led mechanisms for giving them a price. The most prominent example was the work of Pearce, *et al* (1989) *Blueprint for a green economy,* commissioned by the Thatcher government in the late 1980s. This helped established a strong and persistent tendency to play down the social aspects of sustainability in British policy. The 1990 White Paper on the Environment, *This common inheritance*, set out Britain's environmental strategy to 2000 in preparation for the 1992 Rio Conference but focused on environmental protection rather than sustainable development. It was, nonetheless, the UK's first attempt at a coherent policy strategy on the environment. Most of the key developments were institutional, including

the establishment of two ministerial environmental committees, the appointment of green ministers in each government department and the instigation of annual departmental reporting. However, one of the ministerial committees was soon abandoned and there was little evidence of the routine use of appraisal documents. In a review of the White Paper in 1992 a new presumption in favour of economic instruments rather than regulation was set out (Voisey and O'Riordan, 1997). In the judgement of Voisey and O'Riordan (1997), by 1996 the White Paper process had had "little real effect in terms of integrating environmental considerations into other policy areas, and even less with regard to sustainable development". However, they note that it had established a "significant institutional structure for the implementation of sustainable development in the future" (p.29).

In 1994 the DoE published the UK's first sustainable development strategy (*Sustainable development: the UK strategy)* which was part of UK commitment to reporting progress with Rio initiatives. It set out the UK's national strategy for implementing sustainable development to 2012. This document also gave legally-based regulation a secondary role, in this case to voluntary adoption of environmental good practice. Nonetheless, it did accept the concept of demand management concept, established a new landfill tax, and set up new institutions outside government departments (for example, the British Government Panel on Sustainable Development, the UK Round Table on Sustainable Development and 'Going for Green'). However, it lacked targets and budgetary commitment. For example, Local Agenda 21 responsibilities were given to local authorities but with no extra finance provided. In 1996 the second combined review of the White Paper and Sustainable Development Strategy again highlighted the use of voluntary agreements in achieving sustainability.

Despite this, the UK was a prominent player in international sustainable development processes after the Rio Conference. It had a good record on Agenda 21 and was one of only 13 countries reporting on progress by 1996. Furthermore, in Environment Minister, John Gummer, it had a recognised environmental champion. Nonetheless, the UK's prominence at international level has been heavily reliant on its reporting efficiency and record of institutional reforms rather than on evidence of changes in either administrative culture or policies. Where it proved to be most innovative and active was at the local level in the creation of LA21s (Voisey and O'Riordan, 1997). In 1995, nearly three-quarters (71%) of Local Authorities were committed to the LA21 process and by 1997 73% were pursuing LA21 strategies with 50% having begun work on Sustainability or State of the Environment reports (Tuxworth and Carpenter, c.1995; Morris and Hams, 1997). Yet, as Christie (1994) has noted, due to cuts in the power and resources of local government, early policies were characterised as "strong on imagination and commitment and short on resources and powers of coordination" (p.17). In his opinion the early 1990s were characterised in the UK by "a policy culture of dis-integrated centralism, in which local government has been shorn of powers and resources, central government and its agencies find it hard to coordinate policies, and the operation of the minimally-regulated market is given priority" (p.17)

In March 1996 a preliminary set of 120 sustainable development indicators were produced by the DoE. However, these mainly dealt with economic and environmental aspects of sustainability and downplayed the social elements. For example they did not consider issues such as crime, culture and social cohesion. Thus, Voisey and O'Riordan

(1997) conclude that in the mid-1990s in the UK sustainable development was "defined narrowly with little recognition of the implications for wider society and individual behaviour, and the radical agenda of equity, democracy and empowerment" (p.27).

(2) Rural Policy and Rural Institutions

A number of changes were made to key rural institutions during the 1988-1997 period. In 1989, the management of water systems in England and Wales was reorganised. The former Regional Water Authorities were replaced by new private water companies and a new national regulatory organisation, the National Rivers Authority. Privatisation led to significant amounts of former publicly owned land being transferred into private ownership (Richardson *et al*, 1991; Maloney and Richardson, 1994). The NRA challenged established British approaches to environmental protection, characterised by informality and negotiation, by pledging to act as "a tough and effective regulator" (quoted in Seymour *et al*, 1999). However, in practice there was greater continuity than change in the way it dealt with industry in general and agriculture in particular (Seymour *et al*, 1999). In 1996 the NRA was incorporated into the Environment Agency along with Her Majesty's Inspectorate of Pollution (HMIP), the Waste Regulatory Authorities and some small units from the DoE. This new cross-source agency was a major institutional step in facilitating government goals of integrated pollution control. The new organisation focused strongly on issues relating to waste management in its early years.

In 1991 the Nature Conservancy Council (which covered England, Wales and Scotland) was broken up and replaced by English Nature, the Countryside Council for Wales (CCW) and Scottish Natural Heritage (SNH). While this represented a devolution of responsibilities, there were fears from a range of environmental groups that environmental standards and objectives would be diluted, particularly in Scotland (Winter, 1996:216).

In England and Wales, privatisation pressures also affected the operation of MAFF from 1987 when ADAS was given powers (under the 1986 Agriculture Act) to charge for its advice and the government indicated that a strongly commercial approach would be adopted. As Winter (1996) notes, this move removed one of the key pillars of post-war agriculture settlement, free advice. While this can be seen as a legitimate move in light of surpluses of agricultural production, it has been judged as "profoundly inappropriate" in terms of the wider restructuring pressures faced by agriculture at this time (Winter, 1996:239). The mid to late eighties saw farmers being encouraged by government schemes, social pressures and, in some cases, economic signals to adopt more environmentally-friendly practices (for example the ESA scheme from 1987), to diversify their businesses (for example the 1986 Interdepartmental working party on Alternative Land Use and the Rural Economy (ALURE) and the 1987 DoE and MAFF statement, *Farming and Rural Enterprise*) or to address rising concerns over agricultural pollution. The government came under criticism from a range of environmental pressure groups and academics to revise its intentions and promises were made to continue free provision of 'public good' advice. However, subsequent studies have highlighted significant budgetary limits to this 'public good' advice (Winter, 1996:239; Lowe, *et al*, 1992 and 1997). In 1992 ADAS became a 'next steps' agency which was subcontracted to provide 'public good

advice' by MAFF. In addition, MAFF partially funded FWAG to provide conservation advice to farmers. This has produced concerns that pollution and landscape issues were only weakly covered as FWAG has little tradition of expertise in these areas. There is also evidence that this division in the delivery of 'public good' advice between FWAG, "based firmly on the principles of voluntarism and compromise" and ADAS and other statutory agencies with a conservation, landscape or environmental protection remit, has been strained (Winter, 1996:243). Winter (1996) attempts to provide an overview of the total provision of advice given in 1993/4. This suggests that Northern Ireland and Wales were considerably less well covered than England and Scotland in terms of holdings coverage and that Scotland and Wales were the worse off in terms of area coverage. On average, 13% of farmers in Britain had received a FWAG visit and over 20% a visit from ADAS. However, the rate of coverage in the early 1990s for ADAS and FWAG combined was about 4% of holdings a year. Winter (1996:249) concludes that policy greening in this area was slight and that resources for advisory services were "small" with only a "relatively low proportion of farmers" affected by advisory efforts.

In 1997 the Farming and Rural Conservation Agency (FRCA) was created as a specific agency with the remit to deliver public good advice. With around 480 staff covering England and Wales this would appear to offer an increase in resources spent on such advice. An added responsibility of FRCA was the administration of the Countryside Stewardship Scheme, taken over from the Countryside Commission in 1996. This represented a strengthening of MAFF's role in the delivery of agri-environmental initiatives.

In 1995 the government issued the first comprehensive statements of policy towards the countryside (rather than just agriculture) of England, Wales and Scotland since the Scott Report of 1940s (DoE/MAFF, 1995; Scottish Office, 1995; Welsh Office 1996). They can be seen as indicative of an emerging attitude towards the countryside as a rural rather than an exclusively agricultural space and are indicative of the challenges posed to the authority of MAFF over countryside matters from the mid-1980s (for example over agricultural pollution, where the challenge came from the NRA, and over BSE and other public health matters). All three Rural White papers are characterised by the theme of government through 'community'-led initiatives. Central government is cast as an 'enabler' in the economic sphere and a 'partner' in the social sphere, not as a manager in its own right (Murdoch, 1997; Edwards, 1998). Such an emphasis sits clearly within the rhetoric of the Rio conference and neo-liberal economics. The emphasis placed on rural people helping themselves draws particularly on ideals of strong rural communities:

> "Self-help and independence are traditional strengths of rural communities. People in the countryside . . . do not expect the Government to solve all their problems for them . . . . In any case, local decision-making is likely to be more responsive to local circumstances than uniform plans. Improving the quality of life in the countryside starts with local people and local initiative." (DoE/MAFF, 1995:16)

However, there was no substantial new money to encourage this community action and the approach set out in the White Paper has been criticised as a "covert withdrawal of the state" (Murdoch, 1997). As Martin (1999) has highlighted, bottom-up approaches run the risk both of legitimising spending reductions by government agencies and of allowing particular 'community champions' powers which may undermine traditional local representative politics.

(3) Rural development

As in the EU, Britain has tended to equate rural development with agricultural development. Rural development *per se* has taken a back seat both institutionally and in terms of budgetary power. While the Rural Development Commission (RDC) (an agency of DoE) has a history stretching back to the early years of the twentieth century, it has lacked power and resources in relation to the agricultural (MAFF) and planning lobbies (DETR). Rural Development Programmes were the principal area-based initiative by which the RDC set out to achieve its objectives. By 1984 there were 27 such areas in England. The principal strategy of the RDC up to the early 1990s was to promote employment provision (Bowler and Lewis, 1991:164). However, the objectives of the RDC were pursued principally through the funding of a network of voluntary organisations, most notably the county-based Rural Community Councils. Some writers (such as McLaughlin, 1987) have argued that this voluntary approach has played down the importance of government-led strategies in other rural agencies and allowed them to by-pass responsibility for rural development. Others, such as Cherry and Rogers (1996), have argued that it is "quite difficult to point to formal policies of rural community development in Britain" (p.174).

The RDC has nonetheless played a key role in highlighting issues of rural deprivation, the lack of affordable housing, threats to local services and social exclusion (Martin, 1999:170). It has encouraged local appraisals at parish level and funded community development workers in some of the most deprived areas (Martin, 1999:171). A notable example of its work is 'Rural Action for the Environment', a bottom-up rural environmental initiative set up under the government's 'Action for the Countryside' programme which was launched in 1992 and funded by the Countrysdie Commission, English Nature and the RDC. Although it had only a modest budget of £3.2 million over three years, by 1995 all of non-metropolitan England was covered by one of its 40 network teams, offering expertise to local communities and a commitment to the bottom-up ethos of the initiative (Martin, 1999).

However, the RDC's initiatives are small compared to the rural development schemes funded under the EU regional development initiatives (although it is a key provider of matched funding for EU initiatives – McNicholas and Woodward, 1999:20). The first round of Objective 5b funding in 1988 led to the designation of four areas: Dyfed-Gwyness-Powys in Wales; the Scottish Highlands and Islands; Dumfries and Galloway; and parts of Devon and Cornwall. In 1994 the designations were extended to create 11 Objective 5b areas in the UK, as set out in Table 1. In addition, the Scottish Highlands and Islands were redesignated as an Objective 1 region (Ward and McNicholas, 1998).

Table 1: Objective 5b regions of the UK 1994-1999

Region	*Area* (sq km)	*Pop*	*Funds* (£m)
Rural Stirling & Upland Tayside	6900	71000	21
North & West Grampian	4193	149000	33
Borders	4714	103881	25
Dumfries & Galloway	6400	147800	39
East Anglia	2410	230770	50
Lincolnshire	3094	190878	44
Marches	3200	148000	34
Midlands Uplands	1000	41305	10
Northern Uplands	14286	374000	90
South West	7350	775304	183
Rural Wales	14271	623828	153
TOTAL	67818	2855765	682

Source: Ward and McNicholas, 1998:32

Under the LEADER 2 initiative, 66 areas of the UK were approved for the receipt of funds, twenty in England, eight in Wales, 14 in Scotland and 24 in Northern Ireland (McNicholas and Woodward, 1999:17).

(4) Population change

Between 1981 and 1991 the combined national populations of England and Wales underwent a slight decline of –0.1%. However, this disguises a trend of decline in Wales and of increase (by 3.8%) in England. Strong trends of counterurbanization in the preceding decade (1971-1981) were dampened but general trends of a decline in the populations of Inner and Outer London , metropolitan areas and large cities and an increase in the populations of non-metropolitan areas, including remoter, mainly rural areas, continued (Lewis, 1998:138-141). In fact, remoter, mainly rural areas were the fastest growing areas of England and Wales from 1981-91, growing by just over 6%. However, significant regional and local differences were found and most of this rural growth was confined to areas south of the Wash. Some rural areas continued to experience population decline, some at district level, some in particular parishes. From the early 1980s regional rural population increase occurred mainly in a growth belt extending from "East Anglia through Northamptonshire and Oxfordshire to Wiltshire, Dorset and Hampshire" (Lewis, 1998: 141). Outliers of significant rural growth (5-10%) were also found in parts of the South West, mid-Wales and the Welsh Marches. Much of the change is due to in-migration. The overall growth rate for rural areas was 6.9% compared to 3.8% for England as a whole (1981-91).

Table 2: Population and Population Density in Scotland, 1999

UA	*1999 Population*	*Population density*	*%age Change in pop: 91-99*
Rural			
Highland	208,600	0.08	2.2
Western Isles	27,560	0.09	-6.3
Argyll & Bute	89,730	0.13	-3.9
Shetland	22,740	0.16	0.9
Orkney	19,600	0.20	0.2
Scottish Borders	106,400	0.22	2.2
Dumfries & Galloway	146,800	0.23	-0.3
Perth & Kinross	134,030	0.25	5.0
Aberdeenshire	212,650	0.34	4.5
Stirling	84,700	0.39	4.0
Moray	85,210	0.38	1.2
Angus	109,840	0.50	1.3
S Ayrshire	114,250	0.95	0.6
E Ayrshire	120,940	0.97	-2.4
RURAL SCOTLAND	1,497,840	0.21	1.4?
SCOTLAND	5,119,200	0.98	0.2?

Source: Scottish Executive Central Research Unit, 1999

Between 1991 and 1998 rural Scotland's population increased by 1.3%, whilst the population of Scotland as a whole was relatively stable, rising by only 0.3%. The major reason for this was urban-rural migration. Although most migration was found to be within a given locality, this migration has reversed the long-term trend of depopulation. Rural districts close to the central belt experienced the most in-migration (see Table 2) (Scottish Executive Central Research Unit, 1999).

Drawing on a survey of 700 respondents, the Scottish Executive Central Research Unit (1999) found migrants to be younger, more economically active, wealthier and better educated and in-migration was judged to have brought many benefits to rural Scotland. Long-term residents (resident since at least 1981) were generally found to welcome in-migrants.

Reasons for the continued attraction of rural areas were numerous. A growth in rural employment opportunities (see below), enhanced by new forms of communication (encouraging migration to more remote areas) and cheaper sites for industrial development (mainly in more accessible rural areas) has encouraged both employees and individual entrepreneurs into the countryside. The greater ability to commute longer distances from home to work due particularly to rising car ownership has also enabled the increased use of the countryside as a residential space, despite rising rural house prices (see below). People have also been encouraged to the countryside by rural ideals, which include the perception of a cleaner, healthier environment in rural areas, and ideas of urban areas as places of crime and pollution, exacerbated by weak urban regeneration policies. This has led to a continuing preference for a rural life style, particularly amongst young families and rising numbers of increasingly wealthy

and mobile retirees. The nature of the 'rural idyll' was summarised by Little and Austin (1996) in the following way:

> "Rural life is associated with an uncomplicated, innocent, more genuine society in which traditional values persist and lives are more real. Pastimes, friendships, family relations and even employment are seen as somehow more honest and authentic, unencumbered with the false and insincere trappings of city life or their associated dubious values." (p.10)

A survey by the Countryside Commission in 1997 reported that over half the population expressed the desire to live in the countryside (cited in CA, 1999:8).

By 1998 about 20% of the population of England lived in rural areas. Most rural settlements in England are very small (over three-quarters have populations of less than 500) but most of the rural population (over two-thirds) lives in settlements of 1,000 to 10,000 people (CA, 1999: 7). The rural population is older, on average, than the national population (CA, 1999: 7 citing ONS Mid Year population estimates, 1996).

(5) Land use and planning policy

The key elements of the planning system of England and Wales were set out in the 1947 Town and Country Planning Act. This aimed to contain the development of urban areas and protect the countryside from 'inappropriate developments'. Key policies have been the designation of green belts, designed to prevent 'urban sprawl', and the omission of many agricultural changes from the system of planning permission. The planning system has a strong tradition of local (county and district) control and discretion in planning. Preservationist attitudes, strongly influenced by ideas of the countryside as a place of scenic beauty, free from industries apart from traditional (non-industrialised) agriculture and suitable for residential and rural recreational activities, characterise the planning system in England.

Murdoch and Marsden (1994), however, report that an "increased emphasis on a *laissez-faire* approach was evident in DOE planning circulars of the mid-1980s" and ascribe this to "tentative moves" by central government to "'free up'" the planning system (p.26). This coincided with the 'crisis' of productivist agriculture in the 1980s, which led to government calls for diversification of the rural economy. Policy statements such as *Farming and Rural Enterprise* (1987) suggested that restrictions on industrial and residential development of agricultural land might be loosened and the Farm Diversification Grant Scheme (1988-92) encouraged farmers to diversify into new agricultural or non-agricultural activities.

Murdoch and Marsden's (1994) case study work in Buckinghamshire suggests that local planners were generally more likely to give planning permission for developments (such as golf courses, light industrial units, housing) during this period but that action from local residents was important in influencing the location of such developments. For example, Murdoch (1993) reports evidence that the development of areas for aggregates extraction is restricted by preservationist pressures in the SE of England whereas it is much more extensive in Scotland where such pressures are less acute despite a greater potential for environmental impact (p.237).

By the late 1980s, lobbying of central government by a range of countryside and environmental groups central led to a renewed commitment to "protecting the land from sporadic development" (Murdoch and Marsden, 1994:26). Thus, the 1991 Planning and Compensation Act strengthened the planning process by bringing all rural areas under the local development plan-making process for the first time (Murdoch and Marsden, 1994). It also set out to regulate local discretion further through regional government office scrutiny of plans and MAFF and RDC comments with respect to rural diversification (Elson *et al*, 1995:ii)

Revised Planning Policy Guidance note 7 (PPG 7) *The Countryside and the Rural Economy* was published in January 1992. The guidance gave priority to building re-use (Elson *et al*, 1995: v). In a 1995 analysis of this policy based on 32 case study authorities, it was argued that "Plans in the more 'accessible' areas, those closer to the main urban areas, were more advanced than those in the more 'remote' rural areas" (Elson *et al*, 1995: i). Most plans were found to have regard to the need to balance and integrate conservation and development, although "strong priority" was given to restrain development in statutorily designated areas and on the "best and most versatile" (presumably in agricultural cropping terms?) agricultural land (Elson *et al*, 1995: ii).

In a subsequent study undertaken between October 1997 and July 1998 to assess the position of rural development in land use planning policies it was concluded that local rural planning strategies tend to prioritise environmental protection over the meeting of economic and social needs (Elson *et al*, 1998). While planning application approval levels are generally high, clear variations in the rates of approval of non-residential applications were found according to different types of rural areas. Areas defined as "deep rural" had a 90.7% approval rate, whereas for "mixed rural areas" the rate was 86.4% and for urban fringe areas, 80.9%. Even wider variations were found between individual planning authorities (Elson *et al*, 1998: xii). The most frequent reason given for the refusal of planning permission was argued to result from "an outdated view of what are appropriate uses in the countryside". It was concluded that "Many authorities continue to operate a very strong presumption against uses not directly related to farming the land", including equestrian uses, a range of types of farm diversification, and recreation, tourism and transport uses (Elson *et al*, 1998:94). Such an approach seems out of step with the changes to the industrial and employment mix of the countryside which have resulted in a "multi-use, multi-activity environment" (Elson *et al*, 1998:94), and contrasts with national DETR sustainable development policy (DETR, 1999).

A DoE report covering land use changes from 1985-1994 indicates that only about 2% (285,000 ha) of the area of England was affected by change. However, the most important type of land use change over the period was the transfer of land **between** different rural land uses (defined as agriculture; forestry, open land and water; minerals and landfill; and outdoor recreation) and this affected 130,000 ha. There was a further net change of 60,000 hectares of land from rural to urban uses (defined as residential; transport and utilities; industry and commerce; community services; vacant) (this constituted about 0.5% of all land classified as in rural land use) (DETR, nd).

In relation to land use change between rural land uses, agriculture experienced the greatest losses of 29,000 ha to other rural land uses. The top five trends were: a shift of 27,000 ha from agriculture to forestry, open land and water; a shift of 21,000 ha from one type of agriculture to another; a shift of 18,000 ha from forestry, open land and water to agriculture; a shift of 17,000 ha from agriculture to outdoor recreation; and a shift of 14,000 ha within the category of forestry, open land and water. Agriculture was also the greatest loser in terms of transfers of land from rural to urban uses. The five top trends here were: a shift of 28,000 ha from agriculture to residential use; a shift of 13,000 ha from agriculture to transport and utilities; a shift of 7,000 ha from agriculture to industry and commerce; a shift of 3,000 ha from agriculture to community services; and a shift of 2,000 ha from outdoor recreation to residential. However, there is evidence of a slowing trend of land moving from rural to urban land use classes. The annual net change fell from 8,000 ha in 1987 to 6,500 ha in 1992 (DETR, nd).

(6) Housing

While the population of Britain has witnessed a slight decline since 1981, it has been projected that 4.4m new households will form between 1991 and 2016 (DETR Website). The early years of this projection have witnessed considerable demands being placed on rural areas for residential development.

By 1996, there were nearly 4 million dwellings in rural England. This constitutes a fifth of the country's total housing stock. Five per cent of this stock was built between 1991 and 1996 (DETR, 1996). Regional variations in house-building are strong. For example in the South East (excluding London) the projection is for 1,103,000 new households between 1991 and 2016, with the expectation that 25% of these will be related to in-migration (DETR, 1999). Housebuilders in the South East also expressed a marked preference for building on green field land as this was felt to be both easier and safer (DETR, 1999).

The percentage of land for new residential development taken from rural land uses fell from about 53% in 1985 to 43% in 1997 (of this 37% was from agriculture, with the remaining 6% from a mix of other rural land uses). In terms of residential development in urban and rural areas in 1997, however, 54% of the land used had not been previously developed. There were also wide regional variations linked to such averages, for example in 1995 the figures range from 81% in London and 54% in the North West to 37% in the East Midlands and 32% in the South West (DETR, nd). Continued demand for rural dwellings has resulted mainly from a growth in households due to more people living alone and also due to the ongoing growth in the rural population, the need to provide affordable housing for the significant proportion of rural dwellers on low incomes (about a quarter of rural residents in England and Wales are in or on the margins of poverty according to Cloke *et al*, 1995 and Milbourne, 1997), a lack of residential properties in cities, and demand for second homes. Although less than 1% of rural homes are second homes, there are considerable spatial variations with some districts in National Parks having considerably higher levels (CA, 1999:23-4).

In more peripheral areas of Scotland the demand for housing has mainly been met through the sale of vacant agricultural dwellings or the upgrading or conversion of

older rural properties. In areas closer to the central belt, however, the stock of such buildings is limited and the greater rates of in-migration has resulted in increasing house prices and the need for increased provision of social housing (Scottish Executive Central Research Unit, 1999).

(7) Changes in rural industries

By the 1990s employment patterns in the rural areas of Britain were similar to those of the whole country. The Countryside Agency recently reported that, by 1991, rural areas in England had a "similar mix of employment sectors" as the country as a whole (CA, 1999:13) and Doyle (c.1999) reports "a convergence in the employment profiles of rural and urban areas in Scotland" from the 1980s (see also Scottish Office 1999). Generally, there has been a decline in traditional land-based rural industries and a growth in service industries in rural areas. This on the whole mirrors national patterns, with some minor variations. For example, Doyle (c.1999) reports that from 1980, rural areas recorded a "faster fall in employment in primary industries, a slower decline in manufacturing employment and a faster growth in service sector jobs than Scotland as a whole". The major exception relates to manufacturing in rural England. Whereas nationally there has been a decline in manufacturing employment, rural England has experienced significant rates of growth .

Most businesses in rural areas are small or medium sized. In Rural Development Areas 91.4% of all VAT-registered businesses in 1997 had fewer than 10 employees (CA, 1999: 15). Some rural areas also have low levels of GDP. In 1996, the English county with the lowest level of GDP per person was Cornwall, ranking below all metropolitan counties. Other mainly rural counties in the bottom 10 include Durham, Isle of Wight, East Sussex, Northumberland, Devon and Somerset (CA, 1999:17). However, rural unemployment levels are generally no higher than national averages and are lower than average in parts of England and Scotland (Doyle, c.1999; CA, 1999).

Table 3: Employment Profile of Rural Scotland (c.1992)

	Rural Areas	All Scotland
Primary	6.4%	4.4%
Manufacturing	18.4%	20.4%
Construction	6.9%	6.8%
Services	68.3%	68.4%

Source: Doyle (c.1999) and Scottish Office (1992).

NB Figures exclude the self-employed.

i) Rural manufacturing

Between 1960 and 1991 when Great Britain as a whole lost nearly 43% of its manufacturing employment, rural areas were exceptional in experiencing growth in this sector. By 1991 rural areas had about 250,000 more manufacturing jobs than in 1960, an increase of 45% (North, 1998:167).Townsend (1993) argues that rates of growth in rural manufacturing slowed during the 1980s and he reports only a 4.6%

increase in remoter rural areas from 1981-89. Nonetheless, rural England, in particular, contains areas which have been recognised as important elements of the international economy and are placed among the leading investment frontiers (North, 1998). This growth in rural areas has been attributed to a number of different causes: the availability of spacious and lower cost sites, the attraction of rural environments to employees in terms of rural ideals and the quality of life, the availability of cheaper and less unionised or militant (often female) rural labour, the impacts of telematics (telecommunications and computer technology) and government and EU policy (North, 1998). While several authors ascribe considerable significance to telematics (eg North, 1998 and Doyle, c.1999), Grimes (2000) argues that although teleworking was "widely hyped as the best prospect for rural areas" it "continues to be predominantly an urban or suburban phenomenon" (p.13).

Townsend (1993) argues, using a shift-share analysis, that this shift has occurred in both southern and northern areas of Britain. Remoter rural areas of southern Britain gained about 40,000 more manufacturing jobs between 1981 and 1989 whereas those in the north gained 33,000. The implication of these findings is that the urban-rural shift is independent of industrial structure (North, 1998).

Shifts have been particularly marked with respect to high technology industries (synthetic materials, pharmaceuticals, electronic goods, scientific and medical instruments and telecommunications). However, here strong regional concentrations of change are apparent. Rates of growth are highest in East Anglia, the South-West and central and northern Wales. Nonetheless, the bulk of high technology industry remains in the South East region. Even in rural regions where high growth rates have been experienced, growth tends to be strongly spatially concentrated. For example, Gould and Keeble (1984) in their study of new firms in East Anglia, reported that three-quarters were located within 48kms of Cambridge.

ii) Rural services

The greatest growth in rural based industries over this period has been in the service sectors, not traditionally associated with rural areas.

In Scotland, Doyle (c.1999) reports that from 1981-91 there was "an increase of 36000 jobs in schools, hospitals and social services" and of 5000 jobs in business services (excluding hotels and catering), and that evidence points to the continuation of these trends in the 1990s (Scottish Office, 1999).

iii) Rural tourism

Tourism is one of the world's largest and fastest growing industries and rural tourism is a growing industry in Britain in terms of both land use and employment (Butler *et al*, 1998). In 1996, it was reported that there were 1.3 billion day visits to English countryside in 1996 (UK Leisure Day Visits Survey). Walking is the single most popular recreational activity in the countryside (CA, 1999:32). However, there has been a growth in both some more traditional (eg walking, watching wildlife, visiting country houses) and novel recreational activities (eg mountain biking, rock climbing and water sports) in the countryside.

In Scotland, Doyle (c.1999) reports that tourism is widely considered to be the biggest potential source of rural development and is seen as an essential component of any development strategy (Scottish Office, 1998). Figures available for Scotland as a whole indicate that tourism-related activities provide around 177,000 jobs and create revenue of £2,655 billion pounds and thus are more important in these terms than agriculture where the comparable figures are 68,000 jobs and £1943 million (Doyle, c.1999).

Although tourism has been recognised to have considerable economic benefits, it also has a number of ecological and social problems associated with it. A report by the Scottish Tourist Board in 1992 highlighted five main pressures from tourism in Scotland:

1. Pressure from people, leading to footpath damage, disturbance to wildlife and trampling effects on vegetation.
2. Pressure from traffic, leading to congestion and pollution.
3. Visual intrusion, caused by inappropriate design and siting of facilities.
4. Untidiness, caused by litter and wastes.
5. Conflicts between different users.

(cited in Murdoch, 1993)

iv) Agricultural change and diversification

In 1997 there were 144,777 farm holdings in England and Wales, covering 92,233km2 (CA, 1999:18). A total of 417,400 people were employed in agriculture (1.7% of national workforce) in 1997. This represents an average of 4.4% of the population of rural districts (1991). However, again there are strong regional variations, with some areas much more reliant on agricultural employment. For example, in South Holland (Lincolnshire) and Leominster (Herefordshire), 15% of employment was in agriculture (1997). The longer-term decline in agricultural employment continued over the period, with a 14% decline in agricultural jobs from 1987-97, mainly amongst agricultural employees. Farm incomes followed a pattern of "fluctuating decline" from the 1970s (CA, 1999:21). A pattern of low incomes in the late eighties and early nineties was followed by a recovery in the mid-1990s and sharp decline in 1997/8 (CA, 1999:21).

There is considerable debate over the extent of farm diversification in Britain. This is partly due to differences in definitions, partly to varying levels of commitment to the idea of a 'post-productivist transition' dating from the mid-1980s/early 1990s and partly to a lack of comprehensive data (Morris and Evans, 1999).

In a study of three English counties Evans and Ilbery (1992) estimated that only 6% of farms had accommodation enterprises and only "a fraction" of these "generated significant income" (Morris and Evans, 1999: 353). Subsequent studies, however, have suggested higher levels of agricultural diversification. For example, Ilbery *et al* (1997), in a 1994 survey of 1,250 farm businesses in three areas of England, found three out of ten had some form of business diversification, although most had only one. There were also considerable variations between the areas. In the Oxfordshire lowlands 33% of farm businesses had diversified whereas the figure for the West

Midlands urban fringe was slightly lower (29%) and considerably lower for the Northern Pennines uplands (23%).

Studies adopting a pluriactivity perspective report even higher levels of diversification albeit dominated by off-farm employment. For example, in a Scottish survey of 1989 Dalton and Wilson found that 40% of farms had adopted some form of diversification with the majority accounted for by off-farm employment. Similar results were found in the 1993 Scottish survey by Dent and colleagues who reported that 59% of all farm households were engaged in either on-farm diversification or off-farm employment, with most of the activity having been initiated since 1987. Once again off-farm employment was dominant, constituting 60% of all diversification activity. Thus, by 1995, 41% of employment on full-time holdings and 85% of work on smallholdings was of a part time nature (see Doyle, c.1999).

A recent English survey by Gasson and colleagues (1998) which surveyed 491 farmers in 1997 which asked about measures taken in response to the financial uncertainties of the 1990s found that while most had relied on conventional productivist responses, most notably increasing production from existing enterprises (65%), nearly a fifth (18%) had started non-farming enterprises (Winter and Smith, 2000).

Overall most work suggests that farm diversification has been limited to date, with particular spatial concentrations relating to market opportunities, local opposition and planning policies (Ilbery and Bowler, 1993; Murdoch and Marsden, 1994) although some of this diversification has led to the multiple use of land defined as agricultural.

Rural Sustainability 1998 to date

(1) Models of Sustainability

In November 1998, DETR (established under the new Labour government in 1997) signalled its broader understanding of sustainability when it issued 13 'quality of life' indicators which included environmental, economic and social indicators. Its revised UK sustainable development strategy of 1999, *A better quality of life: a strategy for sustainable development* took this understanding a step further. Unlike the earlier strategy, this places importance on the social as well as the environmental and economic dimensions of sustainable development and is much more in line with the ideals of sustainability established at the Rio Conference. Its main aims are as follows:

- social progress which recognises the needs of everyone
- effective protection of the environment;
- prudent use of natural resources; and
- maintenance of high and stable levels of economic growth

(2) Rural Policy and Rural Institutions

Major changes in British rural institutions are related to the devolution of powers from Whitehall. In 1999 the Scottish Parliament and Welsh Assembly were established and given responsibility for rural

affairs in their respective countries. In England Regional Development Agencies were established and given responsibility to deliver 'sustainable development' at the regional level. England also witnessed the disbanding of the Rural Development Commission whose responsibilities were divided between the RDAs and a new national organization, the Countryside Agency which replaced the Countryside Commission . There have also been calls for the reform of MAFF or its replacement by a new Ministry of Rural Affairs which would better reflect the changing priorities of rural areas (UK Round Table on Sustainable Development, 1998).

Consultations have recently been issued for new rural policy documents (DETR/MAFF, 1999; Scottish Office, 1998). *Rural England: A Discussion Document* contains a strong emphasis on sustainable development based on economic, environmental and social aspects and a embraces a vision of a living and working countryside:
"The White Paper will look at the longer-term future for the English countryside and at how policies on the economy, health, transport, education, the environment, crime, agriculture, planning and many other areas will support a sustainable countryside and rural communities in the future. . . It will look at how social, economic and environmental objectives can be integrated to ensure there is sustainable development." (para 1.5)
It includes a greater stress than the 1995 Rural White paper on the interdependence of town and country and rural areas as 'countryside for all'. This latter element is also embodied in the *Countryside and Rights of Way Bill* issued in March 2000 in which public access to about four million acres of mountain, moor, heath, down and registered common land is proposed.

Another significant development is the inclusion of a new Rural Development Regulation in the Agenda 2000 CAP reforms. This will entail the compulsory formulation of Rural Development Plans by all member states and is an indication of an albeit slow shift away from ideas of rural areas as purely agricultural spaces.

(3) Population
For comprehensive data it is necessary to wait for 2001 census for national level changes which could then be cross-referenced with CS2000 information). However, most local authorities have made population projections and have planning application data. This would allow evaluation of the impacts of population changes and new housing development on environmental quality. The trends in England suggest that while the national population is likely to fall slightly, counterurbanisation is likely to continue.

(4) Housing
It has been estimated that 1m more homes will be built in rural areas of Britain by 2011. In February 1998 the government issued a policy document entitled *Planning for the Communities of the Future*. This set out a pledge to "raise the national proportion of new homes to be built on previously developed land to over 60% over the next 10 years". It also included this target as one of its headline indicators of sustainable development (see DETR 1999). It is thus likely that the transfer of undeveloped land in rural land uses (principally agriculture) to residential land use will continue to decline slowly. However, it should be noted that the government has chosen to use the less demanding target of the proportion of homes built on previously

developed land rather than the proportion of previously developed land used for residential development.

(5) Agriculture and farm diversification

The likely trends are for a further decline in agricultural employment and a modest increase in agricultural diversification. Several recent surveys have found that farmers are planning for more diversification. For example. a postal survey of 1,925 farmers in the south west of England by PROSPER (1998), found that 21% planned to start non-agricultural enterprises to secure their futures (Winter and Smith, 2000). Likewise an ADAS (1999) survey of 2,352 farmers in England and Wales (a response rate of 37%) found that expansion and diversification were the most important future survival strategies reported by farmers. Forty per cent of farmers hoped to survive by purchasing more land, 54% are seeking to rent more land, 64% envisage developing non-farming sources of income and 50% are looking to diversify (Winter and Smith, 2000).

A Scottish study by Allbrooke *et al* 1998, comprising a postal survey in March-April 1998 of farms in Dumfries and Galloway with 119 responses found 19 farmers (16%) planning to increase income through diversification. Another Scottish study by Ramsay *et al* (1999) based on a postal survey of 429 farmers in the Borders area of Scotland found that nearly a half (46%) envisaged a need to develop non-agricultural sources of income, with holiday accommodation and off-farm employment the most likely developments (Winter and Smith, 2000).

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Appendix 2:
Drivers of Countryside Change

(Work package 3.1)

Incorporation of data from Processes Study into CS2000 Database

Matt Lobley and Clive Potter

28 March 2000

Drivers of Countryside Change

Phase 1 Study

Incorporation of data from Processes Study into CS2000 Database

Matt Lobley and Clive Potter

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The Data

Summary and overview

The 'Processes' data were collected through face to face interviews with 504 occupiers of land in 169 ITE sample squares during 1993. The interviews were conducted using professional interviews employed by Produce Studies Ltd and were of good quality throughout. We can therefore be confident of the quality of the data although difficult questions and those open to interpretation are noted below. A wide range of data was collected relating to:

- Land in the sample square
- The farm & land use
- The farmer & farm family
- The farm business
- Future plans

The data table (below) provides full information for each variable. It will be seen that some of the variables represent responses to questions where farmers were asked to make informed but subjective assessments such as PRESENT (current economic situation of the business) and FUTURE (expectation of economic change over next five years). While there are obvious health warnings attached to such data, they nevertheless capture a respondent's overall perceptions and exceptions and it is these that influence future plans and decision making. In other cases, for example financial data, there is of course scope for obsfication on the part of the respondent. This is true for all questionnaire surveys and we have no reason to expect our data to be any more inaccurate than others. In fact, we have very reason to believe it is more accurate as the interviews were conducted face to face (it is easier to 'lie' on a postal questionnaire) and interviewers were fully briefed before hand and instructed to probe fully for complete and accurate answers. One other point to note is the section on land within the square. The idea behind these questions was to establish the 'typicality' of land within the square compared to the rest of the farm as many of the other questions necessarily relate to the whole farm. Each respondent was shown a photocopy of the relevant sample square (taken from the 1:25,000 OS sheet and asked to conform their land holding and then answer a

series of questions relating just to that land. In the majority of cases, respondents felt that their 'square land' was broadly typical of the whole farm.

Coverage of squares

As part of the Wye College Processes study a total of 833 potential respondents were identified in 204 squares subject to field survey in 1978, 1984 and 1990. Of these, 50 names were eliminated for reasons of double counting or ineligibility (chiefly because they were not agricultural holdings or because both landlord and tenant were listed),leaving an effective sample of 783 occupiers. The overall response rate was 64% although varied slightly by landscape type (61% in the combined marginal & upland category, 64.1% in pastural landscapes and 66.3% in arable landscapes). Overall, the survey covered 42% of the total land area of 169 squares with a mean coverage (by area) of 62%. Actual coverage ranged from less than 1% to 100% coverage by area. Thirty-two per cent of squares had less than 50% coverage, whereas 34% had 80% or more of their surface area covered by the survey.

Linking Processes and CS data

Four variables can be used to link the *Processes* data with CS data:

LANDCLAS – ITE land class

LANDTYPE - Landscape type (note: the marginal upland and upland landscape have been merged due to low responses in the Upland group)

SQNO – ITE sample square number

OCCID – ITE ownership/occupancy boundary unit

Using the latter two together allows the *Processes* data to be linked to CS databases. In 32 cases the farm survey identified an occupier of land within a square not previously identified by CS (where NEWOCC = 1) i.e. 472 cases can be matched with CS1990 data

The variable SQOW gives each case a unique code derived by multiplying the ITE square number by 100 and adding OCCID.

Data Format

The *processes* data has been supplied in two formats. The file DETR1 is in *SPSS* format (version 9.0.0). Ideally, this is the most useful format as it includes all the variable and value labels (see table below). In addition, the same data has been supplied as an Excel 97 file (DETR2). In this case the first row of the spreadsheet contains all variable names but the associated variable and value labels are missing. Cells reading '#Null!' contain the SPSS default system missing character " . ".

The Data

Most of the variables in the table below are self explanatory. The series of GOAL and GOALBAR variables however, require some explanation. Farmers were presented with a list of 8 farming 'goals' and asked for each one to state if it was not important, fairly important

or very important to them. They were then presented with a list of possible constraints (e.g. GOALBAR1 – the size of the holding) and asked if these were a minor or major constraint, or irrelevant.

Data table

No of Cases: 504
No. of variables: 141

The Square

Variable name	Variable label/meaning	Values	Value labels
LANDCLAS	ITE Land Class	1....32	
SQNO	ITE Square number		
OCCID	Occupier Identification number		
SQOW	Sqno*100+occid		
LANDTYPE	Landscape Type	1 2 3 4	Arable Pastoral Marginal & Upland Upland
COUNTRY	Location	1 2 3	England Scotland Wales
NEWOCC	New occupier, not previously identified	1 2	Yes No
STATUS	Respondents status	1 2 3 4 5	Sole operator Partner Director Manager Other
SQTYP	Is square land typical?	1 2	Yes No
SQLAND1	Change in square land holding post 1990	1 2	Yes No
SQCHANG1	Bought land since 1990	1 2	Yes No
SQCHANG2	Sold land since 1990	1 2	Yes No
SQCHANG3	Rented land since 1990	1 2	Yes No
SQCHANG4	Let land since 1990	1 2	Yes No
SQPER	Square land performance	1 2 3 999	Better Worse Average N/A
SQREA1	Better/worse soil type	1 2 *999*	Yes No *N/A*

SQREA2	Better/worse drainage	1 2 999	Yes No N/A
SQREA3	Better/worse topography	1 2 999	Yes No N/A
SQREA4	More/less difficult access	1 2 999	Yes No N/A
SQREA5	Other reason	1 2 999	Yes No N/A
SQCHANGA	New agricultural building since 1978	1 2	Yes No
SQCHANGB	New non-ag building since 1978	1 2	Yes No
SQCHANGC	Field boundary removal since 1978	1 2	Yes No
SQCHANGD	Underdrainage since 1978	1 2	Yes No
SQCHANGE	Drained marshy ground since 1978	1 2	Yes No
SQCHANGF	Reclaimed rough grazing	1 2	Yes No
SQCHANGG	Converted grass to arable since 1978	1 2	Yes No
SQCHANGH	Converted arable to grass (not SA) since 1978	1 2	Yes No
SQCHANGI	Increased fertiliser on grass since 1978	1 2	Yes No
SQCHANGJ	Reduced fertiliser on grass since 1978	1 2	Yes No
SQCHANGK	Increased fertiliser on arable since 1978	1 2	Yes No
SQCHANGL	Reduced fertiliser on arable since 1978	1 2	Yes No
SQCHANGM	Increased stocking density since 1978	1 2	Yes No
SQCHANGN	Reduced stocking density since 1978	1 2	Yes No
SQCHANGO	Changed cropping patterns since 1978	1 2	Yes No
SQCHANGP	Increased pesticide/herbicide since 1978	1 2	Yes No
SQCHANGQ	Reduced pesticide/herbicide since 1978	1 2	Yes No
SQCHANGR	New tree planting	1 2	Yes No

SQCHANGS	Replanting trees	1 2	Yes No
SQCHANGT	Entered conservation scheme since 1978	1 2	Yes No
SQCHANGU	Entered Set Aside since 1978	1 2	Yes No

The farm & land use

FMTYPE	Farm type classification	1.0 2.0 3.0 4.0 4.1 5.0 6.0 7.0	Dairy Cattle and Sheep Arable Mixed other Pigs and poultry Horticulture other (e.g. all set aside)
FARMAREA	ha size group	1 2 3 4 5	very small (<20ha) small (20<50ha) medium (50<200ha) large (200<700ha) very large (>=700ha)
TENURE	Farm tenure	1 2 3	wholly owned wholly rented mixed
HOLCHAN1	Change in holding area since1978	1 2	yes No
	Changes on newly acquired land:		
NUCHAN1	New ag building	1 2	Yes No
NUCHAN2	New non-ag building	1 2	Yes No
NUCHAN3	Field boundary removal	1 2	Yes No
NUCHAN4	Underdrainage	1 2	Yes No
NUCHAN5	Drained marshy ground	1 2	Yes No
NUCHAN6	Reclaimed rough grazing	1 2	Yes No
NUCHAN7	Converted grass to arable	1 2	Yes No
NUCHAN8	Converted arable to grass (other than sa)	1 2	Yes No
NUCHAN9	Increased fertiliser on grass	1 2	Yes No
NUCHAN10	Reduced fertiliser on grass	1 2	Yes No

NUCHAN11	Increased fertiliser on arable	1 2	Yes No
NUCHAN12	Reduced fertiliser on arable	1 2	Yes No
NUCHAN13	Increased stocking density	1 2	Yes No
NUCHAN14	Reduced stocking density	1 2	Yes No
NUCHAN15	Changed cropping patterns	1 2	Yes No
NUCHAN16	Increased pest/herbicide use	1 2	Yes No
NUCHAN17	Reduced pest/herbicide use	1 2	Yes No
NUCHAN18	New tree planting	1 2	Yes No
NUCHAN19	Replanting trees	1 2	Yes No
NUCHAN20	Entered conservation scheme	1 2	Yes No
NUCHAN21	Entered set aside	1 2	Yes No
NLANUS1	Arable area		Area (ha)
NLANUS2	Area under fodder crops		Area (ha)
NLANUS3	Area under other crops (ex grass)		Area (ha)
NLANUS4	Area of temporary grass		Area (ha)
NLANUS5	Area of permanent grass		Area (ha)
NLANUS6	Area of rough grazing		Area (ha)
NLANUS7	Area of woodland		Area (ha)
NLANUS8	Area of set aside		Area (ha)
NLANUS9	Area of roads, buildings, etc		Area (ha)
NLANUS10	Other non-ag land		Area (ha)
ENTCHAN1	Set up new enterprise since 1978	1 2	Yes No
ENTCHAN2	Closed down enterprise since 1978	1 2	Yes No
ENTCHAN3	Expanded enterprise since 1978	1 2	Yes No
ENTCHAN4	Reduced enterprise since 1978	1 2	Yes No
ENTCHAN5	Unchanged since 1978	1 2	Yes No
ENTPREV	Significant enterprise change before 1978	1 2	Yes No

The farmer and farm family

AGRIED	Formal agricultural education	1 2	Yes no
SUCCESS1	Expectation of succession	1 2 3 4 999	definitely yes definitely no *don't know/too early to say* hopefully/probably N/A
MARRIED	Whether married	1 2	Yes No
CHILD	Any children?	1 2 999	Yes No N/A
FARMAGE	Age of farmer (respondent)	1 2 3 4 5	Under 35 35-44 45-54 55-64 65 and over
LABOUR1	% of total labour met by family	1 2 3 4 5 6	less than 25% 25-50% over 50 but less than 75% Over 75 but less than 100% 100% N/A
LABOUR2	Change in family labour since 1978	1 2 3 999	More less same N/A

The farm business

DEBT1	*Any debts or loans*	1 2 999	Yes No N/A
DEBT2	% of income needed to service debt	1 2 3 4 5 6 999	none less than 25% 25-50% over 50-75% over 75% Don't know D/K, refused etc
DEBT3	Change in debt level over last 5 years	1 2 3 4 5 6 999	increased a lot increased slightly no change fallen slightly fallen a lot other D/K

ECONSIT	Current economic situation of farm business	1 2 3 4 5 999	very good good fair poor very bad D/K, refused, etc
OFFJOB1	Regular off farm work (respondent)	1 2	Yes No
OFFJOB2	Gross off farm income	1 2 3 4 5 6 999	less than £1, 000 £1-4, 999 £5-9,999 £10-14, 999 £15-19, 999 over £20, 000 N/A, d/k etc
FUTPART	Ever considered future part time farming	1 2 999	yes no N/A
DIVERSE1	Existence of farm based non-ag enterprises	1 2	Yes no
DIVERSE2	Ever considered diversifying	1 2 999	yes no N/A
INPROP1	Any change in relative importance of income sources in recent years?	1 2	Yes No
DEPEND	Dependence on agricultural income	1 2 3 4	<40% 40<75% 75<95% =>95%
FUTINCOM	Contribution of non-farm income excepted to change in future?	1 2	Yes no
HIREWOK1	Any hired labour employed	1 2	Yes No
HIREWOK5	Change in hired labour over last 10 yrs	11 2 3 999	more less same N/A
HIREWOK6	Any future labour reduction	1 2 3 999	yes no undecided N/A
YEARS	Years on farm		
ORIGAREA	Area at time of takeover		

INVEST1	Does rate of investment = depreciation?	1 2	Yes no
INVEST2	Any significant new capital investment since 1978	1 2	Yes no

INVEST3	Type of investment: Buildings	1 2 3	Yes No N/A
INVEST4	Type of investment: Machinery	1 2 3	Yes No N/A
INVEST5	Type of investment: Equipment	1 2 3	Yes No N/A
INVEST6	Type of investment: Other	1 2 3	Yes No N/A
INVEST7	Investment linked to general restructuring	1 2 3	Yes No N/A
TURNOVER	Farm business turnover	1 2 3 4 999	less than £20, 000 £20-49, 999 £50-99, 999 over £100, 000 D/K, refused, etc
INCHANGE	Change in NFI over last 5 years	1 2 3 4 5 6 999	increased a lot increased slightly same fallen slightly fallen a lot other N/A

CONINV	Any conservation management or investment since 1978	1 2	Yes No
LANDIN	any land in schemes	1 2	Yes No
CONFUT	Any future conservation plans	1 2	Yes No
CONSIDR2	Ever considered joining scheme in future	1 2 3 999	yes no d/k N/A

The Future

FUTFARM	Still farming in 10 years time?	1 2 3	yes no d/k
FUTINV	Plans for future investment	1 2 3	yes no undecided
LANDPLAN	Plan to acquire more land	1 2	Yes No

POSITION	Expectation of economic change over next 5 years	1 2 3 4 5	become much better become better stay the same become worse become much worse
FUTURE	Expectation of economic change over next 5 years	1 2 3 4 5	become better become better stay the same become worse become worse
PRESENT	Current economic situation of farm business	1 2 3 4 5 999	good good fair poor very bad D/K, refused, etc
FUTPLAN	Future work plans	1 2 3 4 5 999	never retire will retire at some stage semi-retire at some stage already semi-retired & will remain so already semi-retired & will retire completely N/A
GOAL1	Making reasonable living	1 2 3	Not important fairly important very important
GOAL2	Maximising profits	1 2 3	Not important fairly important very important
GOAL3	maintaining value of holding	1 2 3	Not important fairly important very important
GOAL4	Maintain involvement as hobby	1 2 3	Not important fairly important very important
GOAL5	Carry on family tradition	1 2 3	Not important fairly important very important
GOAL6	Enjoying farm life	1 2 3	Not important fairly important very important
GOAL7	Being progressive and up to date	1 2 3	Not important fairly important very important
GOAL8	Looking after countryside	1 2 3	Not important fairly important very important

GOALBAR1	Size of holding	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR2	Cost & availability of capital	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR3	Level of income from holding	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR4	Availability of family labour	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR5	Cost of hired labour	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR6	Health reasons	1 2 3	Minor constraint Major constraint Irrelevant
GOALBAR7	Other reasons	1 2 3	Minor constraint Major constraint Irrelevant
GOODFARM	Attributes of good farmer	1 2 3	Stick to tried & tested practices Follow new practices where well tested Keen to experiment with new methods

Appendix 3:
Drivers of Countryside Change

(Work Package 3.2)

Review of Processes Study in the Context of Cs2000

Clive Potter and Matt Lobley,
Imperial College, Wye

29 March 2000

DRIVERS OF COUNTRYSIDE CHANGE
PHASE 1 REPORT, WORK PACKAGE 3.2

REVIEW OF PROCESSES STUDY IN THE CONTEXT OF CS2000

Clive Potter and Matt Lobley

1. INTRODUCTION

The agricultural policy driver is still one of the most important in the British countryside. However, it would be wrong to attribute countryside change solely to the Common Agricultural Policy, technological change and market forces also playing a powerful role in determining longer term trends in farming practices and farming systems. Still, at the time of the last socioeconomic survey of the Countryside Survey sample squares in 1993, the decisions of farmers were still demonstrably conditioned by the price support and 'coupled' system of producer aids available under the Common Agricultural Policy (CAP). The overall impression at that time, in fact, was one of stasis rather than change, with farmers poised between the ending of one period of very significant agricultural restructuring and the beginning of another. Change in the recent past appeared to be increasingly confined to special situations – for instance, on farms where succession was taking place or where an occupier, for a variety of reasons, was striving to 'catch up' through a programme of intensification and enterprise change. As the *Processes* study put it "By implication, the stable majority (of farmers) have already carried through land cover changes and there is a strong sense in which the CS1990 has caught the tail end of a process that was once much more widespread and less farm specific than it has since become" (Potter and Lobley, 1996, p87). We expected more change to come, probably in response to implementation of the next round of CAP reforms that was then imminent but also brought about by longer term and more secular trends in farmer inheritance, succession and retirement and by changes in the culture of farming.

In the event, the intervening seven years have been very eventful ones for British agriculture and farmers have seen their operating environment change in ways that would have been hard to predict in 1993. Ironically, policy change has played a relatively minor role in this transformation, though the decade has seen determined efforts to decouple agricultural support from farmers' production decisions. The effects of the 1992 CAP reforms, while significant under any normal circumstances, have been eclipsed at farm level by the combined impact of movements in world market prices and the devaluation of Sterling against the Euro, producing first a boom and then a deep recession in farming fortunes. Over the decade, farming incomes have risen and then, for some sectors, collapsed and while there has not as yet been a sharp 'correction' in asset values, the number of farm bankruptcies is on the increase. As Gasson et al (1998, p2) conclude, "In retrospect, 1996 coincided with the end of an interlude of relative prosperity for British agriculture. The industry was about to experience a series of shocks".

It is probably too early to say how far the recession which arrived in 1997 has translated into changes to farming practice, land cover and biodiversity. All the evidence from farm surveys carried out since the *Processes* study (none of them of course linked to the Countryside Survey sample squares) suggest a surprisingly graduated farmer response, with much less structural change than one might expect, farmers instead making a series of adjustments in order to 'carry on farming'. Having said that, subtle adjustments to farming practice and agricultural systems can add up to often profound changes in landscape and wildlife terms and these set the framework in which the CS 2000 results need to be understood. The purpose of this section is threefold:

First, to explain changes to the policy and economic context of farming that have occurred since the last socioeconomic survey of the Countryside Survey sample squares took place;

Second, to speculate about the farmer response to these trends and events and to present a broad interpretation of their likely land cover and ecological effects;

Third, to assess the scope for further interpreting the CS2000 results through a reanalysis of available data but also to explore the case for a repeat socioeconomic survey of the sample squares.

2. Policy Change and Economic Recession: The Changing Context of CS2000

Respondents to the 1993 survey already knew that change was on the way in the form of the 1992 CAP reforms. With the exception of the dairy sector, the agricultural situation in the EU in the early 1990s seemed little better than a decade before, with cereal surpluses a particularly pressing problem. Policymakers were finally beginning to acknowledge the basic unsustainability of a policy which was highly expensive, politically inconvenient and incompatible with the international liberalisation of trade. By this time, it was clear that the outcome of the Uruguay Round of trade talks would be an international commitment to liberalise agricultural support. This, together with the challenges of eastward expansion of the EU, and the need to bring the farm budget under tighter financial control, led to the MacSharry reforms. In essence, the MacSharry package aimed to reduce EU dependence on the use of export subsidies and reform domestic support by cutting intervention prices and introducing a system of direct compensation payments to farmers that were partially decoupled from production. The final package of measures agreed in 1992 included:

- a significant reduction in support prices for cereals and beef, with more moderate reductions in dairy price support;
- the introduction of a new system of compensation aids to arable farmers (in the form of the Arable Area Payment Scheme) and augmented livestock premium payments to beef and sheep producers together with a new premium payment to dairy farmers;
- the introduction of a set aside requirement for arable farmers, set at a rate of 15% for the first year;

- the introduction of a series of 'accompanying measures' designed to boost rural development and agrienvironmental schemes

At the time various predictions were made of the impact on farming incomes across the UK (see, for example, Oglethorpe, et al, 1993). Farmers interviewed in the sample squares at this time were broadly optimistic about the future, many expecting an improvement in their economic position as a result of the reforms. We noted that livestock farmers were significantly more bullish than their arable counterparts, however, and it was usually the most expansionist farmers with the strongest entrepreneurial instincts who believed they would continue to expand their core farming businesses in the years ahead.

In practice, bouyant world market prices and the devaluation of Sterling following the UK's withdrawal from the Exchange Rate Mechanism in the autumn of 1992, combined to bring about a mini boom for nearly all types of UK farmers, but especially cereal producers. Importantly, these largely masked the market consequences of the MacSharry reforms, confining their effects to the adjustments farmers found they had to make in order to remain eligible for the (now significantly appreciating) compensation payments. Between July 1992 and July 1994 the green pound increased in value by a quarter, strengthening the floor under market prices and increasing the effective value of compensation aids from Brussels. Arable farmers particularly benefited because of strengthening world market prices. According to the Farm Business Survey (FBS), net farm incomes in this sector rose strongly each year from 1987/8 until 1995/6, with the 1995/6 figure more than double the 1992/3 average.

By the autumn of 1996, however, the tide had turned as Sterling began to gain in value against most major currencies and the value of the green pound declined (the latter losing a third of its international value during 1996 and 1997). UK intervention prices for cereals and other supported commodities fell by 13% during 1996/7. Since then, Sterling has maintained its value to the extent that during the first half of 1999 the value of the Euro against the pound fell by a further 5.7%. The result has been a pronounced fall in commodity prices received by UK farmers and an effective devaluation of compensation payments. Total farm income fell by 38% during 1996/7 and by a further 29% in 1997/8 (MAFF, 1998). For arable producers, the mid 1990s were unexpectedly good years as farmers rode the way of devaluation, high world prices and the overcompensation on offer to them under the MacSharry package. Net farm incomes rose steadily each year from 1987/8 until 1995/6. Since this peak, incomes have declined consistently, falling by 44% on average during 1997/8. Beef producers have fared even worse. The 1980s and early 1990s saw many lowland dairy farmers turning to semi-intensive beef production after the imposition of milk quotas in 1984. Cattle numbers rose from 600,000 in 1980s to 800,000 in 1990 in England following a significant shift in beef production from the uplands to the lowlands. Despite this, returns from lowland livestock enterprises have long been volatile and the combination of an appreciating currency and the beef export ban has been to cut net farm incomes on average by 114% between 1995 and 1998/9. Although there are important regional variations in performance, the dairy sector, once it had adjusted to the imposition of quotas, shared in the prosperity of the early to mid

1990s. For farmers with sufficient milk quota, bouyant world prices and the effects of depreciation together with increased competition between processors following deregulation, have been highly favourable and average net farm incomes rose steadily for dairy farmers during the first half of the decade. The decline since 1996 has been decisive, however, with average incomes in 1998/9 a third of those in 1995/6. Hill farm incomes have continued their long decline, with annual fluctuations around a downward trend. The safety net of agricultural support has become increasingly important, 160% of net farm incomes accounted for by direct subsidies by the mid 1990s. Nevertheless, the slump in cattle prices during 1996/7 undoubtedly reduced the viability of many cattle and sheep farms in LFAs, average net farm incomes declining by 44% over the following year.

3. A First Assessment of the Farmer Response

For many farmers, the late 1990s have consequently been among the most difficult in their farming careers and unprecedented media attention has pushed the 'farming crisis' up the political agenda. By comparison, the implementation of the MacSharry reforms earlier in the decade has been a fairly painless process, eliciting little response beyond that already planned and certainly failing to bring about the restructuring and extensification of production which many were expecting. From their study of a random stratified sample of 558 farmers in GB, Winter, et.al. al (1998) concluded that the effect of the reforms were limited to the management changes necessary to ensure compliance with the conditions of the new compensation payments on offer, particularly in the arable sector. The most obvious example was set aside, set at 15% for the period 1993 but then fluctuating, falling to 10% in 1996 and 5% in 1997. In mid decade (when the set aside rate was 18%), over 700,000 hectares were taken out of crops and put into rotational and non rotational fallow in the UK (MAFF, 1997). Arable farmers also found that, under the eligibility rules for the Arable Area Payment Scheme (AAPS), they were unable to convert land that had been in permanent grass in 1991 to arable or temporary grass. This put a brake on arable expansion and halted a long established trend towards the conversion of permanent grass. At the same time, however, they had a strong incentive to minimise the area of eligible land on their farms not growing eligible crops since not to do so reduced eligibility for payment in subsequent years. Meanwhile, the high profitability of arable farming throughout the mid 1990s meant that many farmers were increasing their hectarages of unsubsidised crops such as flax and potatoes and continuing to intensify production generally. Winter et al (1998, p71) deduce that "policy, in this context, (was) having a strong influence on land use but not on the intensity of the land use within that system".

For livestock producers, the new system of livestock premium payments has similarly brought about changes to the pattern of farming, especially in the sheep sector, where the combination of quotas and the partial decoupling of support (though the imposition of limits on headage payments per farm) has effectively put a lid on further expansion of the national sheep flock and encouraged a redistribution of sheep through quota trading (principally away from the lowlands in favour of the upland fringe). Beef producers, by

comparison, have been little affected by the reforms, only 11% reporting any significant change to farming practice as a result of the introduction of the new system of premium payments (Winter et al, 1998). So far as the extensification payments were concerned, many discovered the ceilings were very near to, or even above, current stocking rates and thus required little adjustment to ensure continued eligibility. Dairy farmers similarly found their position little affected by the modest reforms to the quota system. Trends fostered by the quota system continued, with a further increase in the area devoted to forage maize and other cropping on farms with the capacity to intensify in this way. Farmers able to purchase additional quota from outgoing producers expanded herd size and continued to increase their share of national output.

It was only later in the decade that changing market conditions began to pose any sort of threat to the general expansion of the preceding five years. The psychological shift from optimism to pessimism was slow to take hold, however. Surveys conducted on the cusp of the 1997 slump reveal great reluctance to contemplate radical restructuring of enterprises, and a marked resistance on the part of even very financially-stressed farmers to begin to plan to 'get out of farming'. From their periodic review of the way farmers are adjusting to the cost-price squeeze, Gasson et al (1997) discovered little relationship between degree of financial pressure and degree of farmer response, concluding that, at that time at least, many were sticking with traditional ways of dealing with the recession. The "commonest responses to the financial uncertainties of the 1990s has been to increase output from existing enterprises, cut out unprofitable enterprises, reduce inputs and machinery and labour costs, increase the area farmed in order to spread costs and take financial advice ..."(Gasson, et al , 1997, p37).

Even so, by 1998/99 attitudes had begun to change decisively and a survey conducted by the NFU suggested that 57% of respondents had considered leaving the industry during the previous two years. Almost a third had reduced labour and 64% had increased borrowings over this period (NFU, 1999). In practice, though, there was still little sign of any radical restructuring,either though choice or through the agency of market forces. The NFU survey aside, few respondents to surveys were seriously contemplating getting out of farming, while the number of farm bankruptcies remained comparatively low (net worth continued to increase due to rising land values, while 45% of farmers in 1996/7 had no bank borrowings at all (MAFF, 1998)]. As PROSPER discovered from its survey of almost 2000 farmers in Devon, Cornwall, Somerset and Dorset in the summer of 1998, a majority of farmers (60%) felt that conventional adjustment strategies – chiefly cost cutting and expansion in farm output – would see them through, with a minority contemplating diversification or off farm employment to bolster their declining agricultural incomes. A similar pattern of response emerged from an ADAS survey conducted in 1999, showing 40% of respondents hoping to survive by purchasing more land and 50% looking to diversify in the next five years (ADAS, 1999).

Diversification is widely promoted as the solution for many farmers who cannot continue as mainstream farmers. In fact, far from being a lifeline for most marginal farmer, studies show that the most successful diversifiers tend to be larger than average, to have higher net farm incomes and a higher than average level of indebtedness. There is also a strong

bias in favour of urban fringe locations or areas well served by transport links and distribution networks. This is particularly true for activities involving adding value through processing and marketing, thought to be undertaken by about 10% of farmers at the present time (MAFF, 1999). Off farm employment, by comparison, is a far more widepread phenomenon. Gasson (1996) estimates that upwards of 40,000 farmers in England and Wales are able to remain in farming by virtue of other sources of earned income, with part time farmers managing over two million hectares of farmland as a group. Official estimates confirm this, suggesting that, by the late 1990s, about 25% of farms had an income of some sort from full time or part time employment off the farm (MAFF, 1999).

Yet given that the favoured strategy of most main occupation farmers is to expand output, commentators have begun to wonder how it will be possible for a majority of farmers to survive merely by buying or renting more land. Such a strategy presupposes that land has been/will be given up by someone but few potential leavers are as yet willing to identify themselves (though in terms of past actions it should be noted that farm surveys, by definition, are biased in favour of survivors). It seems likely that there has been continued farm amalgamation throughout the 1990s in the classical sense as smaller, less viable holdings have been taken over by operators looking to realise the significant economies of scale in modern production (the number of cereal farms fell by 17% in England in the ten years to 1998, with the bulk of the reduction taking place in the smallest size category; in the dairying sector 47% of dairy cows in England and Wales were in herds sizes of 100 or more in 1995 compared with 43% just three years earlier). Nevertheless, the reluctance of many family farms to give up farming has probably prevented the large shake out of land that might have been expected during such a deep recession. What appears to have happened instead is a trend towards renting or contracting out the management of land by farmers who are either on a trajectory out of agriculture or have elected to become part time operators by taking up employment off the farm. For the small family farmer forced to take up other gainful activities to supplement farming income, the ability to lease out land under short term agreements means that the farmland resource is still generating income and occupancy can continue. For the elderly farmer on the point of retirement, often nowadays without a successor, the same mechanism allows the farmer and his or her spouse to continue to live in the farmhouse but also to maintain the family name on the land. In either case, structural change is postponed but the effective management of increasing areas of arable and grassland is transferred into the hands of farms large enough to remain viable as agricultural businesses.

The surge in demand for contracting services, on the other demand, comes partly from mainstream farmers but also from new entrants who are setting up 'residential farms', living in the farmhouse and continuing to engage in full time employment outside agriculture. In one of the more intriguing features of recent agricultural change, people from a variety of backgrounds are choosing to contract out the management of their land in order to minimise capital outlays and maximise flexibility. According to MAFF (1999) estimates, as much as 10% of all farmed land in the south east, an area experiencing the greatest influx of this new breed, is already farmed under contract and it is likely that coverage in areas like the Midlands will grow to 20% where arable production is

particularly amenable to contract haulage and harvesting. So far as the suppliers of contracting services are concerned, usually large, generously capitalised farms, agricultural contracting has already become the most important form of on farm diversification, and a means of realising the economies of scale in the use of machinery and equipment which could only otherwise be achieved by buying or renting more land.

4. Processes of Countryside Change in the 1990s

Agricultural restructuring is thus a reality, even if it is proceeding in a number of different directions. Established trends towards a concentration of production on fewer, larger farms have continued, as has the opposite trend towards more part time farming and pluriactivity. Overall, the number of holdings has remained steady but there has been a large increase in the number of part time farms (some commentators, for instance Ward (2000), predicting that they will outnumber full time businesses by 2004). New types of agricultural holding are also emerging in the form of 'retirement farms' and 'residential holdings' and a variety of novel land holding and management arrangements are being entered into by farmers who are determined to hold on to their farms but who find they cannot depend exclusively on the dwindling agricultural income they are capable of generating. All of these trends are likely to have had important implications for land use and the rural environment over the period covered by CS2000. Let us consider briefly what they might mean for arable, pastoral and upland landscapes respectively:

Arable Landscapes

It is likely that arable landscapes have been most directly affected by the MacSharry reforms. As noted above, the introduction of set aside, together with the eligibility conditions attached to the AAPS, has had the effect of putting a brake on arable expansion and should have prevented the ploughing up of long term grass leys and permanent grassland. On the other hand, the effects of Sterling devaluation on crop prices, at least until 1998, has been to give arable producers a great incentive to reduce temporary grass leys in the rotation in order to maximise their receipts of direct aid. Recent farm surveys suggest that fertiliser use and the application of farm chemicals has not noticeably declined on many farms, and in some cases may actually have increased (see Winter et al (1998)]. It will be interesting to see if these trends in rotations and farming practice have translated into measurable biodiversity gains or losses as revealed by CS2000. The environmental consequences of the recent downturn are harder to predict but it is reasonable to assume that the cost cutting on which most farmers are now embarked will have had consequences for the level of conservation investment and management taking place in arable landscapes. How far the increased availability of government payments for pilot arable stewardship schemes will have countered an established trend towards declining peripheral habitat on arable farms, remains to be seen. Agrienvironmental schemes to date have had a limited purchase in such situations, fewer than 6% of Countryside Stewardship agreements being for field margin management in 1999, for instance (MAFF, 1999).

Pastoral Landscapes

The 1990s have seen wide fluctuations in the profitability of livestock farming. For dairy producers, the 1992 reforms preserved quota entitlements and postponed the large scale restructuring which serious reform would usher in. Nevertheless, the long term trend towards fewer, larger herds has continued and by the end of the decade one commentator (Ward, 2000) was predicting that 50% of dairy producers were poised to leave the industry over the next five years. On farms large enough to remain viable, the trend towards more intensive grassland management has likely continued, with increased planting of forage maize and other arable crops displacing grassland, especially in England. This will have further eroded the grassland resource in places like the south west and south Wales. But it is the continued restructuring of the beef sector which will have had the most profound impact on pastoral landscapes. Lowland livestock farmers have been most severely affected by the recession and the beef export ban and a move into sheep on many such farms will have altered their grazing regimes in ways unlikely to be environmentally beneficial. A switch from cattle to sheep often produces changes in sward composition, for example. Physically, sheep are less well equipped to graze the sward of wet grassland particularly and there may be a decline in biodiversity and conservation interest as a result (Ashworth, et al, 1997). Strictly speaking, it is in pastoral landscapes that small family businesses are most vulnerable, especially in locations remote from centres of population and employment and distant from markets and processing centres. The gradual winding down of such farms, often in situations where an ageing farmer has recognised that succession will be impossible, is likely to have had its own distinct impact on the rhythm and intensity of land use and thus on the quality of the conservation resource. Elsewhere, such as in the south east, the growing importance of residential farms will already be apparent and may well be having an impact on the conservation of landscape features and habitat. Whether turning over the management of a farm to a contractor in such cases leads to further landscape and ecological decline, however, requires further investigation.

Upland Landscapes

It is conventional wisdom that upland farmers are extremely vulnerable to changes in agricultural support. Ironically, this landscape type may consequently have remained the most stable in landscape terms as increased amounts of public money have been committed to sustaining the hill farm. So long as policymakers continue with LFA support (and Agenda 2000 is robust in its commitment to hill farming support), large scale restructuring in the hills and uplands will be postponed. Nevertheless, by enabling farmers to trade their quotas of livestock payments, the 1992 reforms have already brought about a further shift in sheep production from the lowlands to the upland fringe. The continuation of headage payments meant further pressure to increase stocking on better, improveable grassland but may also have led to the removal of stock from the open hill. According to English Nature (1999), localised overgrazing accounted for 87% of all recorded damage to upland SSSIs in 1997/8. Yet there is also evidence of habitat decline due to the withdrawal and redistribution of stock elsewhere. The CS2000 is thus likely to reveal a complex pattern of intensification and extensification, with reductions

in biodiversity driven by both overexploitation and neglect or undermanagement, often on the same farm There is some evidence that structural change is taking place as the current generation of farmers fail to persuade their offspring that sheep farming in the hills is a viable way of making a living. According to recent research in Scotland (Allbroke, et al, 1998), there are already clear signs of a withdrawal from agriculture in more remote locations. This brings in its wake a process of gradually more extensive farming, and even ranching, of hill farms as farmers on a trajectory out of agriculture wind down the business and cut back on labour.

5. The Scope for Further Analysis of the 1993 and 2000 Data Sets

In the absence of a data from a repeat socioeconomic survey, it is not possible to examine the direct impact of these patterns and trends for land cover and biodiversity in the sample squares since 1993. However, some understanding of the likely causes of the changes recorded by CS2000 may be achieved indirectly through analysis of already available secondary data, including re-analysis of the *Processes* data themselves. So far as the latter is concerned, a useful exercise would be to undertake a 'look forward' from the 1993 to identify farmers and situations most likely to have been affected by the 1997 recession. The Processes study identified different categories of farmer according to whether they were on an expansionary or contracting path. These classifications were useful in explaining past change but may be good predictors of future change. One distinction which could be considered would be between those who are able to react and even exploit policy change and recession and those who are forced to absorb such change if they are to stay in farming. It would be interesting to see if the distribution of such farms exhibited any association with recorded changes in environmental stock. A cruder test of association could be between changes in levels of agricultural and off-farm income and in levels of debt and levels and rates of environmental stock change.

Having established from this whether there are any reliable proxy variables for vulnerability to recession, it should be possible to undertake a 'read across' from the June Census to the CS2000 results. Likely candidate variables would include farm size and type, enterprise mix and size, as well as amount of land given up or acquired. The limitations of such an exercise should be recognised, however. No Census data are collected on the age of the farmer, the existence of a successor or degree of dependence on farming income (though respondents are required to indicate whether they run other commercial enterprises on the farm). Previous studies suggest that these are important predictors of sensitivity to policy change and economic recession. Unlike the June Census, the FBS does collect data on income source and presents considerable detail on the significance of off farm income and income from non-agricultural enterprises. FBS also generates a range of potentially useful data on input costs, assets and liabilities and net worth. Although it is based on a random sample of full time farms, a classification of businesses on this basis may be valuable in identifying clusters of vulnerable farms and hence likelihood of particular types of management change.

6. The Case for a Resurvey of the Sample Squares

In their review of CS1990, Haines-Young and Swanwick (1998) recognise that the Countryside Surveys have been designed to describe change but not to look at the causes of change. While better analysis and presentation of the CS2000 should help to identify some of the key physical processes behind land cover and ecological change such as intensification, extensification, afforestation, deforestation, development and abandonment, it is acknowledged that there is a definite limit to its explanatory power as a stand-alone exercise. This is where the socioeconomic survey enters in because to understand *why* change is taking place requires the collection of socioeconomic data collection which are linked to physical change data. The justification for a repeat survey can be examined under three headings:

First, the alternative course of action to a resurvey are limited and may not supply the causal explanations required

As we have seen above, there is probably a good case for undertaking a reanalysis of the 1993 data set in order to present a 'look forward' to the present day based on intentions data from the survey. Assuming that the occupiers of land in the squares are mostly the same today that they were seven years ago (actually rather an heroic assumption in a period of farm structural change), it would be of interest to see if most land cover change has taken place in situations where farming expansion was planned. Unfortunately, farmers are not always reliable predictors of their own behaviour and such an exercise would be a very unreliable basis for explaining the changes actually measured by CS2000. Many of the changes to farmers' operating environments were unforseeable in 1993 and some are 'shock events' which would not have been factored into even the most prescient farmer's plans. It would be misleading to assume that these planned actions have generally been fulfilled and thus can be used to explain observed land cover change. Equally, there are problems with the coverage and depth of data sources like the June Returns or Farm Business Survey which might act as a substitute for updated socioeconomic data linked to the sample squares. Again, while it would be a worthwhile exercise to attempt a 'read across' from CS2000 data to the June Census, such an aggregated analysis would have limited explanatory power. Evidence of an association does not prove causality. For example, even if it could be shown that the highest rates of change are being experienced in locations undergoing most enterprise or land use change, this would have explained change merely in an immediate sense and is only the first step, albeit it a useful one, down the chain of causation (for instance, by explaining the actions of farmers in expanding their beef enterprise or going out of dairy). Discovering why such enterprise changes have been made and relating them back to the different drivers of change at a landscape scale can only be answered through a questionnaire survey of the individual land managers concerned.

Second, the socioeconomic data base attached to the sample squares is a unique knowledge resource which deserves to be extended and refined through a repeat survey.

To our knowledge, there is no other rural data base which links behaviour to environmental consequences in the way the socioeconomic component of CS1990 managed to do. Its importance derives from its ability to offer explanations at the parcel, square, land class and landscape level of land cover change in terms of the economic status, decision making histories and psychological motivations and aspirations of the people who actually occupy and manage farmland. This is impossible to achieve through conventional farm surveys, no matter how well designed or complete their coverage. A repeat survey would expand the explanatory power of the Countryside Survey in a number of ways. Obviously it would generate new data which would enable high change situations in the 1993-2000 period to be characterised and fully explored. The analytical possibilities would be considerable. Also, by dint of enabling comparisons of socioeconomic data between 1993 and 2000, it would facilitate one of the most comprehensive longitudinal analyses of countryside change ever undertaken. Trajectories of change within farms and locations could be defined and compared, adding significantly to our understanding of the dynamics of change.

Third, a repeat survey would give an opportunity to correct some of the limitations of the first survey and establish an improved baseline for future work.

The previous survey was rightly criticized for its exclusive focus on farmers and farm families as agents of change. A resurvey would allow for a more comprehensive coverage of other types of occupiers and land managers of land in the sample squares, leading to a more balanced view of the drivers of change. The questionnaire used in 1993 could also benefit from being updated and rebalanced. Additional questions could be introduced into the questionnaire in order to investigate new types of land holding and their consequences for land use (the phenomenon of residential farms and retirement farms, for example). A new suite of questions would also be needed to better probe the effects of policy change and to investigate the impact and effectiveness of agrienvironmental and rural development measures under the post-Agenda 2000 regime. Other corrections could include:

- increasing the coverage of the survey by surveying a larger number of squares and/or targeting the survey at particular land classes important for environmental policy purposes such as those with BAP target habitats;
- improving farmer capture within the surveyed squares, particularly in cases where coverage was below 50% of the area farmed;
- refining the measure of environmental stock used as the dependant variable in the subsequent data analysis. The Processes study used a composite measure which probably underestimated the extent of the conservation resource in arable landscapes. A resurvey would offer the chance to integrate recent thinking on indicators of biodiversity value and improve the policy applications of the work.

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Clive Potter and Matt Lobley,
Wye, March 2000

Appendix 4:
Drivers of Countryside Change
(Work Package 3.3)

Study Review of Key Trends in Agriculture

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1 INTRODUCTION

Agricultural market and policy trends in Britain for the period between 1992 and 1996 were studied at length in earlier work sponsored by DETR (Winter and Gaskell 1998). The aim of this paper is to up-date, as far as possible, our understanding of subsequent trends based on a desk review of sources published between 1996 and 2000.

The paper has four main aims:

- To examine the key trends in agricultural policy in the 1990s. (As the paper assumes knowledge of the 1992 MacSharry reforms discussed at length in Winter and Gaskell (1998), this section is necessarily quite short.)
- To examine agricultural market trends, with particular reference to the post-1997 crisis.
- To examine the responses of farmers to policy and market changes with particular reference to the period since 1995 .
- To provide a brief commentary on the Agenda 2000 reforms and their likely implications.

2 TRENDS IN AGRICULTURAL POLICY IN THE 1990s

2.1 THE MACSHARRY REFORMS

The 1992 reforms are now seen as relatively modest. However in several respects they fundamentally shifted the balance of the CAP from a system of price support to direct payments weakly decoupled from production, and when they were first introduced there was considerable expectation that they would lead to environmental benefits. The background to the 1992 CAP reform has been widely discussed (Fennell 1997, Grant 1997, Johnson 1995, Kay 1998, Ockenden and Franklin 1995, Swinbank and Tanner 1996, Winter and Gaskell 1998). The main factors in the reform were:

- a substantial reduction in commodity support prices, to bring them nearer to world market prices and to make agricultural products more competitive on the Community and world markets;

- the introduction of direct payments to compensate for the effect of lower prices on farmers' incomes;

- the introduction of measures to place limits on production levels and entitlements to payments (arable set-aside, quotas in the sheep and beef sectors, eligibility rules and limitations); and

- a number of accompanying measures, including those concerned with the environment.

In budgetary terms the reform shifted the burden of support to taxpayers from consumers, who had long paid the price of the CAP through higher food prices resulting from the protection given to European products from foreign competition[i]. Thus, direct payments have made the cost of the CAP more transparent, though more so in some sectors than others, and this helps to explain the growing expectations from environmental groups that continued CAP payments should be deliver tangible environmental results. The reforms were potentially more far-reaching in the arable sector than for sheepmeat or beef. The dairy sector was scarcely touched at all, having already experienced its own upheaval with the imposition of milk quotas in 1984 (Burell 1989, Cox *et al* 1990), nor were pigs and poultry affected. It is sometimes mistakenly assumed that pigs and poultry are not covered by the CAP. In fact both sectors, and poultry meat especially, gain some benefits from trade barriers and/or export refunds. These measures are designed to compensate poultry and pig producers for the higher prices they have to pay for cereals under the CAP.

A number of factors lay behind the reform and, indeed, the continuing reform process. First, a major issue was that of the European Union's Agricultural Budget. Intensive pressure on policy makers in the agricultural sector to reduce the amount of money spent has come from finance ministers of the European Union and representative sof consumers and taxpayers. However, whilst the 1992 reforms were aimed at restricting spending in some areas, particularly the high costs of storing and disposing of surpluses, the 1992 agreement represented a compromise among European Union members. Consequently the pruning of the budget was not as drastic as might have been expected. Indeed direct costs increased.

Secondly, pressure was being exerted at the GATT meetings, for the EU to cut agricultural support to farmers. In particular this came from the United States and the Cairns Group of countries. As growth took place in the global economy, and the Uruguay Round reached an impasse, the reforms of 1992, were forced on the European Union, by the need for it to demonstrate to its trading partners a willingness to bring in farm policy reform and reduce financial support in the farm sector.

Thirdly, by the end of the 1980s the CAP was commonly cited as a major contributory factor to all kinds of wider ills, including environmental degradation, poor farm animal welfare and rural social and economic problems. These concerns contributed greatly to the debate surrounding the MacSharry proposals.

The implementation and impact of the reform has been discussed in detail in publications arising from the CAP and the Countryside Project (Winter and Gaskell 1998a, 1998b,; Winter *et al* 1998; Winter 2000a). Subsequent modifcations to the schemes are set our in Winter (2000b).

Milk Marketing

One area of policy not covered by the MacSharry and Agenda 2000 reforms is milk marketing and this has been subject to considerable policy pressure in recent months. In July 1999 the Monopolies and Mergers Commission (MMC) published its report on the supply of raw cow's milk and found that Milk Marque to be a scale monopolist by virtue of its 49.6% share of the supply of milk in Great Britain in 1997/98. The MMC found that Milk Marque had exploited its position by using its selling system to price discriminate and to control the supply of milk made available to the market in order to raise the average price of milk above levels that would otherwise have been reached by engaging in the following practices:

- It has increased the required tolerances of its supply-led contracts to a degree greater than was necessary if its objective was to balance overall supply, and widened the price differentials between its different contract types more than was justified.

- It has forced its smaller processor customers to pay a higher average price for their milk than its larger customers to an unjustified extent.

- By imposing restrictions on the use of milk bought in its lowest priced contracts in the summer 1998 selling process, it has obliged some processors to purchase milk at higher prices than they would otherwise have had to pay.

- It has entered into individually negotiated contracts with certain large processors on terms that were neither disclosed nor made available to the generality of its customers.

- It has been able to exploit the particular aversion of some of its customers to the risk of obtaining inadequate supplies of milk or supplies obtained on adverse terms.

- It has been able to facilitate its price discrimination strategies by inhibiting the secondary trade in milk between processors.

- It has arranged for milk to be contract processed outside the market in Great Britain. Milk Marque has been able to constrain the volumes of milk offered to its usual customers in the face of largely unchanged demand, thereby raising the marginal price of milk.

- The MMC also considers that an increase by Milk Marque in its milk processing capacity may be expected to operate against the public interest, by enabling it to divert milk into processing, reducing the milk available to others and thereby raising its price.

- Milk Marque effectively sets the floor price of milk for producers in Great Britain, because of its membership policy and its high market share. Since purchasers of milk must offer producers a higher price than that offered by Milk Marque if they are to attract and retain those producers, milk prices throughout Great Britain are higher than they would otherwise have been.

  (DTI Press Notice P/99/587)

Under pressure from the DTI, in September 1999 Milk Marque announced plans to break itself into three roughly equal sized companies. Stephen Byers Secretary of State for Trade and Industry made the following announcement::

> If the plans announced by Milk Marque for its break-up are approved by its members then I will withdraw my request of 6 July 1999 to the Director General of Fair Trading that he seek undertakings from Milk Marque on the various interim measures recommended by the MMC, and advise on changes to the system for sale of milk by Milk Marque. In the meantime I am extending the deadline for receipt of those undertakings by a further month, to November 8; that is, until after the members of Milk Marque have had an opportunity to vote on the proposals of Milk Marque's Board. (DTI Press Notice P/99/756)

However, on the 29th November 1999, the NFU and the MMB were granted leave to apply for a judicial review to overturn the recommendations of the Monopolies and Mergers Commission report.

2.2 AGENDA 2000

It soon became apparent that support cost for the 1992 reform from the budget would need to increase. As originally proposed, costs from the European Union Agricultural budget would have increased by 1.9 billion euro in the dairy sector and 2 billion euro for beef by 2006. As Agenda 2000 discussions continued the costs of the Common Agricultural Policy assumed greater importance in the scheme, as the funding of the European Union and the financial transfers generated between states were examined. Two plans were proposed and rejected:

- Payment of some cost by the member state (reducing CAP spending, and redressing the budgetary imbalance between member states, to benefit those with small-farm sectors);
- Reducing headage and acreage payments, e.g. by 3 per cent per annum.

To meet a budget figure, and to reduce EU support needed, price cuts for milk were delayed till the later stages of the period, and the cuts in beef prices were reduced. This compromise package exceeded the figure originally intended by almost seven billion euro. At the request of the French Minister, the package was modified at the Berlin meeting and the limited CAP reforms, that had been introduced into Agenda 2000, were further diluted.

To obtain agreement on policy, a number of pay-offs were included to satisfy individual countries, e.g. increased milk quota, increases in cereal reference yields and drying subsidies etc. Milk quotas were left in place, area and livestock headage and crop area payments will also continue to be paid in full indefinitely. This package was planned to stretch to 2006, allowing for the next reform plan to be produced in 2005.

With prospects of disagreements between the WTO and the EU likely, it is probable that the EU will be forced to modify this watered down Agenda 2000 policy before the 2005 date stated. The other major issue, not yet fully addressed is the eastern European enlargement and how the EU will deal with this expansion of agricultural policy.

The statements of commitment for the EU agricultural policy, in 'the European Model for Agriculture, follow the same objectives enshrined in the original European Commission agricultural policy objectives of 1957, with additional emphasis on, "a competitive agricultural sector", and "production methods which are safe". Agenda 2000 continues, "a simpler more comprehensive policy which establishes clear dividing lines between collective decisions at Community level and those taken at Member State Governmental level," and "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."

It seeks 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 and more comprehensive 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.

KEY FEATURES

The key features of the Agenda 2000, reforms, as described in the Council of the European Union document, 'Agenda 2000' (1999), in Agra Europe, 12 March (1999) and 1 April (1999) are as follows (see also Swinbank 1999):

Cereals

The intervention price for cereals will be reduced by 15 per cent in two tranches for 2000 and 2001 (rather than by 20 per cent as proposed by the Commission and agreed by the Agricultural Council). Arable area payments will be increased to compensate for half this price cut. The arable area payments on oilseeds and linseed will be reduced over a three year period to equate with that of cereals, from 2002.

Beef

Support prices are to be reduced by 20 per cent by 2002, (rather than the 30 per cent as originally proposed by the Commission), and a 'safety net' intervention system is to be retained. The beef special premium and the suckler cow premium are enhanced; but the proposed dairy cow premium was not adopted. Instead, all animals become eligible for a new slaughter premium, of 80 euro per head(which is subject to normal exchange rate conversion) for animals over eight months old; Member States are entitled to pay a slaughter premium on young calves from their own budgets, at the discretion of their own governments.

Milk

The Agricultural Council had been sharply divided over milk, with some Member States seeking more fundamental reforms than those proposed by the Commission, and France and Ireland taking the view that the milk regime should be simply rolled forward unchanged. In the event the, quota regime was renewed until 2006, but with a mid term review in 2003. The 15 per cent cut in intervention prices proposed by the Commission was adopted. However the programme of price reductions will not begin in 2000 as proposed, nor even 2003 as agreed by the Agricultural Council, but instead in 2005 through three annual 5 per cent steps. In parallel with the price cuts, milk quotas will be increased by 1.5 per cent pro-rata in most Member States, Mediterranean States and Ireland will receive more than this with effect from 2000.

Support Prices

Although support prices for cereals, beef and milk have been reduced, the Commission neither proposed, nor did the council adopt any concomitant reductions in import tariffs.

Cross-compliance, Modulation and Ceilings

Member States have to determine appropriate environmental measures which must be followed by farmers if they are to receive their area and headage payments in full. The practical application of this raises questions of a bureaucratic and judicial nature.

Under modulation Member States can if they wish introduce measures to modulate the area and headage payments a farm can receive, on the basis of overall employment on the farm, overall prosperity of the holding, or the total amount of aid paid to the holding. Such funds would be used by the Member State in support to agri-environmental measures, less favoured areas, areas with environmental restrictions, early retirement, afforestation and rural development.

The Commission had proposed ceilings that, if adopted, could have made budget savings on the amount payable to any single holding.

BUDGET COST

Originally the budget was put at 307.1 billion euro over 2000-2006. In order to reduce this, and also to get a final agreement, some of the measures for reform were adjusted or dropped. The budget ended up over this figure at 314 billion euro.

- 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
- possible transformation of the support schemes in Less Favoured Areas (LFA) into a basic instrument to maintain and promote low-input farming system.
- It was these proposals which provided the basis for the lengthy discussions and debates that took place during the period.

Key details extracted from the detailed policy statement giving additional information are as follows:

MARKET PRICE REDUCTIONS

Reductions in market support prices ranging between 15% for cereals and 20% for beef will be introduced. A cut of 15% will apply to the milk sector from the year 2005/2006. The cuts will be introduced gradually with the objective of bringing Europe's farmers into closer touch with world market prices, thus helping improve the competitiveness of agricultural products on domestic and world markets with positive impacts on both internal demand and export levels. Equally important, the changes will contribute to the progressive integration of the new Member States from Central and Eastern Europe.

The institutional price reductions will be partially offset by an increase in direct aid payments, thus contributing to the aim of providing farmers with a fair standard of living. The move away from price support towards direct income support for farmers means a further decoupling of

aid from production.

FACTORS OUTSIDE THE EUROPEAN UNION

Greater market orientation will help to prepare the way for the integration of new Member States and reinforce the European Union's position in World Trade Negotiations. As stated in the conclusions to the European Council in Berlin on Agenda 2000: 'the decisions adopted regarding the reform of the Common Agricultural Policy within the framework of Agenda 2000 will constitute essential elements in defining the Commission's negotiating mandate for future global trade negotiations.'

QUALITY

The reform takes account of increased consumer concerns over food quality and safety, environmental protection and animal welfare in farming. Both in market support and in the new rural development policy, compliance with minimum standards in the fields of environment, hygiene and animal welfare is a requirement.

ENVIRONMENTAL MEASURES

Member States have to undertake environmental measures they consider appropriate. In fulfilling this obligation, Member States would have three options at their disposal. In the first place, implementation of appropriate agri-environmental measures applied under rural development programmes may be sufficient. Secondly, Member States may also make direct payments under the market organisations conditional on the observance of generally applicable environmental requirements. Thirdly, they may attach specific environmental conditions to the granting of such payments. In the latter two cases, a proportionate reduction or cancellation of payments would be applied in cases of non-compliance.

RURAL DEVELOPMENT

The new policy for rural development seeks to establish a coherent and sustainable framework for the future of Europe's rural areas. It will complement the reforms introduced into the market sectors by promoting a competitive, multi-functional agricultural sector in the context of a comprehensive, integrated strategy for rural development.

The guiding principles of the new policy are those of decentralisation of responsibilities - thus strengthening subsidiarity and partnership - and flexibility of programming based on a 'menu' of actions to be targeted and implemented according to Member States' specific needs. As a coherent package of measures it has three main objectives:

- to create a stronger agricultural and forestry sector, the latter recognised for the first time as an integral part of the rural development policy;
- to improve the competitiveness of rural areas;
- to maintain the environment and preserve Europe's rural heritage.

The agri-environmental measures are the only compulsory element of the new generation of rural development programmes and hence represent a decisive step towards the recognition of the role of agriculture in preserving and improving Europe's natural heritage. The agri-environmental aid scheme will encourage farmers to introduce, or continue to use, farming practices compatible with environmental protection and natural resource conservation.

DECENTRALISING MANAGEMENT

Direct payments to producers have been organised in a different way compared with 1992. Part of the direct payments for the beef and dairy sectors will take the form of a national

financial envelope from the EAGGF budget which Member States can distribute, thus allowing them to target specific national or regional priorities. Each Member State will be able to allocate resources freely, subject to certain Community criteria designed to prevent distortions of competition.

FURTHER SIMPLIFICATION

The Common Agricultural Policy reform contains important elements of simplification in various sectors. In the wine sector, for instance, there is now one regulation where previously there were twenty three. In rural development, again, there is now one regulation where before there were nine. But the Commission has aimed to contribute to simplification by decentralising, streamlining and simplifying programming procedures.

Following the political agreement reached during the Berlin European Council on 24 and 25 March 1999, and the approval by the European Parliament on 6 May 1999, the Council formally adopted the new regulations for the period 2000-2006 in May and June 1999.

IMPACT OF AGENDA 2000

OVERALL IMPACT

The seven main policy statements in Agenda 2000, providing the "European Model for Agriculture," are at best vague. Certainly with the devolution of some discretionary power to individual Member States, there is good reason to be aware of issues for both farmers and the environment, in relation to the UK Government's interpretation of central CAP, and what action in favour of the various sectors, that they are, or are not prepared to take.

Most of the analysis on Agenda 2000 impacts so far, has been broad based with relatively little detailed analysis. This is much to be expected, so early in the process. Babcock et al (1999) modelled the commodity policy changes arising from the Berlin Agreement to simulate their impact up until the year 2008/09. The main conclusions drawn are given below.

Impacts on Crops.

With a set-aside rate of 10% for 2000/01 and 2001/02, the Berlin agreement is not projected to have any significant impact on crop production. Total crop area declines slightly, due to an increase in voluntary set-aside area in response to lower intervention price. After 2001, the total area devoted to cereals and oilseeds increases as the set-aside rate declines. Most of the rise in area is likely to go into wheat production. The projections show the decline in the intervention price enables the EU to export wheat without subsidy from 2001/02, and commercial exports to expand above the baseline levels. The increase in wheat exports, results in a steady reduction of cereal intervention stocks. By equalising the direct payments for both cereals and oilseeds, the Berlin Agreement puts an end to restrictions on oilseed plantings contained in the GATT Uruguay Round Agreement; thus, planting decisions should be driven by market factors. Based on relative returns, oilseed area is projected to decline.

Impact on Livestock

Projections show the phased reduction in the beef intervention price prompts the release of beef intervention stocks, reducing domestic beef prices. By 2002, the intervention price reductions are complete, and intervention stocks are eliminated. In 2002, EU beef prices are 5 percent below the U.S. price. Although U.S. and European beef are not perfect substitutes on international markets, it is assumed that with the 5 percent price discount, the EU can export beef without subsidy. Beef producers in the EU respond to lower prices by decreasing

beef production. The downward pressures on beef production are offset partially by producer payments, changes in dairy cow inventories, and reductions in feed costs.

Lower beef prices encourage consumers in the EU to increase their consumption of beef. Substitution effects away from pork and poultry consumption are fully compensated by lower pork and poultry prices. Lower cereal and oilseed prices prompt small increases in EU pork and poultry production, inducing an average decline in EU pork and poultry prices.

Impact on Dairy sector

The projected impacts of the Berlin Accord on the dairy sector are modest during the first five years of the simulation period. The increase in the milk quota in 2000 and 2001 raises milk production by less than 1 percent, depressing the milk price an average of 2.5 percent. The larger increase in the dairy quota beginning in 2005 raises milk production 1.6 percent above the baseline in 2008. Dairy cow numbers are expected to decline throughout the projection period in response to greater output per cow. Butter and SMP intervention prices are reduced concurrently with the second increase in the milk quota. The combination of lower market support and increased production pushes the milk price 9.5 percent below the baseline in 2007.

Another modelling exercise in the United States, carried out by the United States Department of Agriculture, Economic Research Service in 1999 indicates in its projections that many European Union agricultural commodities will continue to be uncompetitive on world markets (Agra Europe No. 1872). It was predicted that the price cuts will allow exports of some wheat, pork, poultry and eggs without subsidy in 2000. Particular problems with the WTO may be expected in the dairy sector due to modest price reductions, i.e. exports will be difficult without subsidy. As the Agra Europe report summarised, "while the EU has given itself adequate advantage to face the World Trade Organisation round with equanimity on domestic support and imports access, it remains highly vulnerable on the export subsidy front". Konandreas (1999) of the Food and Agriculture Organisation confirms this analysis with regard to the dairy sector which accounts for 29% of all EU export subsidies and which is largely unaffected by the Agenda 2000 reforms.

The United Kingdom, Ministry of Agriculture's own analysis suggests a decline in producer returns by 2008 of 7% for the arable sector and 2% in dairying but an increase in beef returns of 5%. Considering the decline shown in the period 1997-1999 in market trends, and the deteriorating levels of return over 2000, little optimism is to be found in the estimates of future farm performance.

ENVIRONMENTAL IMPACTS

Turning to possible environmental impacts, ADAS and CSL (1999) were commissioned by the Ministry of Agriculture to examine the impact of Agenda 2000 reform proposals on pesticides and fertiliser use. This concluded that the impact of Agenda 2000 reforms, as drafted in March 1998, would be to return cropping patterns to a level close to pre set-aside levels, (based on the proposal in the initial Agenda 2000 proposals that set aside would be reduced to zero). Compared with 1996 it is predicted that set-aside will reduce by about 80 per cent, linseed would cease to be grown and peas and beans reduced by 20 per cent. These reductions would be replaced by increases in oilseed rape (78%), wheat (3%) winter barley (11%) and spring barley (20%). The areas of non-food crops are predicted to reduce significantly. The implications for pesticide and fertilise use result from the changes in crop area. The overall increases in weight of pesticide use are predicted to be insecticides 1.3 per cent, fungicides 6.0 per cent, herbicides 2.3 per cent, growth regulators 4.8 per cent and molluscicides 16.6 per cent. The increased area of wheat will lead to more isoproturon (herbicide) being used. More of the insecticide gamma-HCH will be used on oilseed rape and an increased use of pyrethroids would also be expected. Total annual tonnage of fertiliser nitrogen applied is predicted to increase by about 11 per cent and with the changed balance of cropping may increase rates from 139kg N/ha to 153 kg N/ha. The calculated impact on potential nitrate leaching of this is an increase of up to 3per cent.

A recently published study by the Utrecht Centre for Agriculture and Environment (1999) suggests that the Agenda 2000 reforms will provide minimal environmental benefits and describes the environmental rhetoric surrounding the reforms as little more than "window dressing". In the three main sectors of cereal, dairy and beef, there is no real shift towards greener policy:

> "The changes in the arable regime may have some positive effects, but these cannot be seen as a significant step towards the integration of environmental concerns into the CAP. Set-aside can lead to reduced pollution and have positive effects on biodiversity," the report concedes, but adds that the 15 per cent support price cut for cereals will do little to discourage fertilizer and pesticide use. In addition, maintaining the area payment for silage maize "has aroused concerns about loss of biodiversity, increased soil erosion, pesticide use and nutrient leaching in many regions," as farmers turn grassland to maize planting.
>
> In the dairy sector, increasing quotas for a handful of countries while the sector remains unreformed until 2005 "may lead to some further intensification and increased emissions". However, the outlook for Agenda 2000 beef reform is marginally brighter. In contrast to the arable regime, the payment system for beef "does not favour intensive beef farmers," in the EEB's view. The responsibility to allocate part of the funding in this sector (from 'national envelopes') is a "potentially important improvement, " *as it offers scope to impose environmental criteria* as conditions for payment (Agra Europe 1874).

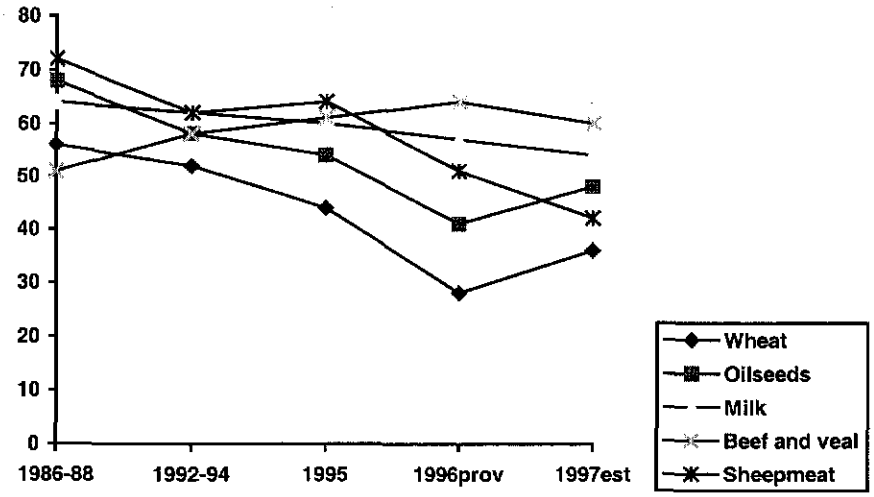
3 MARKET TRENDS

3.1 AGRICULTURAL TRENDS 1996-1999[1]

Some of the key trends in British agriculture during the period 1996-1999, with particular reference to the 1997/98 year, demonstrate the fall in the economic returns to agriculture, which is especially significant in some market prices. The drop in farming incomes is clear, especially in small farms and in the livestock areas which are in a loss making situation, a feature that is likely to continue as the new policies bite. Four re-valuations of the green rate during 1997/98 reduced the sterling value of CAP support payments by 14% (MAFF 1998), and this in particular reduced support payments.

Figure 3.1 shows the trends in Producer Subsidy Equivalents (PSEs)[2] for the period as calculated on an annual basis by the Organisation for Economic Co-operation and Development (OECD). It illustrates just how modest has been the move towards liberalisation as a result of the Uruguay Round reforms. In the case of the UK, it is interesting to note that the proportional share of total CAP spending has risen steadily over the period since 1992. In 1992, the UK accounted for 7.7% of total European Agricultural Guidance and Guarantee Fund (EAGGF) expenditure in the EU. This rose slowly to 8.9% in 1996 and dramatically to 10.8% in 1997. Initial increases in share were due to the large farm structure in the UK and the high proportion of arable farmers entering the main Arable Area Payments Scheme (AAPS). The sharp increase between 1996 and 1997 was due to BSE induced expenditure.

Figure 3.1 PSEs in Key Commodity Sectors of GB Agriculture



Source: OECD.

With the increasing value of sterling during the period between 1996 and 1998 many of the early gains experienced by the UK as a result of the implementation of the Uruguay Round agreement during a period of low sterling value have been wiped out. Both CAP support

[1] This section draws heavily on Winter 2000.

[2] PSEs represent an attempt to aggregate hidden and direct cash support for farmers through market support measures, direct payments, reductions in input costs and general services. For a full discussion of PSEs see Buckwell 1997.

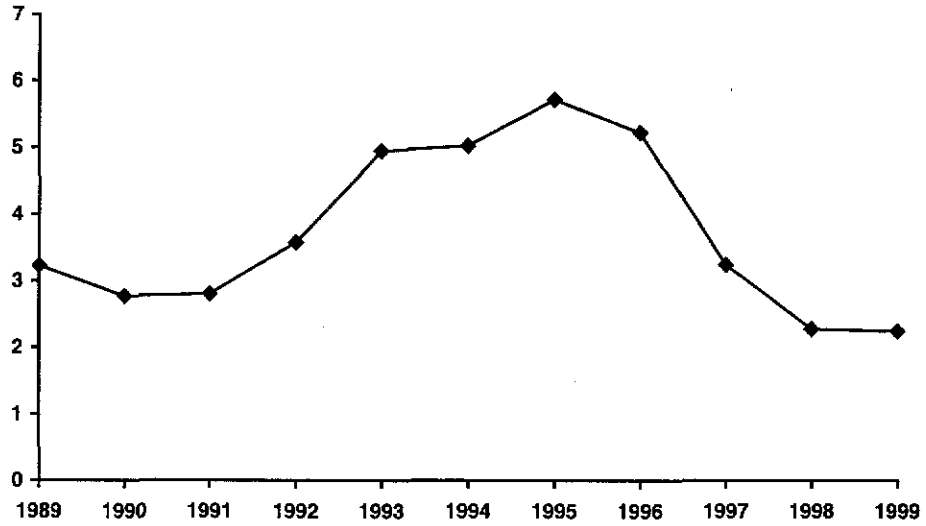
prices and direct payments have fallen in real terms and by the autumn of 1998 the aggregate support level was down by 21% from November 1995[3]. In real terms Total Income From Farming (TIFF)[4] doubled between 1990 and 1995, before falling back by over 60% between 1995 and 1999. (Table 3.1, Figure 3.2)

Table 3.1 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

Figure 3.2 Total Income from Farming in UK (£billion – real terms)



Source: MAFF Press Release

3.2 FACTUAL EVIDENCE OF FARMINGS ECONOMIC PROBLEMS

The changes caused in UK agriculture , which are mentioned in the opening section and that have had so much publicity in the media, (i.e. Uruguay Round Agreements and subsequent CAP adjustments, BSE, and regulations concerning animal welfare) have had an effect that is seen in the movement of prices. It must also be realised that prices will move still lower as Agenda 2000 and measures in support of WTO agreements are implemented.

3.2.1 Arable Sector Economics

Market prices in the arable sector have undergone a significant downturn since 1996/97 (e.g. Fig 3.2). Following a period of high world prices and correspondingly high profits in the cereal sector, 1997 saw a fall in prices and a corresponding decline in profitability within the sector. By 1997/98, UK farmers had sustained a drop in cereal prices of about one-third from pre

[3] Agra Europe 1813. 28.08.98.

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

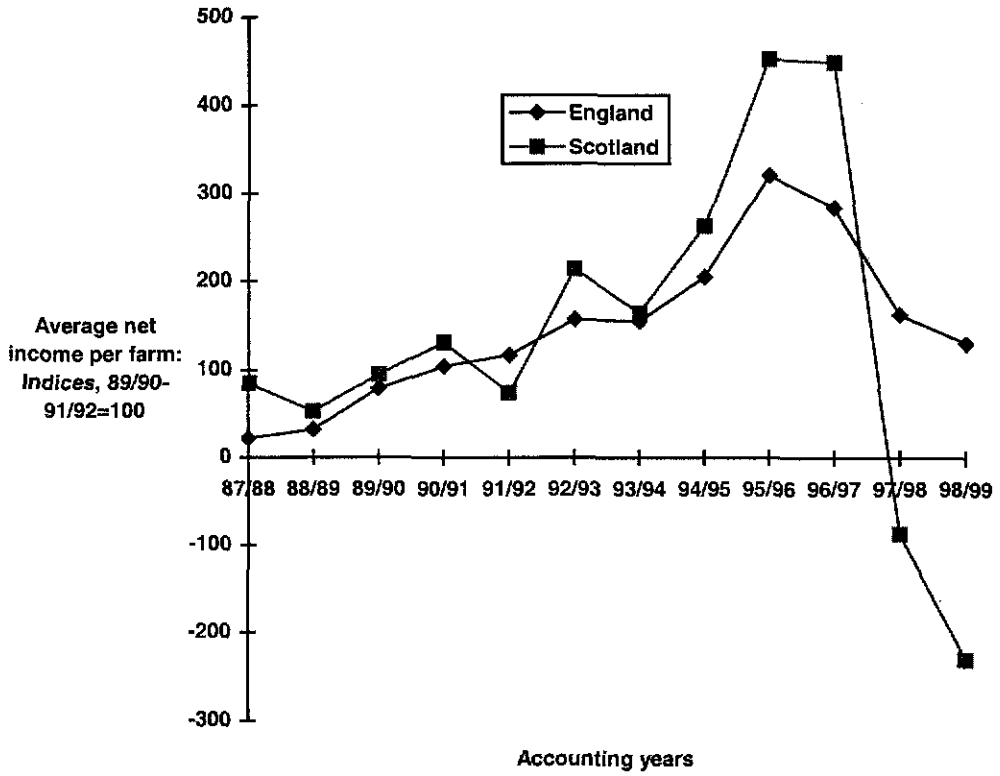
1995/96 levels (Hill and Cook 1999). Moreover, the strong pound hampered British exports. EU export levies were re-introduced for wheat and flour on two occasions and UK intervention stocks remained low throughout 1997, peaking at 15,800 tonnes, which compares to 6 million tonnes in 1986 (MAFF 1998).

The decline in profitability has resulted in a small decline in the area under cereal cultivation in 1998, down 2.5% in the UK between 1997 and 1998, and a further 9.1% between 1998 and 1999. By contrast the area under oilseeds rose by 13.7% between 1997 and 1998, but declined again by 14.9% between 1998 and 1999.

In 1998 there was, for the first time since 1992/93, an overshoot of the EU Maximum Guaranteed Area (MGA) for oilseeds (see 2.4.9) with seven member states liable to penalties. The UK was one of the worst 'offenders', exceeding its MGA by 45%, with a reduction of oilseeds aid of 23% in 1998/99 as a result. There was an overall arable area overshoot in 1998 of 1.4% in England and 7.8% in Scotland. There was also a massive overshoot of the forage maize base area in England, so much so that growers were paid on only 36.4% of their eligible area and associated set-aside, reducing the rate from £241.72 to £88.15.

Agra Europe (1813. 28.08.98), drawing on work at the University of Cambridge (1998), has pondered the significance of declining support levels for crop choice. Comparing gross margins of sugar beet and potatoes over a period from 1980, they show that whilst the sugar support regime has provided stability of returns compared to the cyclical experience of the non-supported potato producer, the balance is swinging in favour of potatoes as sugar beet support declines. They also point to the vigorous and innovative processing industry that is growing up around potato production since the demise of the statutory potato marketing scheme which limited production by quota.

Figure 5.2 Cereals: Net Farm Income in England and Scotland, Current Prices



Source: *Farm Incomes in The United Kingdom*, HMSO, annual.

The operation of the Arable Area Payment Scheme (AAPS) has been examined for MAFF and the Welsh Office Agriculture Department by Andersons (1997) in a survey based on analysis of MAFF data and interviews in 1997 with 575 arable farmers in England and Wales. Amongst those interviewed in the MAFF study, three-quarters felt that the AAPS had increased profits (Andersons 1997). Tables 3.2 to 3.4 provide important evidence on the buoyancy of the cereal sector in the post '92 period.

Table 3.2 Crop Subsidies on Cereal Farms adjusted for Green £ Devaluations since September 1992 (£'000), UK.

	1992	1993	1994	1995
Net farm income £ per farm	24.8	23.0	30.4	46.6
Crop subsidies £ per farm	9.1	26.3	31.0	38.1
CROP SUBSIDIES ADJUSTED TO SEPT 1992 GREEN £ RATE	9.1	22.0	26.4	29.8
Total devaluation effect £ per farm	-	4.3	4.6	8.3
Net farm income excluding devaluation effect £ per farm	24.8	18.7	25.8	38.3
Devaluation of green £ % since Sept 1992	-	19.3	17.2	27.7

Source: MAFF data analysed by Andersons (1997).

Table 3.3 Proportion of arable farmers indicating changes in income (%)

Change in Income	England	Wales
	%	%
Significant Increase	30	17
Slight Increase	44	59
No Effect	17	19
Slight Decrease	3	4
Significant Decrease	1	-
Don't Know	4	2

SOURCE: ANDERSONS (1997)

Table 3.4 Percentage of 1996 profits from Area Payments – England

% of profit from AAPs		Farm Type			Farm Size (ha)			
	All	Cereals	Gen crops	Other	1-14.9	15-99.9	100-299.9	300+
Less than 50	60	44	62	72	67	62	46	37
50-74	18	26	17	13	11	18	25	43
75-99	7	13	3	5	5	9	8	9
100+	4	7	3	3	3	3	8	3
Don't know	10	10	15	8	14	8	13	7

SOURCE: ANDERSONS FARMER SURVEY

The Andersons (1997) study found that 15% of farmers in England were growing crops on non-eligible land. The amount of land under cultivation is not given but is almost certainly small. Nonetheless there are likely to be negative rather than positive implications for landscape and wildlife in terms of loss of temporary grassland. This is consistent with the findings reported in Winter and Gaskell (1998)

and Wintert (2000). A similar finding emerged in a PhD by Lind (1999), covering the 1995/96 season, reported in Robinson and Lind (1999):

> *There is evidence from the commercial cereal producers in north Hampshire that they have intensified their crop production, with some crops grown on non-eligible land despite the fact that AAPs cannot be claimed on these crops. Some non-eligible land has also been ploughed-up for potatoes as potato prices have been particularly buoyant. .... several of the larger cropping enterprises reported reducing their area of temporary grass in favour of permanent cropping, provided this was part of their entitlement to AAPs. .... This also increases use of agro-chemicals and thereby limits environmental benefits.* (Robinson and Lind 1999: 306)

3.2.2 Beef and Sheep Economics

Figures 3.8 and 3.9 illustrate the downturn in fortunes for the beef and sheep sectors. Things might have been worse - measures taken at the EU Agriculture Council meeting in March 1998 ensured that livestock premia payments to producers in 1997, although 5.4% lower than in 1996, were unaffected by the re-valuations of the sterling green rate. Nonetheless the trend is downward with 1998 payments 4.2% lower than in 1997 (MAFF 1998). UK market prices in the sheep sector remained firm for the first three-quarters of 1997. However, from end-October they began to fall steadily and for November/ December were some 30% down on the same period in 1996. This is largely attributed to the poorer quality of some lambs and to strengthening sterling, which has reduced export demand and thus led to higher domestic supplies. Nevertheless, good prices earlier in the year meant that for the year as a whole, prices averaged just 9% below 1996 levels (MAFF 1998).

A survey of hill farm income by the UK Tenant Farmers' Association found that average net farm income had fallen by 53% between 1997 and 1998, a fall bringing average net farm income down to £7, 400[5]. The NFU predicted in September 1999 that average cash hill farm incomes in Britain would fall to £5,300 in 1999[6]. These dire warnings are largely borne out by the Government's own predictions issued in November 1999 (Tables 3.5 and 3.6 which show that Net Farm Incomes[7] for Hill, Cattle and Sheep Farms in England and the United Kingdom in 1999/2000 are forecast to be lower than in 1998/99 in absolute terms, with a proportionate decline of 35% in the UK.

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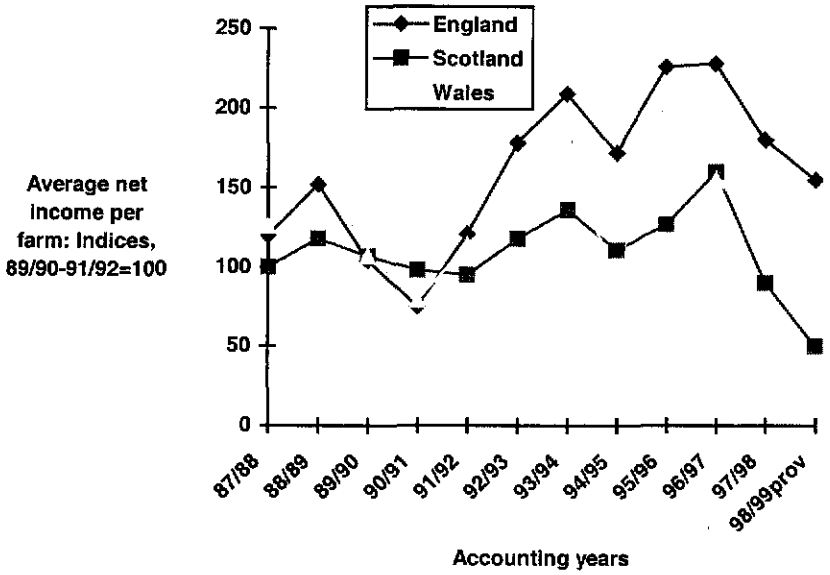
[5] Agra Europe 1824.13.1198.

[6] Agra Europe 1867 17.09.99.

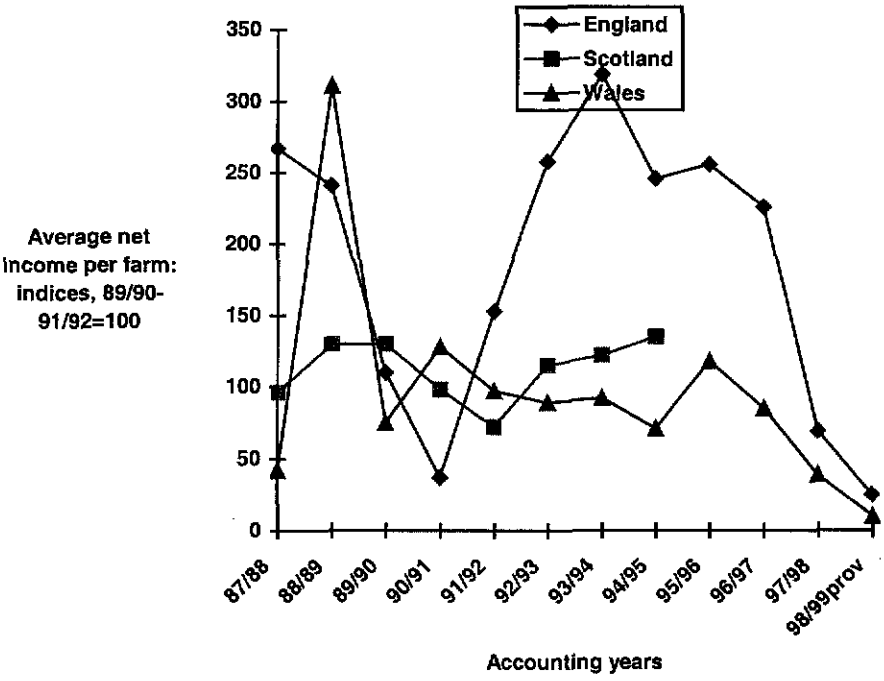
[7] Net Farm Income is the return to the principal farmer and spouse for their manual and managerial labour and on the tenant-type capital of the business. Tenant-type assets, which for this purpose are all assumed to be owned by the occupier, includes crops, machinery and livestock. Net farm income treats all farms on a consistent basis by assuming that all farms are tenanted. Thus the profitability of farms of different tenure can be compared. For owner-occupied land an inputed rent is included as a cost so that any other non-tenant-type costs linked to land, buildings and works have to be excluded. In addition an inputed labour cost is deducted for unpaid family labour (other than for farmer and spouse).

Figure 3.8 Cattle and Sheep (LFA): Net Farm Income in England, Scotland and Wales Current Prices



Source: *Farm Incomes in The United Kingdom*, HMSO, annual.

Figure 3.9 Cattle and Sheep (lowland): Net Farm Incomes in England, Scotland and Wales Current Prices



Source: *Farm Incomes in The United Kingdom*, HMSO, annual.

Table 3.5 Net Farm Income: LFA Cattle and Sheep Farms in England

FULL-TIME FARMS ONLY	Net Farm Income (£/farm)			Annual % change	
	1997/8	1998/9	1999/0	1998/9	1999/0
		(prov)	(forecast)	1997/8	1998/9
All SDA Cattle & Sheep	13,600	**8,100**	6,000	-40%	-25%
All LFA Cattle & Sheep	10,800	5,800	4,500	-47%	-20%

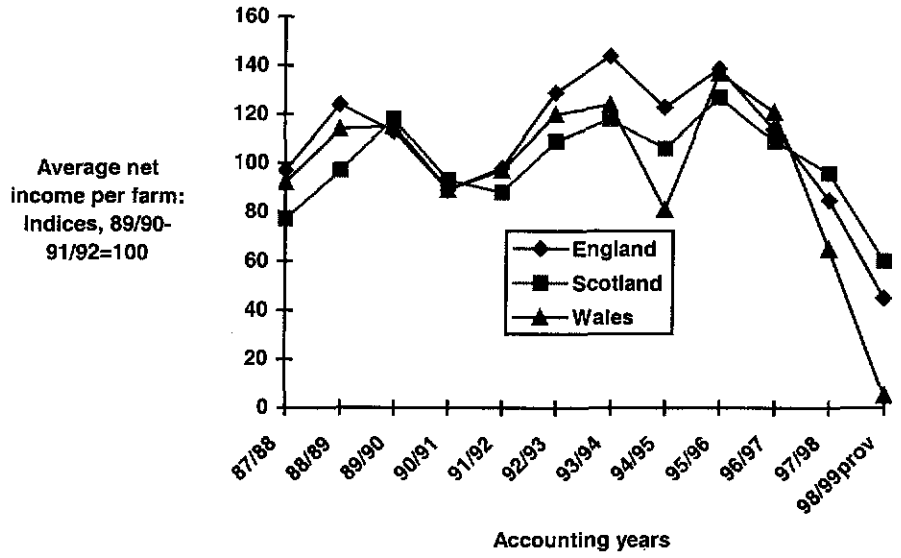
Table 3.6 Net Farm Income: LFA Cattle and Sheep Farms in the UK

Full-time farms only	Net Farm Income (£/farm)			Annual % change	
	1997/98	1998/99	1999/00	1998/99	1999/00
		(prov)	(forecast)	1997/98	1998/99
All SDA Cattle & Sheep	8,900	4,300	2,500	-52%	-35%
All LFA Cattle & Sheep	7,600	3,200	2,000	-58%	-35%

3.2.3 Dairy Sector Economics

For many years the dairy sector has retained its long standing high levels of profitability. A significant downturn in fortunes is now being experienced in the sector (Figure 3.11). In 1997 world and EU markets for butter were stronger than in 1996 as a result of increased demand from Russia. Consequently, intervention for butter was closed in most Member States throughout the year and in all Member States by the end of the year. UK stocks of intervention butter fell from a level of about 4,000 tonnes at the beginning of the year to 2,300 tonnes by the end of 1997. The market for milk powders weakened throughout 1997. In 1996-97 the level of quota remained at the same level as in 1995-96. During the 1996-97 quota year the UK exceeded its national quota of 14.2 billion litres by 0.38% and paid a superlevy of £14.70, compared with an over production of 1.11% in the 1995-96 quota year (MAFF 1998)

Figure 3.11 Dairy Net Farm Income in England, Scotland and Wales



3.2.4 Milk Quotas

In policy terms, the quota system remains the cornerstone of direct intervention in the dairy sector, although the high level of support largely derives from indirect market supports through trade barriers. The quota allocated to the UK was increased marginally from 14,091 million litres in 1993/94 to 14,158 million litres in 1994/95 a level retained in the following two years, a figure which is 87.5% of the level of milk sales in 1983/84 (Colman *et al* 1998). The milk quota system has been evaluated for the UK agriculture departments by Colman *et al* (1998). It is important at the outset to stress that the objectives of the report were very clear and do not include explicit examination of the impact of quotas upon the countryside. The study's objectives were as follows:

- assessment of the effectiveness of the current quota system in enabling producers to optimise the utilisation of the UK's quota allocation and the impact of constraints including the ring-fencing of quotas;

- assessment of the effect of milk quotas on existing asset values in the dairy sector in the UK and in individual countries, and the impact of quotas on the price of milk;

- assess the effects of alternative policy scenarios, such as two-tier pricing systems and the abolition of quotas.

These objectives for a policy evaluation by agriculture departments suggest that for the dairy sector there is a continuing reluctance to consider environmental issues alongside economic factors. This is borne out in the report where, for example, the efficiency of quota trading is assessed within an economic discourse which does not consider environmental externalities. Thus "for complete efficiency what is required is that milk is produced by the least-cost producers" (Colman et al 1998). Even a discussion of the costs arising from the quota regime which cites the cost of "milk which is poured away ... in the last days of the quota year " elicits no environmental comment.

However, it is possible to draw some countryside inferences, or at least raise questions, from the results. It is generally accepted, as discussed in Winter and Gaskell (1998)[8], that the impact of dairy farming on the environment has been exacerbated by concentration within the sector. Large units tend to employ intensive grassland management techniques and, of course, larger volumes of slurry tend to be concentrated within a single unit. Although larger farmers may have necessary capital resources to improve storage and handling facilities, overall intensity and concentration of production remains a problem. For example, Lowe *et al* (1997) estimated that the proportion of dairy farms in the west of England with estimated levels of nitrogen exceeding 170 kg per hectare[9] in 1990/91 was 42%. Further concentration of production is likely to have increased that figure since then. Thus any moves towards further concentration in the sector are a potential cause of concern. The figures for quota trading given in the Colman report show that the volume of trading (both permanent and temporary transfer) was higher in 1997/98 than for any year since trading commenced, with 14% of UK quota traded during the year. Extraordinarily, more than a quarter of holders of quota now lease out between 91% and 100% of their quota each year, a stark reminder of the extent of restructuring in the industry[10] since quotas were imposed in 1984 amidst fears that quotas would fossilize the pattern of production. The number of UK producers declined from 57,597 in 1983 to 37,668 in 1997 (Colman *et al* 1998). The Colman report shows there is continuing evidence of a drift of quota from the east and south of England to the north and west and to Northern Ireland, which is consistent with a continuing decline in arable-dairy systems, a decline commented on unfavourably in the context of farm animal welfare (Winter *et al* 1997), and is likely to have a range of negative environmental implications.

The reasons for the seemingly inexorable increase in size of dairy herds is alluded to in the Colman report which draws on work on the economics of dairy farming showing that the financial performance of large herds considerably outstrips that of smaller herds (Farrar and Franks 1998). Following de-regulation of the milk market (Anderson and Davis 1996), price differentials for the end product have increased. Thus larger producers benefit not only from favourable fixed costs but also a higher milk price. Thus the margin of milk prices over costs increases as herd size increases, from 5.44 to 12.51 pence per litre for lowland producers and from 5.48 to 12.19 pence per litre for upland producers (Colman 1998).

In assessing the economic consequences of quota, Colman *et al* (1998) note that quota trading (which totals £2.5 billion in permanent quota transfer alone since 1984/85) amounts to a very significant income transfer from current to former dairy farmers. They estimate that this increases the cost of producing milk by 2.5 pence per litre in 1997/98 with quota trading accounting for 12.5% of annual total milk revenue. The report estimates that a producer who has leased out quota annually since 1984/85 will have earned an annual rate of return of 27% on the original sale value foregone of that quota. Given the extent of the restructuring which has taken place in the industry, this raises questions about the effects on land management of such a financial transfer. As with any such transfers, different farmers will respond in different ways. Some might use the resources to facilitate changes in the farm business which will maintain levels of farming intensity. Taxation rules render this more likely where significant capital transfers have occurred through sale of quota. But in other cases, particularly where a farmer is moving towards semi or early retirement, money from leasing or selling quota might allow a gentle winding down of the farm business with less intensive grassland systems for beef or sheep. Thus the prospect of an end to quota trading or a diminution in quota value either as a result of declining profitability in dairying or a decision to end quotas would have land management consequences.

In a detailed analysis of the economics of milk production in England and Wales, Farrarr and Franks (1998) have examined farmers' future intentions for their dairy enterprise up to the year 2000 (sample size = 368). Table 3.7 shows the results and indicates a relatively low role for environmental concern in business planning.

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[8] See also Lowe *et al* 1997.

[9] The EC Nitrates Directive 1991 requires that the application of animal manures in vulnerable zones should not exceed 170 kg of nitrogen per hectare.

[10] This figure, of course, under-states the full extent of restructuring as in other cases quota has been sold.

Table 3.7 Main Influences of the Development of the Dairy Unit

Main influence		Ranked response		
	Mentioned	First	Second	Third
	%	%	%	%
Profitability of milk production	78	43	22	13
Personal circumstances (age, health etc.)	29	16	7	6
COST OF BUYING OR LEASING EXTRA QUOTA	45	13	15	17
Policy uncertainty with regard to milk quota	27	6	8	13
Family circumstances (succession etc.)	27	6	11	10
Capital requirements of continuation/ expansion of milk production (equipment, cows, land)	31	5	11	15
Uncertainty with regard to BSE	7	3	1	3
Profit of other enterprises	27	3	14	10
Realizable capital value of milk quota	14	2	7	5
Availability of labour	9	2	2	5
Environmental concerns (pollution etc.)	5	1	1	3

Source: Farrar and Ranks 1998: 99. Unweighted data. Other factors put forward as likely to influence future plans include; changes in hygiene standards, TB restrictions, the intention to change to organic milk production, disputes with landlords over quota and changes in farm size, including moving to a new farm.

Talling and Warren (1997) report on a postal survey of 133 dairy farmers in Devon and Cornwall on their responses to pollution regulations and grant schemes. Of note is the finding that few (only 15%) had altered their stocking density in order to reduce waste and just 12% had changed to loose housing in order to reduce the amount of liquid slurry to dispose of. The authors conclude that "farmers have done little to adapt their production systems to reduce the risk of water pollution, preferring to rely on capital works". This is consistent with the thesis advanced by Lowe *et al* (1997) that the pollution problem is often perceived by farmers as one requiring a 'technical fix' rather than fundamental adaptations to farming systems.

3.2.5 Organic Sector Economics

Organic farmers in the United Kingdom have found a small but growing market for their produce. Since 1997 there has been an increased uptake in the Organic Aid Scheme, even though the conversion stage presents some economic difficulties to farmers. Surveys have found regional distinctions in the growth of organic farms. These are possibly linked to the farming structure in certain areas, and the demand for organic produce among customers.

In pricing, vegetables may be three times the price of non-organic vegetables. Field crops such as wheat reach double the market price of non-organic wheat. The two adverse factors for the grower are lower yields and the need to seek out good marketing opportunities. With vegetables there may be a lower quality as well as the poorer yield, and with extra labour needed, these could reduce returns, although margins should still be good.

Academic studies of the growth in organic farming have been made, Ilbery *et al* (1999) have examined the geography of organic growers from an analysis of Soil Association farmers, Burton *et al* (1999). They suggest that organic producers are more likely to, be younger, run smaller businesses, be female and influenced by non-economic factors.

The possible limitation in size of the organic market exists among consumers. While some consumers are driven for the desire to have 'clean food', others are constrained by their

budget. Two factors that may affect sales are, firstly the end price to the consumer, and secondly availability of supply.

For both cropping and livestock production, organic production presents another option for the farmer. The presence of financial assistance schemes and technical help should be an additional incentive to move into this type of farming. The current margins from organic production are good, though no comprehensive detailed figures are available. This situation is expected to continue in the near future although there is always the possibility of reduced prices if a number of farmers turn organic.

4. THE RESPONSE OF FARMERS[11]

The agriculture crisis and its short and medium term impacts have been the subject of a number of studies. Some such as Jones *et al* (1998) who examine the impact of the agricultural crisis on rural Wales, do so without recourse to fresh empirical survey evidence. But several others are based on survey evidence and these provide the main focus for our analysis here.

The NFU conducted a survey of 5,000 of its own members in 1999, *Audit for Action,* which found that 57% claimed to have seriously considered leaving the industry during the previous two years. Almost a third had reduced labour and 64% had increased borrowing[12].

In the south west of England PROSPER (1998), a training organisation, explicitly focuses on future prospects in the context not of prospective reforms but of experience of the sharpening agricultural crisis of 1998. The survey is based on a postal survey of 1,925 farmers in Devon, Cornwall, Somerset, and Dorset in the summer of 1998. Nearly 90% of farmers reported a decline in farm income within the previous twelve months. Just over 50% expect their family income to decrease during the coming 5 years. It is perhaps surprisingly optimistic that nearly as many felt that incomes would stay the same or even increase. The crisis does not only impact on incomes. For example, over 30% of farmers in the survey claimed that the amount of their leisure time had decreased substantially during the previous three years.

Over 50% of farmers in the PROSPER survey, including 60% of farmers under the age of 40, felt that farming would be able to adapt to the economic difficulties and survive. What is striking is how many see conventional agricultural strategies as the way ahead as demonstrated in Table 4.1. Thus, the time honoured traditions of expanding farm output and specialisation or continuing as normal are the most favoured options. A significant, but smaller, proportion contemplate non-agricultural income. Proponents of integrated farming systems, with its emphasis on the cost saving potential of lower inputs (see Morris and Winter 1999, Park et al 1999), can draw little comfort from the one per cent who envisaged a reduction of costs and inputs as a way forward. However, it is important to note that this option was not a pre-given response in the postal questionnaire. According to the researcher who designed the survey (personal communication) this was deliberate as it was felt that a high proportion of farmers would automatically tick cost-cutting if it was listed as a 'good idea' without having seriously considered whether it could be achieved. It was hoped that only farmers who were seriously considering the option would specify it in the 'other' category. Other national surveys, which do provide this option for farmers to tick, give considerably more prominence to reductions in inputs.

[11] This section draws heavily on Winter 2000.
[12] Agra Europe 1868. 24.09.99

Table 4.1 Farmers' Perceptions of Likely Steps to Secure Future

Steps to secure future	*% of Respondents*
Expand or increase farm output	56
Withdraw from unprofitable enterprise	35
Continue as at present	30
Other family member take up paid work	22
Start non-farming enterprise	21
Self (the farmer) take up paid work	14
Intend to withdraw and sell up	12
Reduce costs or inputs	1
Sell or let land/building/assets	1
Other steps	1
Non response	4

Source: Prosper 1998: p21

The surprising optimism in conventional solutions, which might be seen as indicative of a rejection of post-productivism within the farming community, has to be put against the high proportion of farm households looking in practice for additional income outside the farm and an accelerating use of diversified income sources. Thirteen per cent of respondents and 13% of spouses had taken other paid employment to supplement their farm income during the previous twelve months alone.

Prosper's findings are borne out by Gasson et al (1998) who surveyed 491 English farmers in 1997. Table 4.2 shows the respondents response to a question on whether particular steps had been taken in response to the financial uncertainties of the 1990s. Once again, the responses illustrate a strong commitment to increased production and to specialisation, although, as noted above, cutting inputs also figures strongly in this survey. The authors summarise their findings as follows:

> Commonest responses to the financial uncertainties of the 1990s have been to increase output from existing enterprises, cut out unprofitable enterprises, reduce inputs and machinery and labour costs, increase the area farmed in order to spread costs and take financial advice. Despite a considerable degree of restructuring, nearly half the respondents claims to be carrying on as before. ... Those under most financial pressure are more likely than other farmers to have reduced inputs, cut machinery costs and lengthened the repayment periods of loans. Farmers under the most pressure are also the most likely to have other family members seek work off the farm. Gasson et al 1998: p.37.

Table 4.2 Response to Financial Uncertainties of the 1990s

Type of response	*% of Respondents*
Steps to increase income	
Increase output from existing enterprises	65
Cut out an unprofitable enterprise	32
Start a non-farming enterprise	18
Introduce a more profitable enterprise	15
Other family member takes off-farm employment	12
Intend to withdraw and sell up	12
Take paid employment outside the farm	5
Steps to cut direct costs	
Reduce amounts of inputs used	45
Reduce machinery costs	42
Reduce labour costs	38
Steps to cut the cost of borrowing	
Sell assets to pay off debts/overdraft	18
Borrow from cheaper interest sources	14
Lengthen repayment period of loans	6
Other steps	
Carry on as before	45
Take financial advice	30
Increase farm area to spread costs	26
Leave farming altogether	4

Source: Gasson *et al* 1998: p. 28

An ADAS (1999) survey of 2,352 farmers in England and Wales (a response rate of 37%), in line with other studies, found a surprising degree of optimism despite inherent and deep rooted difficulties within the industry. Ninety five per cent of farmers have seen their profits decline, with nearly half expecting to make a loss this year, but less than one in ten feel their business will not survive. Table 4.3 shows that the majority of farmers expect to continue in farming and Table 4.4 shows that expansion and diversification are seen as strategies by which this might be achieved. Forty per cent of farmers hope to survive by purchasing more land, 54% are seeking to rent more land, 64% envisage developing non-farming sources of income and 50% are looking to diversify. Table 4.5 shows how farmers see their financial future showing a somewhat bleaker view than implied in the other data.

Table 4.3 Current Attitude to Farming

Statements	**No.**	**%**
Farming has no future - I intend to give it up	96	4
Farming has a limited future - I need to diversify	384	17
I see my future in farming and I want to increase the size of my farm business	529	23
I am happy to stay farming as I am now and for the foreseeable future	344	15
I am worried about my future in farming but I don't know what else I can do	456	20
I see my future in farming but I expect that I will have to change my farming practice	493	21
Total	**2,302**	**100**

Source: ADAS Farmers Voice Summary Results 1999: p. 2

Table 4.4 Likely Changes in Business Strategy

Statements	Yes %	Possibly %	Total No.
Give up farming	2	9	1,962
Sell out and buy a farm elsewhere	1	6	1,916
Retain ownership but lease land to another farmer	3	12	1,941
Retain ownership but enter into a farming agreement with another farmer	4	13	1,917
Seek to purchase more land	8	32	1,960
Seek to rent in more land	16	37	1,995
Invest in farming opportunities overseas	1	5	1,896
Develop non farming sources of income	27	38	2,035
Diversify e.g. non farming use of land	18	33	2,005

Source: ADAS Farmers Voice Summary Results 1999: p. 2

Table 4.5 Financial overview of farm business

Statements	No.	Overall %
At the moment my business is not profitable and may not survive	179	8
At the moment my business is not profitable but can survive for another year or two	793	34
Profits are down, but my business should be able to weather the crisis	1,239	54
I am managing to maintain my profit level	70	3
I have managed to increase profits	26	1
Total	**2,307**	**100**

Source: ADAS Farmers Voice Summary Results 1999: p. 3

Turning now to a Scottish study, Allbrooke *et al* 1998, undertook a postal survey in March-April 1998 of farms in Dumfries and Galloway with 119 responses. The results are broadly compatible with those of the other two surveys, with key results as follows:

- Amongst dairy farmers the direction is clearly toward expansion by increasing the size of herd, volume of milk sold and size of quota. Only 1 dairy in the survey said it would cease production though about a quarter said they would not increase milk sales. (This has implications for the environment if it leads to more accidental pollution and erosion of more natural low ground habitats as dairies intensify).

- Beef units are more pessimistic. 20% aim to reduce beef cow numbers with similar numbers cutting back on store and fat cattle sales and purchases. About a fifth of respondents, however, intend to increase beef cow numbers. In the beef sector, however, the biggest intention is no change, though within this group a shift to more cattle finishing rather than store sales is evident.

- Less change is expected in the sheep sector with almost three-quarters of those responding planning no change in ewe numbers. A sizable number aim to increase lambing percentage and, as in the beef sector, there is a shift from store to fat lamb production to add value.

- Cropping support through arable area payments, is likely to change little, though 15% of those responding to this parameter expected to decrease or cease cropping, thus continuing the long term trend in Dumfries and Galloway.

- Among inputs there is a strong feeling that feed purchases will have to decrease. 51 farmers recorded this response and another 25 expect to cut fertiliser use.

- Capital expenditure plans are the most worrying area for the input supply sector with 68% of respondents (71 farmers) expecting to cut their annual investment in machinery. 55% expect to cut buildings investment and a proportion also plan to reduce fencing/drainage and delay upgrading livestock investments.

- 30% plan to increase the use of machinery rings while around 20 farms in the sample expect to reduce the number of full-time and part-time workers. The majority of farms do not intend to change their labour.

- 40 farms expect to cut personal drawings from the business. To hopefully balance this, 33 will seek to increase off farm work/income, 19 to increase income through diversification and 22 will increase the time spent on learning new skills.

- Little change in land and asset ownership is planned. A small, but significant minority would like to increase the amount of land they own or rent, but most do not plan to expand or contract the farmed area or to sell off unproductive assets, cottages, etc.

- Virtually no other planned changes were listed. One stated an increase in woodlands, another more property lets and one a shift to organic production.

Allbrooke *et al* 1998: p.118-119

Another Scottish study by Ramsay *et al* (1999) is based on a postal survey of 429 farmers in the Borders area of Scotland. As with other studies, few farmers anticipated radical changes to the enterprise mix or intensity of their farming business in response to the crisis, but significant reductions in capital expenditure were indicated by almost half the respondents. Nearly a half (46%) envisaged a need to develop non-agricultural sources of income, with holiday accommodation and off-farm employment the most likely developments.

McDonald and Roberts (1998), Bennett and Jones (1999) DTZ Pieda (1998) all consider the crisis from the specific point of view of BSE (see also Hughes and Midmore 1997). Whilst the McDonald and Roberts and Pieda research prioritises macroeconomic analysis of the economy as a whole, and are not considered further here, Bennett and Jones use econometric modelling techniques (the Land Use Allocation Model - LUAM) to examine the implications for land use in England and Wales of the BSE crisis under three demand scenarios for the year 2000. Scenario 1 involves a 20.31% reduction in beef output between 1995 and 2000, whilst Scenarios 2 and 3 are based on lower downturns of 12.4% and 13.25% respectively. Table 4.6 shows significant potential regional shifts in production as a result of adjustments made by farmers to beef and dairy enterprises arising from BSE. There are additional knock-on effects for other enterprises. One of the problems of this kind of research is that the alternative scenarios can produce quite different results. Thus, for

example, under Scenario 1 cereal production in East Anglia declines significantly whilst, under Scenarios 2 and 3, it increases slightly. Within the beef sector itself there is a switch to lower intensity production, which is particularly marked in the south west, the north and the south east. By contrast dairy production increases in intensity:

> In terms of land use changes, perhaps the most interesting projections of the LUAM relate to input use and the intensity of production. English Nature expressed its concern that the BSE crisis might result in detrimental impacts on the condition of semi-natural and wet grasslands, coastal grazing marshes and moorland Sites of Special Scientific Interest because beef farmers would increase their intensity of production (English Nature, 1998). The LUAM projects that the use of inputs such as fertilisers and purchased cattle feed will fall and that beef production will become more extensive. This may, therefore, have benefits for nature conservation - in the South West, South East and, perhaps particularly, the Northern region where the intensity of dairy production increases less than in the South West and South East.
> (Bennett and Jones, 1999: p.20-21.)

Interestingly, the authors misinterpret English Nature's concerns which are not, in fact, expressed in terms of the fear of intensification but rather that grazed SSSIs face the risk of a damaging *decline* in cattle grazing (English Nature 1998 and work conducted for EN on this topic reported in Winter *et al* 1998).

Table 4.6 Output Value by Regions (constant 1995 prices) resulting from BSE

	1995	Scenario 1	Scenario 2	Scenario 3
Northern				
Dairy	334.166	327.647	329.412	329.412
Beef	270.162	218.979	222.199	222.181
Sheep	136.168	126.956	126.849	127.752
Cereals	92.857	92.529	93.336	93.336
Yorkshire/Humberside				
Dairy	226.820	211.936	217.790	217.790
Beef	188.017	153.093	154.177	154.099
Sheep	103.554	102.771	102.470	102.500
Cereals	188.353	180.979	183.484	183.484
East Midlands				
Dairy	307.825	287.216	289.142	289.142
Beef	168.749	129.775	135.611	133.032
Sheep	47.665	63.540	46.420	48.145
Cereals	437.259	411.539	443.305	443.305
East Anglia				
Dairy	46.887	41.721	42.130	42.130
Beef	69.718	58.619	65.643	58.672
Sheep	41.876	43.317	42.698	40.445
Cereals	279.334	300.049	280.645	280.645
South-East				
Dairy	388.661	394.673	379.394	379.394
Beef	233.413	176.253	204.263	197.102
Sheep	62.636	66.904	70.754	68.421
Cereals	420.309	441.308	421.533	421.533
South-West				
Dairy	540.502	527.034	518.972	518.972
Beef	243.104	188.305	211.831	210.720
Sheep	57.742	55.564	60.182	61.576
Cereals	121.961	120.415	122.504	122.504
West Midlands				
Dairy	296.873	284.779	290.121	290.121
Beef	178.907	136.245	152.584	152.524
Sheep	56.676	53.503	61.935	61.963
Cereals	175.797	168.801	170.856	170.856
North-West				
Dairy	189.883	191.628	192.661	192.661
Beef	99.261	81.279	81.393	81.393
Sheep	50.364	50.716	50.715	50.715
Cereals	32.645	35.562	35.768	35.768
Wales				
Dairy	390.477	367.546	369.426	369.426
Beef	243.728	226.776	231.162	231.037
Sheep	235.028	232.642	233.823	234.325
Cereals	44.607	45.527	45.277	45.277

Source: additional data provided by Bennett and Jones, University of Reading[13].

[13] Grateful thanks to Richard Bennett and Phil Jones for providing some additional data to supplement the data in their paper to allow compilation of this table.

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[i]On the complex issue of costing the CAP see: Buckwell 1997.

Appendix 5:

Agricultural Trends and the FBS: Measuring Changes in Performance and Intensity

(Work Package 3.4)

3 April 2000

Sandra McNally

1. Introduction

The objective of this paper is to contribute to an overview of changes in agriculture in the past decade. The larger overview will provide a useful context in which to consider the environmental changes reported in CS2000. It will also suggest some potential areas of future research in exploring the drivers of countryside change.

This overview draws mostly on information available in the Farm Business Survey for England and Wales. This is an annual survey of about 2,700 farm businesses and gives detailed information on farm characteristics. Our discussion here will be selective, not dealing with national changes in land use, which are more appropriately examined using June Census data. This information is provided in another module. However, this survey is useful for allowing us to examine trends in farm performance and agricultural intensity. Although measures of intensity are whole-farm measures (and therefore quite crude), the survey allows us to examine the context in which intensity has taken place over the last decade. In particular, it will be relevant to know how measures of intensity have changed on different farm types over time. This can further be linked to region and environmental zone, since we know the relative importance of different farm types within these categories.

The report is in three main sections. We first describe some broad characteristics of changes in agricultural performance over time. Then in section 2, we briefly describe the Farm Business Survey for England and Wales and the methodological issues involved in using it to analyse farm-level changes. We show the relative importance of different farm types by environmental zone and Standard Statistical Region. In section 3, we discuss changes in measures of intensity for the different farm types.

2. General changes in agricultural performance

2.1 Net Farm Income

Fig. 2.1 to 2.8 shows trends in average Net Farm Income for different farm types. This information is derived from the Farm Business Survey for England and Wales. The volatility in annual farm income is striking. However, it can be seen that for many farm types, the general trend was upwards for much of the previous decade, most strikingly for mixed farms, cereal farms and general cropping farms between 1993 and 1995. However the dramatic surge in profitability for some farm types between these years is at least matched by the sudden fall in Net Farm Income after 1995.

Net Farm Income is influenced by many factors including output prices input prices, yields, subsidies and technological change. However, it is useful for giving us some idea about the general profitability of different farm types and thus incentives to invest and decisions to enter/exit particular industries. For example, it is clear that there were incentives to expand any business type involving cropping enterprises over much of the previous decade. However, the slump in incomes at the end of the decade is likely to have caused exit out of agriculture for farms that could not withstand the prolonged downturn.

2.2 Price changes

Producer prices are known to be a very important factor influencing farmer behaviour, both in the choice of enterprise and the intensity of production. For example, if the price of root crops increase, one would expect farmers to devote relatively more of their arable area to this crop and to intensify production of this crop to the most profitable level.

Figs. 2.9 to 2.15 show trends in the producer price of some important agricultural commodities. Trends for the following commodities are shown: cereals; root crops; fresh fruit; fresh vegetables; eggs; animals (for slaughter and export); and milk. Although most of the price series show considerable volatility, the general trend up to 1995/96 is one of stability or increase relative to price levels in the 1980s. For example, one can see that for cereals, producer prices were increasing between 1990 and 1993, followed by a small downturn in 1994, an increasing trend up to 1996 and then a sudden and severe fall of about 30%. For animals (slaughter and export) the fall between 1995 and 1997 is closer to 40%.

Clearly, the producer price is not the only factor governing the decision as to what and how much to produce. Other factors such as input prices, prices of other commodities, subsidies and regulations (such as set-aside; quota) are important. Also, one would not expect all farmers to react in the same way to price changes. For example, since there are fixed costs of entering a new type of farm business (e.g. from livestock to arable), higher prices for root crops are not necessarily going to affect livestock producers in any way. Furthermore, returns from production will vary according to factors such as soil quality, which will therefore influence the type of production and intensity.

In Fig. 2.16, we show the ratio of the producer price index to the purchase price index. This has been computed from an index of average producer prices and average purchase prices for all commodities. This ratio has been very stable for much of the decade. However it fell by 20% between 1995 and 1998. However this indicator is very general: what is of most relevance to individual producers is relative producer and purchase prices within particular sectors.

2.3 Subsidies

A major change following the 1992 reforms of the Common Agricultural Policy (CAP) was some substitution towards direct payments and away from price support. In the arable sector, the major change was the introduction of Arable Area Payments and a commitment for most producers to set-aside a proportion of eligible land. An important feature of this scheme is the linking of subsidies to land area. While a farmer can alter his/her payment through the cropping pattern (different rates of subsidy are payable on different types of crop), the level of subsidy does not depend on the intensity of production.

In contrast, for producers of cattle and sheep, direct payments are linked to livestock numbers. While there are some restrictions on intensity of production (e.g. maximum stocking rates; a quota limiting subsidy claims), the system still generates incentives

to increase livestock numbers up to the limit (as long as the revenue obtained does not exceed the variable cost of increasing numbers).

Some brief details of the schemes are provided in Appendix 1. In table 2.1, we show a summary of total expenditure on various types of subsidy in the UK Aggregate Agricultural Account between the years of 1992 and 1999. One can see that huge amounts of expenditure are involved in granting direct payments to farmers. In the arable sector, expenditure on arable area payments is particularly high for wheat, barley and oilseed rape (422 million; 256 million and 175 million respectively in 1999). Regarding livestock subsidies, the greatest expenditure is on the annual ewe premium (326 million in 1999), followed by the livestock 'over 30 month scheme'; suckler cow premium and beef special premium (267 million; 260 million and 257 million in 1999). There is also high expenditure on hill livestock compensatory allowances in LFA areas.

Although expenditure on agri-environment schemes has increased dramatically over the decade (from 24 million in 1992 to 165 million in 1999), this is only a small proportion of total expenditure on agricultural subsidies. Nonetheless, it is largely a reflection of the increase in schemes and designated areas over the decade.

2.4 Other changes

One aspect of reforms of the CAP was the introduction of quota for livestock producers, which limits claims on subsidies. These quotas are tradeable so those producers who would like to reduce production have an opportunity to sell or lease their rights to subsidy to another producer. Figs 2.17 and 2.18 show some trading in rights to claim subsidy - most dramatically for leasing out of Suckler Cow Premium from 1997. Fig. 2.19 shows the trend in the leasing out of milk quota. This has a much longer history (since 1984). During the 1990s, there continued to be a steady upward trend. The trading of quota in this way indicates structural change going on within the agricultural sector. Economic theory would predict that over time, quota becomes more concentrated in the control of relatively more efficient producers.

Finally, Fig. 2.20 shows a measure of productivity for the agricultural sector over the decade. The trend in the period 1990-99 is more stable than the previous decade (increasing between 95.9 and 103.9 between 1990 and 1999; between 85.4 and 95.9 between 1980 and 1990). However, the graph shows that despite the problems in the sector, particularly at the end of the decade, on average the amount of output that can be produced per unit of inputs is still increasing.

3. The Farm Business Survey for England and Wales

The Farm Business Survey (FBS) for England and Wales is an annual survey of about 2,700 farm businesses. The survey is conducted by nine Universities and Colleges of Agriculture on behalf of MAFF. The survey is a stratified random sample of farm businesses above eight Economic Size Units (i.e. a measure based on area of cropping and livestock enterprises and Standard Gross Margin calculated for different enterprises in a base year). This excludes about 40% of holdings that fall below this threshold, although they only account for a very small fraction of agricultural production. This is in contrast to the June Census, where only minor holdings (e.g. farms less than 6 hectares) are excluded.

The survey is a panel of farm businesses. This means that each business can stay in the survey for a maximum of 15 years. Prior to 1989/90, there was no time limit on the number of years businesses could stay in the survey.

The survey contains detailed information on many aspects of the farm's production and detailed financial data. This makes it a very good source of information on which to base an analysis of farmer behaviour. For example, it has been used to estimate the supply response of dairy producers to price (Colman and Solomon, 1998) and to examine the relationship between off-farm labour and agricultural subsidies (McNally, 1999). A particularly useful feature of the data is its panel aspect. This enables one to examine relationships 'within groups' of farmers. The point of this is to remove the variation in statistical relationships that is attributable to unobserved differences between farmers. This affects how regression results can be interpreted.

However, when using such a survey to analyse trends, several potential problems arise. Firstly, the FBS is not a representative sample of all farms, but only 'full-time' farm businesses (in the sense of passing the threshold of eight ESUs). This would pose a problem if one believed that farmers operating below the threshold behave very differently to those included in the survey with regard to the variables of interest. However, there is no reason to expect that farmers operating smaller holdings are not also responsive to changing prices, subsidies etc. There is no strong *a priori* reason for stating that the general trend in measures of intensity should not be similar for farms within and outside the survey population covered by the FBS.

Secondly, the panel aspect of the FBS presents a potential problem for describing change in the general population. This arises from the fact that the sample is not drawn at random every year. This poses a problem if farms remaining in the sample become less representative of the general population of farm businesses. A related problem arises if farms drop out of the survey due to some non-random process.[1] For example, if the probability of small farms leaving the survey increases over time, then average farm size in the survey statistics would appear to increase, even though there may be no change in average farm size for all the farms (i.e. those in the survey and leaving the survey). Hence misleading conclusions can be drawn if this problem is ignored. We check is this is a problem in our analysis by examining trends for all farms and for farms remaining in the sample between 1991 and 1997. In general, the trends are very similar, but there are some exceptions that we discuss below.

Although, there are problems with the FBS (as with all data sets), it is one of the best sources of information on farm businesses in the UK. We focus on four main farm-level measures of agricultural intensity: fertiliser expenditure per hectare of cropping area; pesticide expenditure per hectare of cropping area; grazing livestock units per hectare of area in grass, fodder crops and rough grazing; expenditure on animal feed per livestock unit. The expenditure measures are deflated by relevant annual price indices.[2] Thus, movements in the price of these inputs are removed from these trends

[1] Although farm businesses are allowed stay in the survey for a maximum of 15 years, many drop out before this time has elapsed.

[2] Expenditure on fertiliser, pesticides and animal feed are deflated by the price index for fertiliser and soil improvers, plant protection products and animal feedingstuffs respectively. Price indices are provided by MAFF on Website (as with other MAFF data used in this paper).

in intensity. Clearly, these measures of intensity are not equally relevant to all farm types. We analyse movements in fertiliser and pesticide intensity for the following farm types: Cereals; General Cropping; Mixed; Horticulture. We analyse measures relevant to livestock for the following farm types: Cattle and Sheep Lowland; Cattle and Sheep LFA; Mixed; Pigs and Poultry and Dairy.

The trends in intensity (and also performance measures discussed above) are also not equally relevant to all regions and environmental zones within England and Wales. Tables 3.1 and 3.2 show the proportion of different farm types in the Standard Statistical Regions of England and Wales and the proportion of different farm types in each ITE Environmental Zone.

The vast majority of farms in upland areas are classified as "Cattle and Sheep LFA" farms. In other zones, the distribution of farm types is more balanced, though in the Eastern Lowlands, there is a bias towards cropping farms (Cereals and General Cropping account for about 46%), while in the Western Lowlands, there is a bias towards livestock enterprises (Cattle and Sheep LFA, Cattle and Sheep Lowland and Dairy account for about 59%). This type of pattern is also reflected in the relative importance of different farm types within Standard Statistical Regions. Clearly, there are not enough observations of every farm type within each region to allow an analysis of how measures of intensity changed over time by every farm type in every region. However, we would expect changes in intensity for a particular farm type to be most relevant to those regions/environmental zones that contain a high proportion of the farm type.

4. Measures of agricultural intensity

4.1 Fertiliser expenditure per ha of total main products

We consider this measure of intensity for the following farm types: Cereals; General Cropping; and Mixed. Mean fertiliser intensity is reported for the first three types in table 4.1 and shown graphically in Figs. 4.1.1-4.1.3. The three farm types show a very similar trend in fertiliser intensity over the decade. There is a fairly stable trend until about 1991, with a decline observed in 1992, followed by a substantial increase up to 1996. The increase between 1992 and 1995 is very similar for the three farm types (20%, 28% and 33% for Cereal, General Cropping and Mixed farms respectively). It should be remembered that the expenditure measure has been deflated by the fertiliser price index. So changes reflect variation in volume rather than price.

However after 1995, there is a decline in mean fertiliser intensity for all three farm types. The decline between 1995 and 1997 is 12.8%, 20% and 21% for Cereal, General Cropping and Mixed farms respectively. This brings the mean fertiliser intensity down to a similar level (or slightly lower) than at the beginning of the decade. The increase in fertiliser intensity for all three farm types coincides with the steep rise in Net Farm Income occurring between 1993 and 1995 for these farm types. This suggests that high returns from cropping gave rise to the increase in fertiliser intensity that occurred about this time. Similarly, the decline in mean fertiliser intensity coincides with a fall in returns from cropping (as suggested by the decline in Net Farm Income).

The trends generated in this data are not mainly driven by outliers. The trends in the mean value for fertiliser intensity look very similar to trends in the median. Also, the trend between 1991 and 1997 is very similar for all farms in the survey and only those farms remaining in the survey between 1991 and 1997. Thus there has not been non-random attrition from the survey which affects these trends.

By regresing the log of fertiliser intensity against a time trend, we can compute the annual average rate of change between 1988 and 1997. For the period as a whole, there is an annual rate of increase of 0.7%, 0.6% and 1% for Cereal farms, General Cropping farms and Mixed Farms respectively. However, as the below table shows, the pattern of change is certainly not even between years. Another point worth mentioning is that fertiliser intensity appears to be considerable higher on Mixed farms. The level is more similar for Cereal and General Cropping farms, though higher on the latter farm type.

4.2 Pesticide expenditure per ha of total main products

We refer to 'pesticide expenditure per ha of total main products' as a measure of pesticide intensity. However, there are some comments that should be made about this measure before proceeding. First, in the FBS, the expenditure measure is referred to as 'crop protection expenditure'. We assume that much of this measure reflects use of pesticides and that it is a reasonable proxy. Secondly, we interpret this variable to reflect changes in the intensity of pesticide use. The variable is deflated by the price index for plant protection products. However, to the extent that there is variation in the type of plant protection products purchased by farmers in the FBS (and their corresponding environmental impact), there are some problems in interpreting the variable. For example, a farmer purchasing a relatively more expensive and less damaging type of product may appear (in our analysis) to be more intensive than another farmer using a less expensive product over the same land area. However, for the purposes of this paper, we assume that the general trend in 'pesticide expenditure per ha' reflects intensity of use rather than changes in the type of products purchased by farmers.

We also consider this measure of intensity for Cereals; General Cropping; and Mixed farm types. Mean pesticide expenditure per ha of total main products is reported for the first three types in table 4.2 and shown graphically in Figs. 4.2.1-4.2.3. Again the trends are very similar for the three farm types, though there seems to be higher mean pesticide expenditure per ha on General Cropping farms than on the other two farm types. On average, the trend within each of the farm types has been upwards. Regressing the log of pesticide intensity against a time trend for each farm type shows that this measure has increased on average by a rate of 0.5%, 0.9% and 0.9% per annum for Cereal, General Cropping and Mixed farms respectively between 1988 and 1997. The main increase occurs between 1992 and 1995, with a decline in 1996 and 1997. In this respect, the trends are very similar to the measure of fertiliser intensity. This strengthens our interpretation of 'pesticide expenditure per ha' as a measure of changes in the volume of intensity (rather than in the type of products purchased by farmers). Also, the increase occurs at a time of very high Net Farm Incomes within each sector. As expected, farmers become more intensive when returns to production increase. The trends shown are very similar to trends in median values and trends in mean values for farms staying in the survey between 1991 and 1997.

4.3 A note on Horticultural holdings

Horticultural holdings are also intensive users of fertiliser and pesticide. However, the measures reported above may not be as relevant for this farm type because fertiliser and pesticide may be used intensively in green-houses rather than spread over land. However we report trends in fertiliser and pesticide per ha of total main products. Even if the measure is less meaningful, it does show how fertiliser and pesticide use have increased over time for farms in the FBS. Trends are shown in Table 4.3 and Figs. 4.3.1. and 4.3.2. Mean and median values are reported in Table 4.3.1. because of the very marked difference between the magnitude of these summary statistics. However, the trends are quite similar showing a very high rate of increase over the decade. The trends are broadly similar for farms remaining in the survey between 1991 and 1997.

4.4. Grazing livestock units per ha of grass, fodder crops and rough grazing

We consider this measure of intensity for the following farm types: Cattle and Sheep LFA; Cattle and Sheep Lowland; Mixed; and Dairy.

With this measure of intensity, there are some significant differences between trends in average measures for all farms and for only those farms remaining in the survey between 1991 and 1997. This is most evident for Cattle and Sheep LFA farms. Fig 4.4.1 illustrates this and average values for both groups are reported in table 4.4.1. While there is an upward trend in GLUs per ha for all farms (by 16% between 1988 and 1991), the trend is fairly static for only those farms remaining in the sample between 1990 and 1991.[3] In table 4.4.1, we also show trends in the area of land in grass, fodder crops and rough grazing for both groups; and Grazing Livestock Units for both groups. The difference between the two groups is consistent with the possibility that large farms are more likely to leave the survey or that small farms are more likely to be included in the survey over this time period. This problem might indicate some sort of structural change going on within this farm type over the period. It is interesting the trends in the number of Grazing Livestock Units diverge after 1993 - the year of a major policy reform. However, the problem may be just a quirk of the data.

This problem is also apparent in trends for Cattle and Sheep Lowland farms. However, for this farm type, both groups (i.e. all farms and farms in the survey between 1991 and 1997) show smaller percentage changes over time. The median measure of GLUs per ha (which is similar for both groups) shows a slight decreasing trend of about 3% between the two years of 1988 and 1997.

The measure of GLUs per ha is higher on lowland than on upland farms. In absolute terms, the level of GLUs per ha may seem fairly low.[4] However, the denominator is likely to be an overestimate of the forage area.

[3] The same pattern is observed if we consider median values.

[4] For example, the Suckler Cow Premium is subject to a maximum stocking rate of 3 livestock units per forage hectare in 1994; 2.5 in 1995; 2 in 1996).

Trends in GLUs per ha for dairy farms and mixed farms are broadly similar for farms that remain in the sample between 1991 and 1997 and for all farms. In the case of mixed farms, there is a noticeable increase in stocking density between the years of 1993 and 1995 (about 14%), with a decrease in subsequent years (Fig. 4.4.2). However, the change in the median value over time is much less dramatic (table 4.4.3).

For dairy farms, the change over time in stocking density is very modest - there is only about one per cent difference between the two years of 1988 and 1997. The fairly static trend is shown in Fig. 4.4.3). Mean GLUs per ha on dairy farms are considerably higher than for the other farm types.

In general, this farm-level measure of agricultural intensity does not suggest big changes over time. While mean Grazing Livestock Units have increased over time for all farm types except mixed farms, there has generally been a commensurate increase in land used for grass, fodder crops and rough grazing. However, if animals are being concentrated in particular parts of 'land in grass, fodder crops and rough grazing', then this indicator may not be strongly related to actual changes in intensity on the farm. Also, environmental damage could be related to the type of livestock on the farms. So if farmers are substituting sheep for cattle, the same level of GLUs per ha could be associated with different amounts of environmental damage. Nonetheless, this analysis suggests that if there is environmental damage on livestock farms, this is not likely to have been caused by an increase in overall intensity occurring between 1988 and 1997. Indeed, one would expect the CAP measures of linking livestock payments to maximum stocking rates to have prevented much increase in the overall level of intensity (see appendix).

4.4 Expenditure on animal feed per Livestock Unit

Finally, we briefly consider this measure for all livestock farm types. This is shown in Figs. 4.5.1 to 4.5.5. Clearly, the highest expenditure per livestock unit is found on Pig and Poultry farms. The figures for all the other farm types are much lower - and lowest for Cattle and Sheep LFA farms.

For most farm types, there is some upward trend in the mid-90s which declines in 1996/97. However, for the decade as a whole, the level of expenditure on animal feed is similar in 1997 to its level in 1988. Cattle and Sheep Lowland farms are the only farm type that appears to show a downward trend for most of the decade. The trend shows most variation for the Pig and Poultry farm type. In general, it appears fairly stable on Mixed farms, Cattle and Sheep LFA farms and on Dairy farms.

There may be a link between this measure of intensity and production of P in animal manure. This is more of an issue on Pig and Poultry farms (and also some large dairy units). The graphs indicate that this measure of intensity is no worse in 1997 than it was in 1988. The annual rate of change for Pig and Poultry farms is negative - though not statistically significant.

5. Conclusion

For many farm types, especially for those involving cropping enterprises, the past decade has been a fairly buoyant period for Net Farm Income up until about 1995.

However, trends in income show great volatility. Part of the increase in income reflects increasing returns from production. This appears to be reflected in measures of fertiliser and pesticide intensity. Both measures show an average annual rate of increase.

The trends in measures of stocking density are harder to interpret. However, the analysis in this paper does not suggest very dramatic changes over the decade. The reforms of the CAP are likely to have contributed to limits on the overall level of intensification (e.g. maximum stocking rates as a condition for livestock subsidies). Similarly, for most farm types, changes in expenditure on animal feed per livestock unit have been modest.

References:

Colman, D., and Soloman, A., (1998), Direct estimation of supply response by milk producers, Agricultural Economics Society conference. March 1998. University of Reading.

McNally, S., CAP reform and off-farm labour: panel data analysis in England and Wales (1988-1996). Working paper: presented at Agricultural Economics Society conference (March, 1999) and European Population Economics Society conference (June, 1999).

Fig. 2.1: Mean NFI: Cattle and Sheep, LFA farms

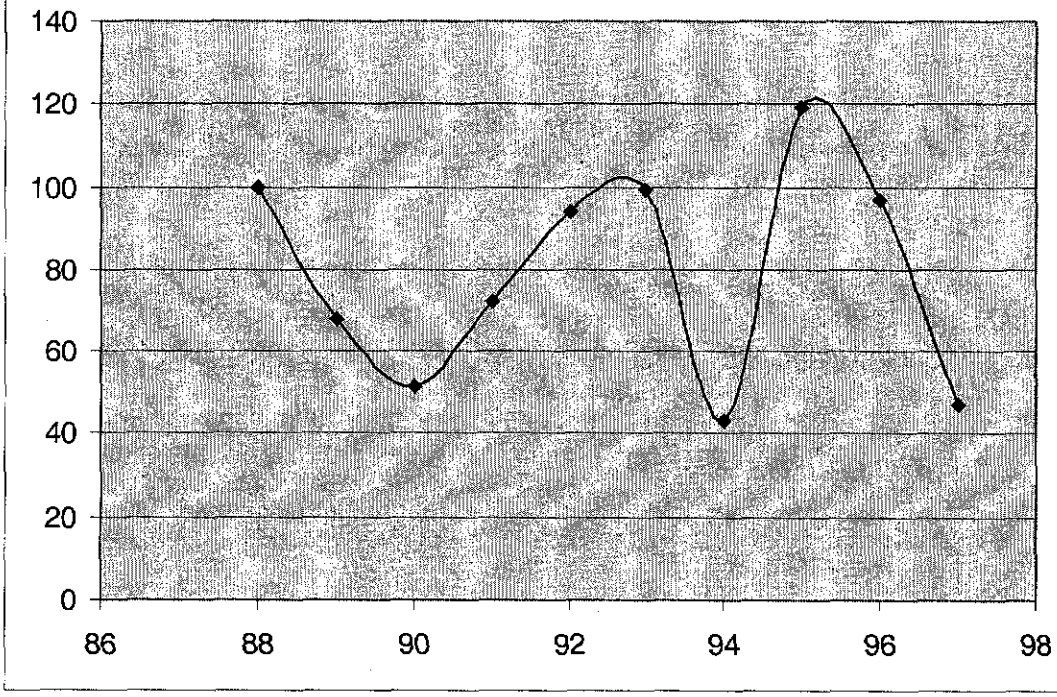


Fig. 2.2: Mean NFI: Cattle and Sheep Lowland farms

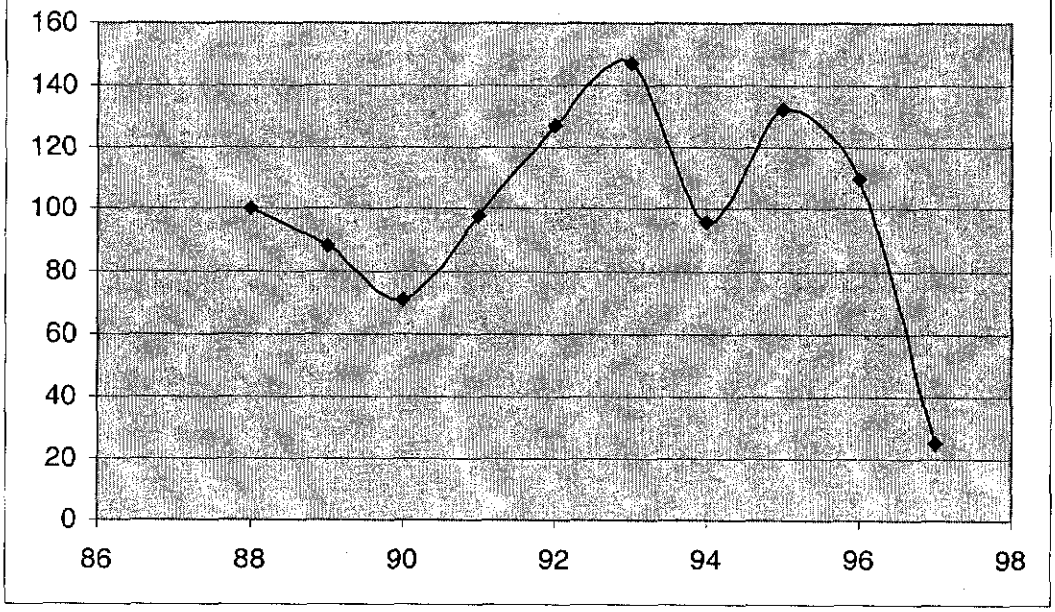


Fig. 2.3: Mean NFI: Mixed farms

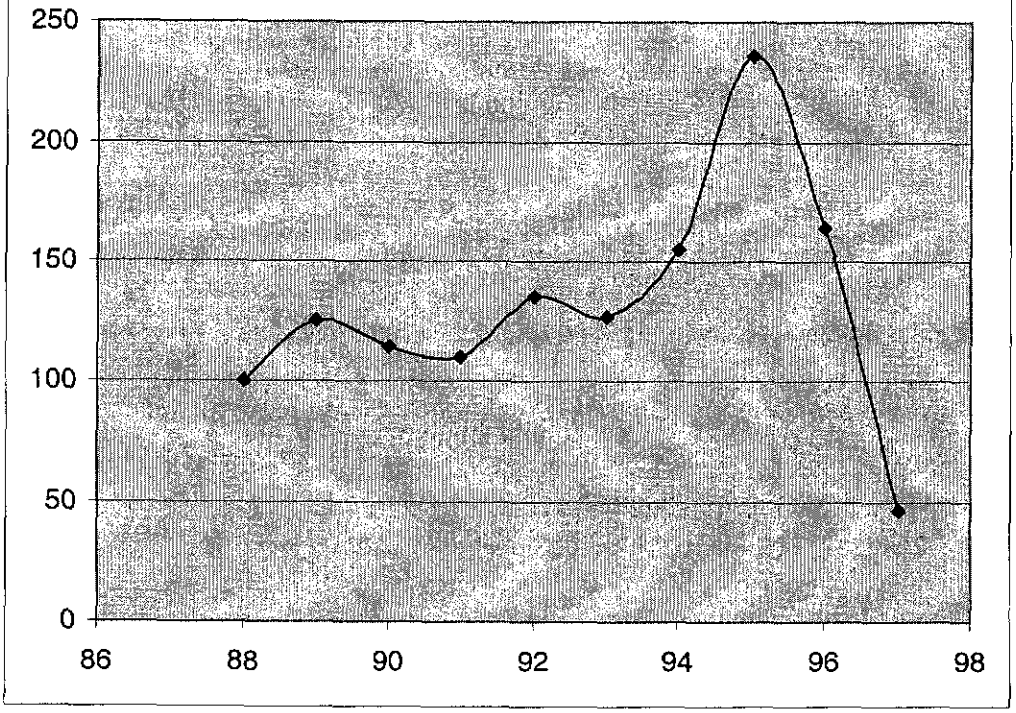


Fig. 2.4: Mean NFI: Cereal farms

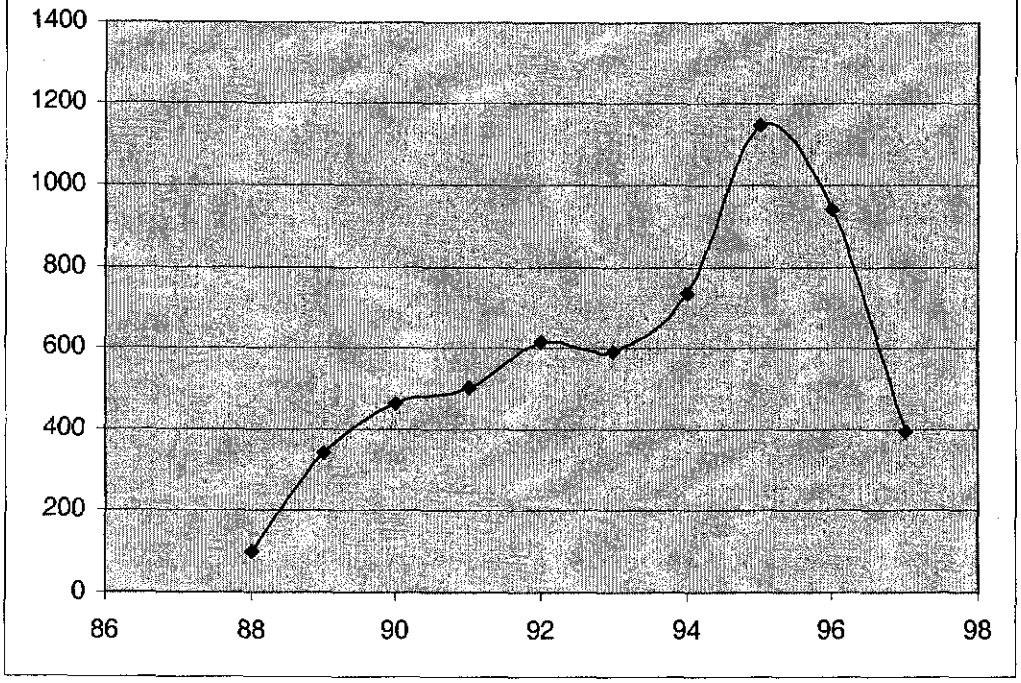


Fig 2.5: Mean NFI: General Cropping farms

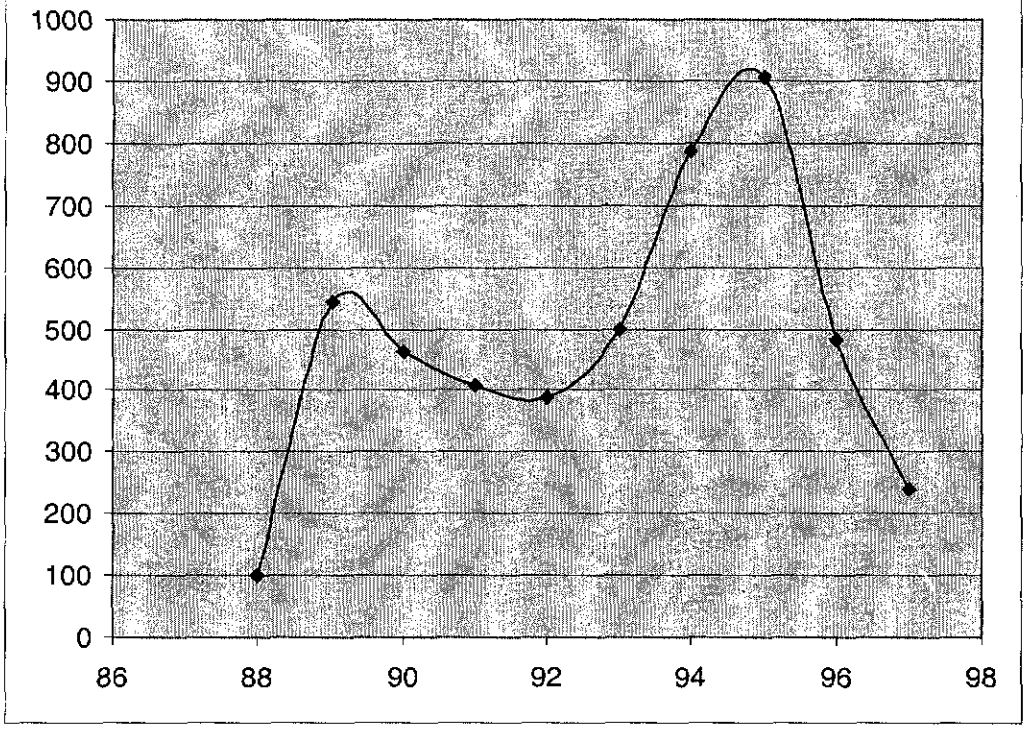
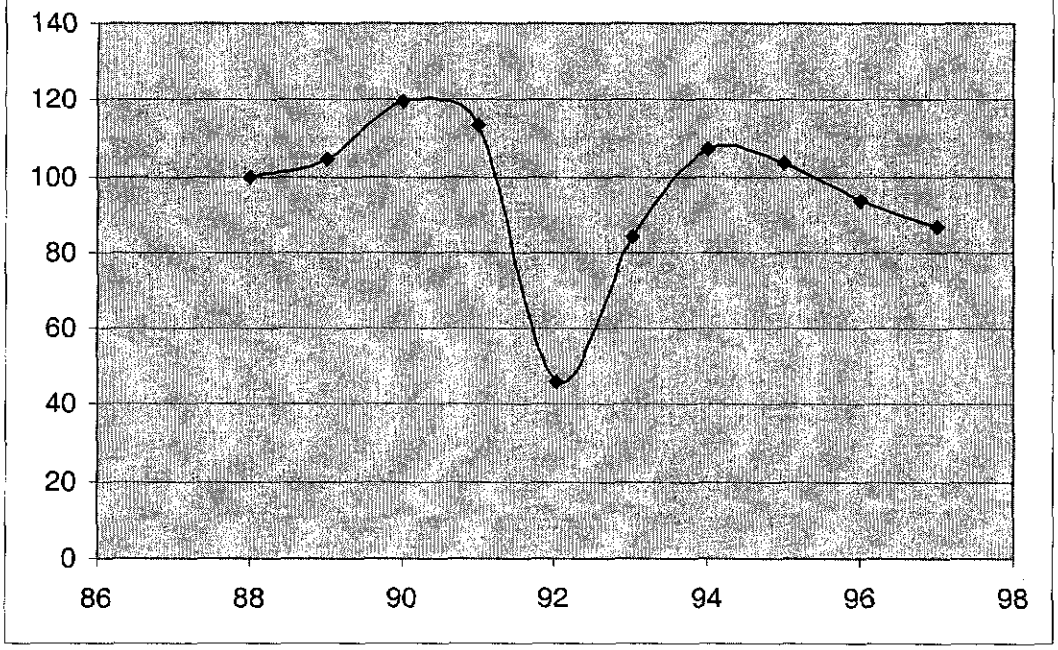


Fig. 2.6: Mean NFI: horticultural farms



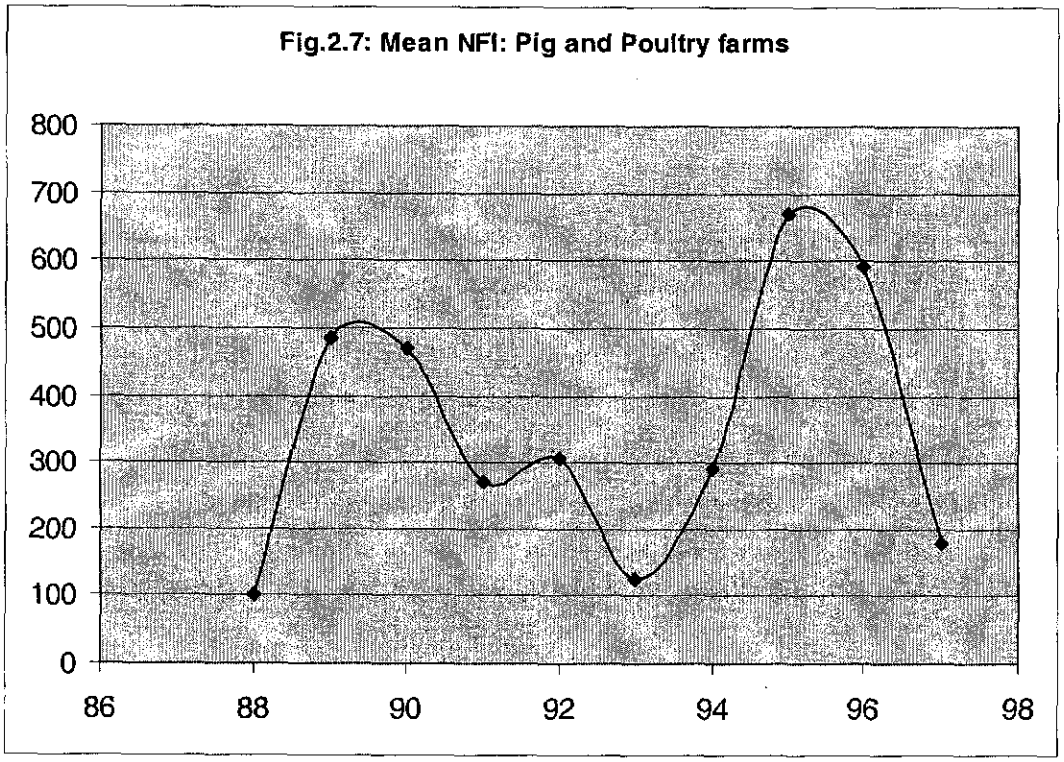


Fig.2.7: Mean NFI: Pig and Poultry farms
800
700
600
500
400
300
200
100
0
86
88
90
92
94
96
98

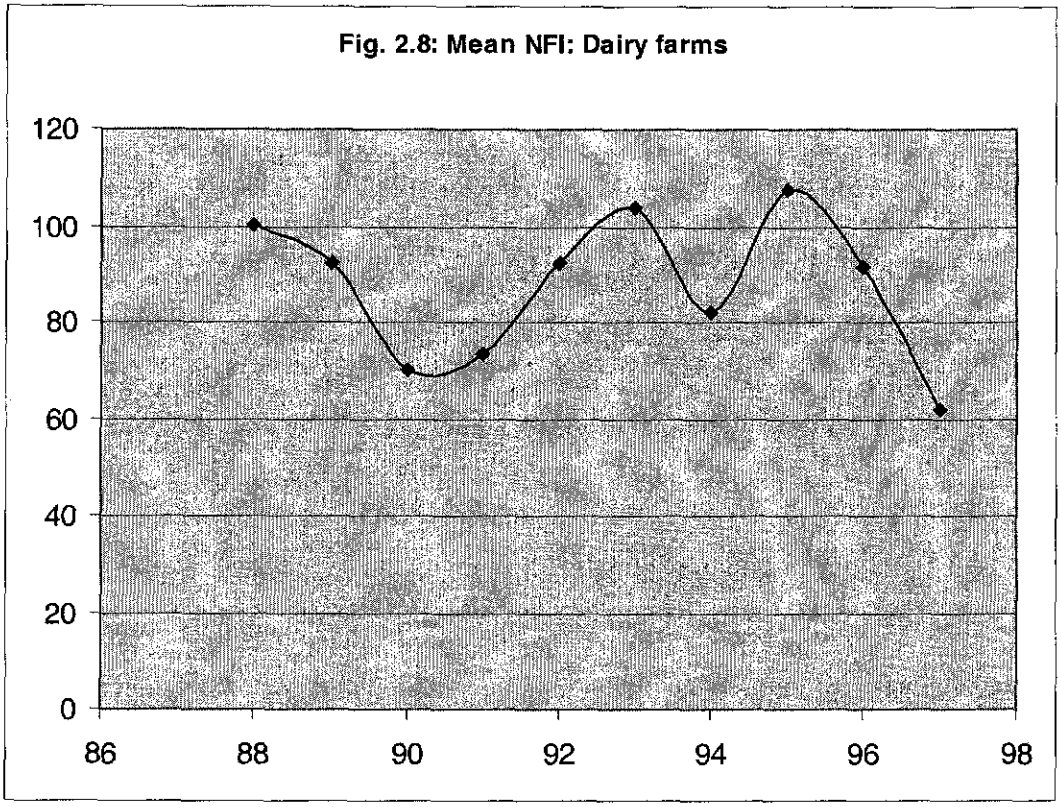


Fig. 2.8: Mean NFI: Dairy farms
120
100
80
60
40
20
0
86
88
90
92
94
96
98

Fig. 2.8: Mean NFI: Dairy farms

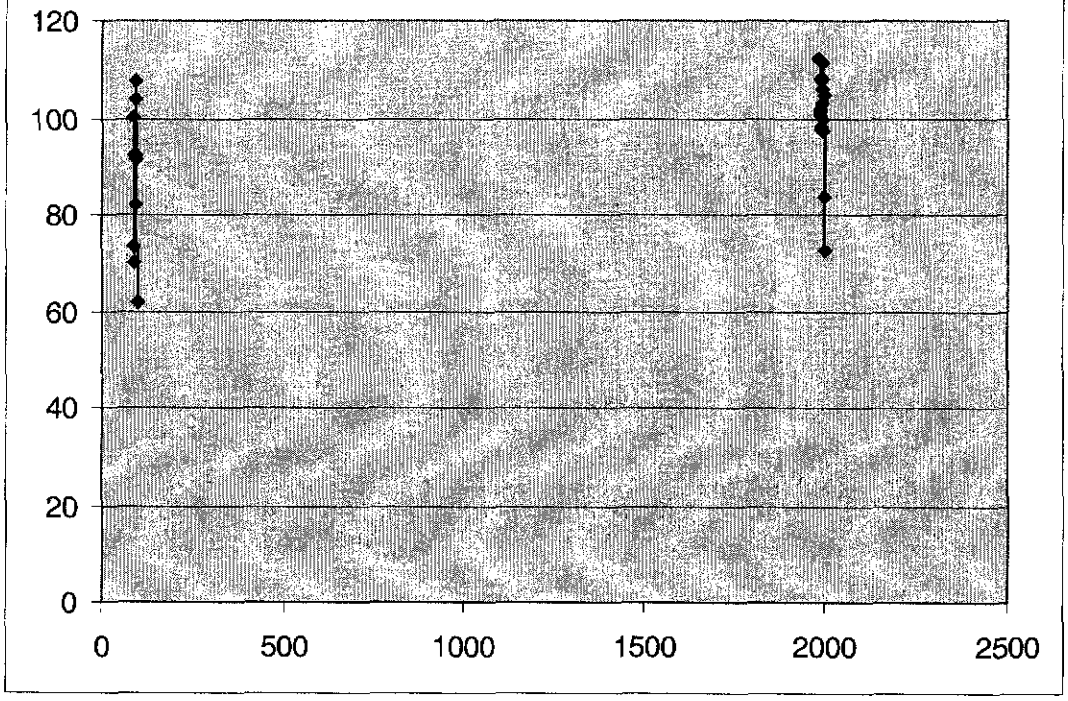


Fig. 2.10: Producer price for root crops

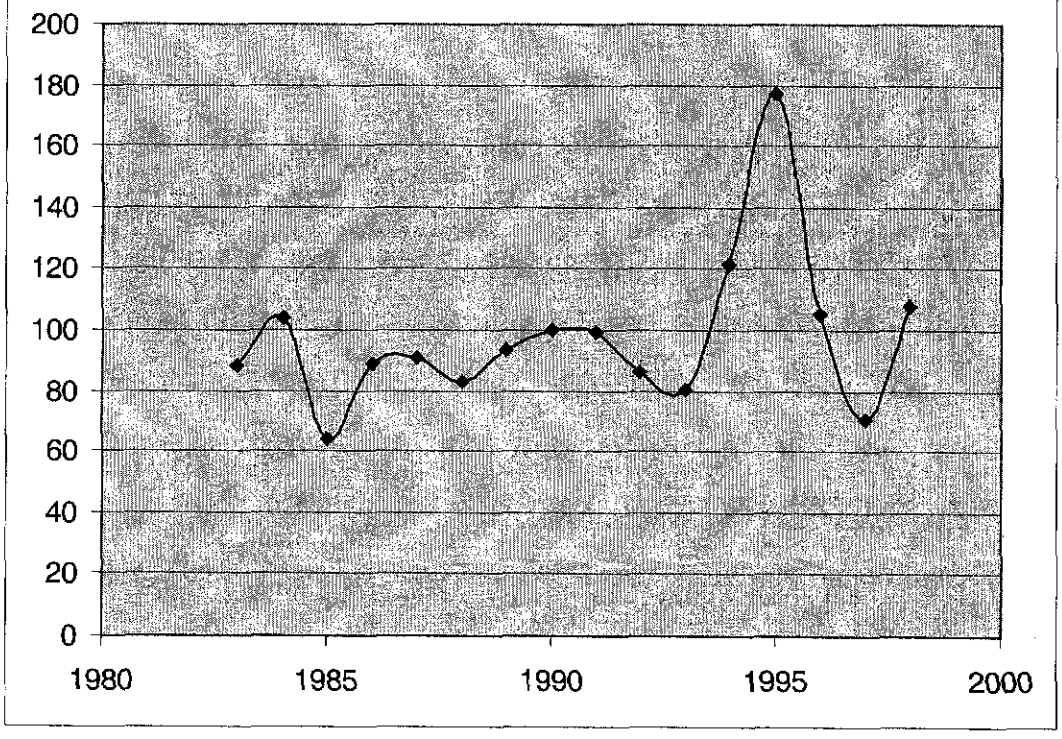


Fig. 2.11: Producer prices for fresh fruit

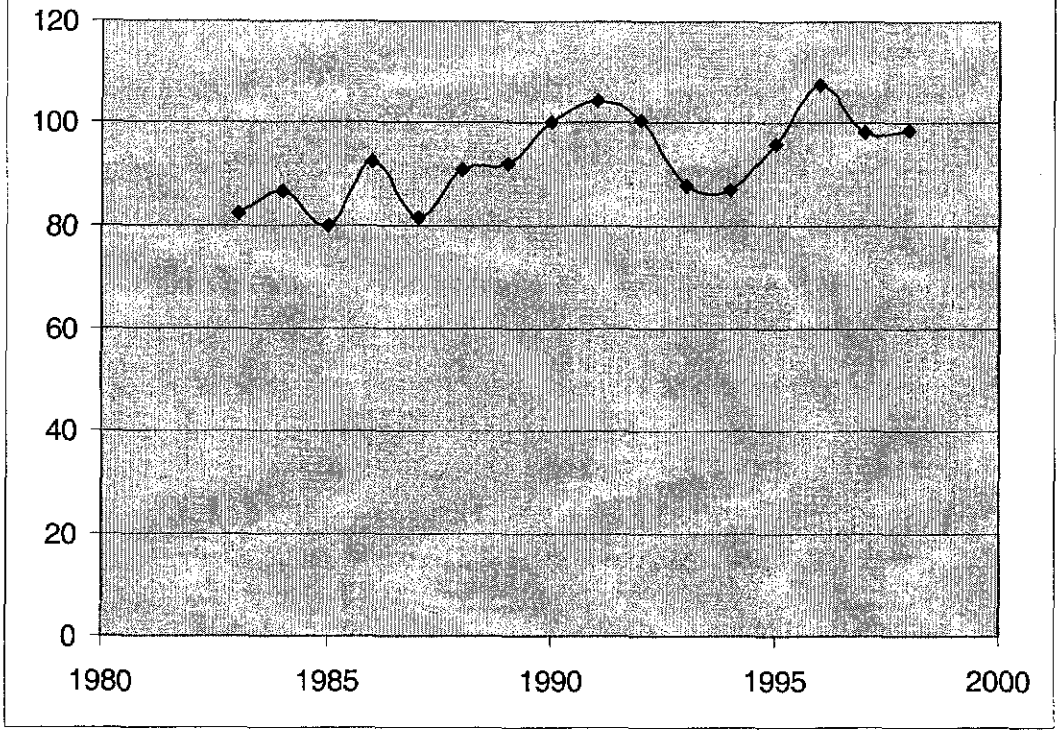


Fig.2.12: Producer price for fresh vegetables

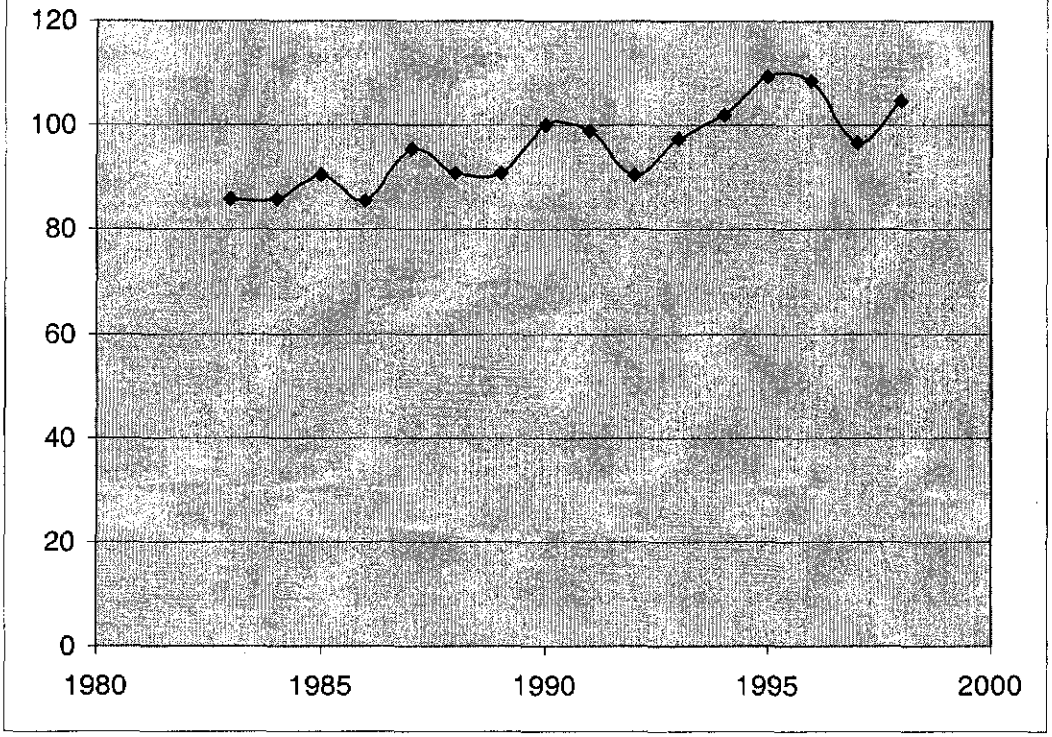


Fig. 2.13: Producer price for eggs

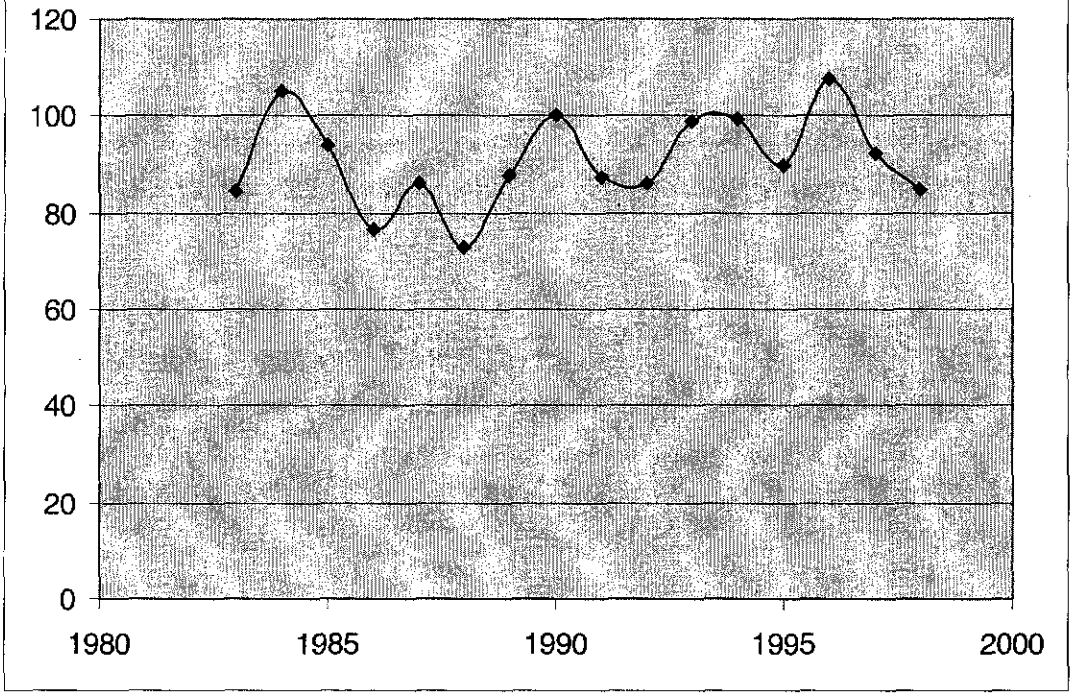


Fig. 2.14: Producer price: animals (for slaughter and export)

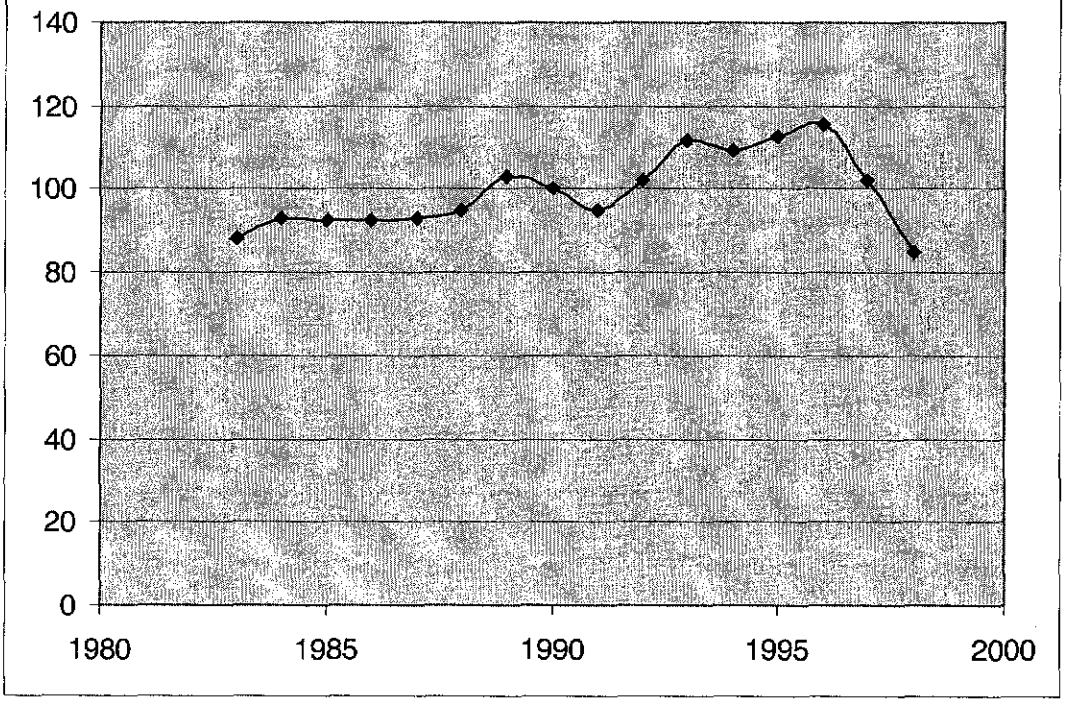


Fig. 2.15: Producer price for milk

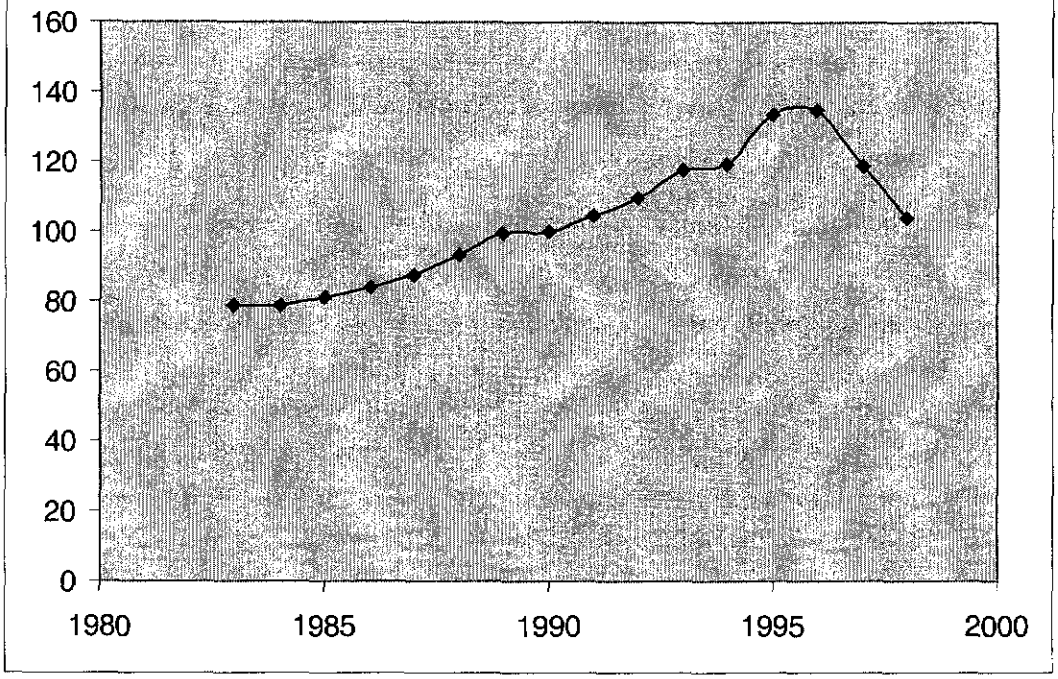
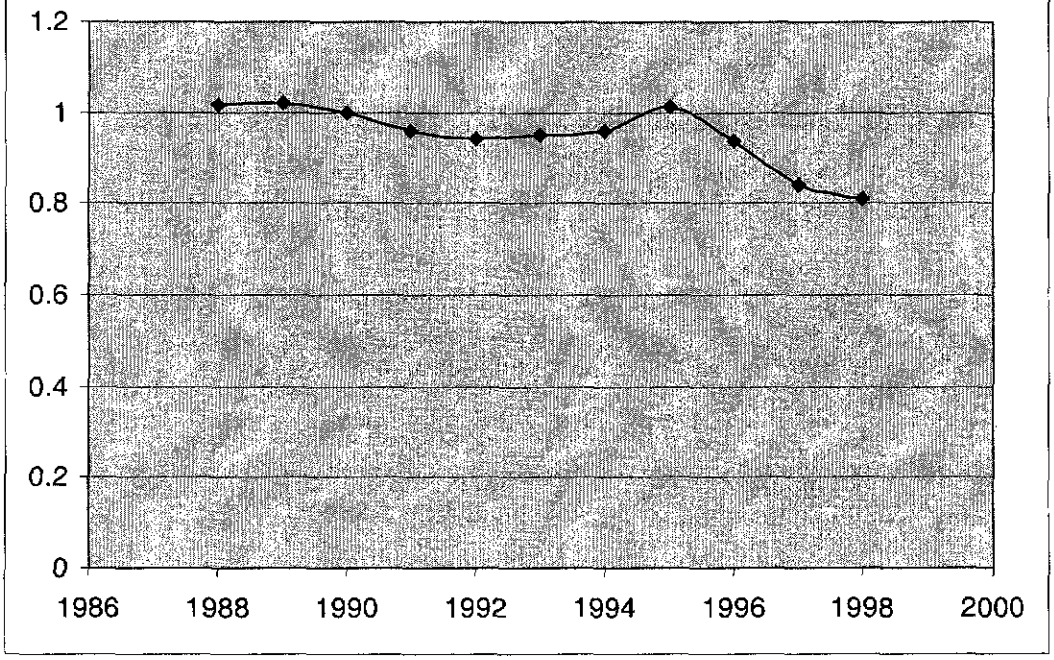


Fig. 2.16: Ratio of the index of producer prices to the index of purchase prices (where 1995=100)



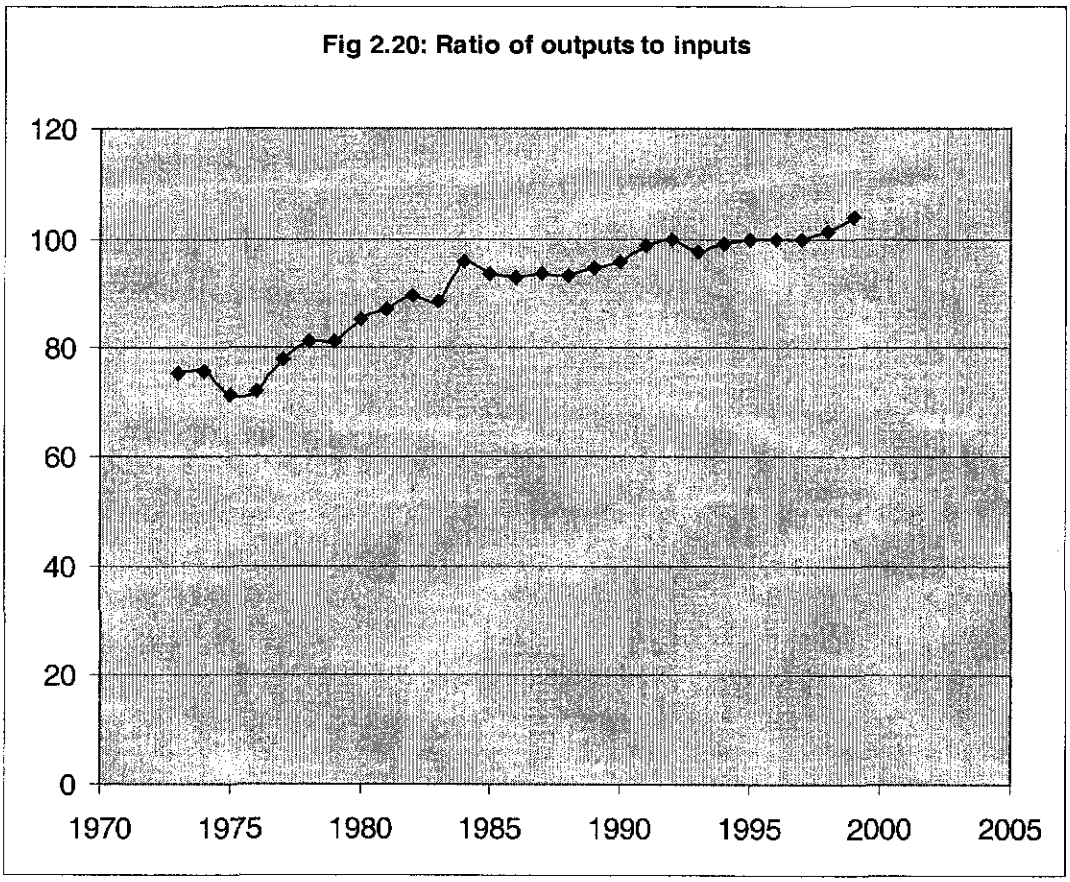


Fig 2.20: Ratio of outputs to inputs
120
100
80
60
40
20
0
1970
1975
1980
1985
1990
1995
2000
2005

Appendix 6:

Drivers of Countryside Change

(Work Package 3.5)

Analysis of MAFF June Census Data at Local Authority Level for England and Wales (1988-1997)

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1. Introduction

This report aims to provide an overview of how farming in England has changed at the regional level over the decade 1988-97, using data from the MAFF June Census, one of the main sources for agricultural data in the UK. The focus will be on describing changes that may have an impact on quality and quantity of land cover. This report will then be linked to another study examining agricultural trends over time using data from the Farm Business Survey. These two reports, together with other research in the same module, will then provide a context in which to interpret the environmental changes observed in CS2000.

The report is structured as follows. Firstly methodological issues are discussed, including information availability from the June Census (JC), the statistical issues surrounding working with district-level data. Also included is a description of other data sets that can be used to understand rural change at the district and regional level, including ONS socio-economic clusters, and a description of how the data is mapped. Secondly the main body of the report will set out the broad structure of agriculture in the English Standard Statistical Regions (SSRs)[1] and how this has changed over the decade. There are six sections here, (a) changes in land area and holding number and mean size, (b)changes in the numbers and proportions of each holding type, (c) changes in land use, (d) changes in cropping, (e)changes in livestock, and (f) agricultural labour changes. Also included is a section which then compares changes in LFA and non-LFA areas Tables and maps are provided where appropriate. Finally, an attempt is made to draw conclusions from these changes, with respect to possible environmental impacts.

2. Methodology

2.1 Data from the June Census

The basic statistics on agricultural holdings in the UK are gathered by MAFF in the annual June Census (JC), held on the first weekday in June. The agricultural holding is the basic unit of enumeration, and there are around a quarter of a million (244,000 in 1994) major agricultural holdings in the UK, that is, holdings above a specified threshold for inclusion in the Census. Minor holdings[2] are periodically included in the Census.
Regional and county results are published yearly, giving a summary of land use, cropping, livestock numbers, tenure of land, seasonal use of land and the number of main holdings included in the Census. Also included is a summary of labour force

[1] Aggregated data for these regions is published each year by MAFF, although in 1997 there is a change to Government Office Region for the published data. County totals have therefore been used for 1997 and aggregated up to the appropriate SSR.

[2] Minor Holding - a holding that satisfies all of the following conditions
- total area of the holding less than 6 hectares
- no regular whole time farmer or worker on the holding
- annual labour requirement less than 100 standard man days, i.e. 8 hours of productive work by an adult worker under average conditions.
- glasshouse area less than 100 square meteres
- the occupier does not farm another holding. (MAFF 1994).

data, including family workers (farmers, spouses and regular hired family labour, other regular hired labour, seasonal and casual labour and trainees on Government Schemes, e.g. YTS).[3] Listed below are breakdowns of the categories used in this report.

LAND USE

Agricultural land use is divided between the following categories; arable (crops, fallow and temporary grassland under 5yrs old), permanent grassland (over 5 years old), rough grazing (sole rights), woodland on holdings and all other land. This last category includes the set-aside element (except for 1988 figures), as well as land taken up by farm buildings, tracks; in other words, land that is not in mainstream agricultural production other than woodland. The total agricultural area excludes common rough grazing land, but includes sole rights rough grazing.

CROPPING, HORTICULTURE AND GRASSLAND

Here the *cereals area* is the total hectarage of cereals grown for threshing (wheat, barley, oats, mixed corn, rye and triticale). The area for *other crops* is the total hectarage for all crops, minus the cereals and horticulture totals. It includes potatoes (early and maincrop), crops for stockfeeding, sugarbeet (other than for stockfeeding) hops, rape for oilseed and all other crops except grasses. The *horticulture area* comprises the total hectarage of vegetables grown in the open for human consumption, orchards (commercial and non-commercial), small fruit (including wine grapes), hardy nursery stock, bulbs and flowers grown in the open and all areas under glass and plastic structures; areas for mushroom growing are excluded. The *grassland area* (temporary and permanent) includes hectarage for clover, sainfoin and lucerne, but excludes all rough grazing. Temporary grassland includes leys under five years old, while permanent grassland refers to grasses five years old and over.

LIVESTOCK

Total cattle numbers refers to the total breeding herd (dairy and beef), plus heifers in calf (dairy and beef), bulls in service and all other cattle over two years old and calves under two years old. *Total pig numbers* includes the total breeding herd, barren sows for fattening and all other pigs. *Total sheep and lambs* includes the breeding flock over one year old, other sheep over one year old and lambs under one year old. Numbers are also available for poultry, goats, horses and ponies and farmed deer, but the amount of land taken up by these enterprises is small. Holdings where pig or poultry are the main enterprise only account for around 3% of all holdings, for example, and tend to be small or very small, i.e under 8ESU.

CLASSIFICATION OF HOLDING TYPES

Holdings are classified into 72 holding types in the EC system, according to how the Standard Gross Margins (SGMs) are distributed among the enterprises. Simplification of these has resulted in nine robust types, identified by the crop or livestock (or group of crops or livestock) enterprise making up usually more than two thirds of the total SGM for the holding. Where both crops and livestock comprise more than one third, but less than two thirds, of total SGM, the holding is classified to a mixed category.

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[3] Data for seasonal and casual workers reflects numbers in work in June, and thus will not include those working at other times, e.g. for seasonal vegetable picking and processing, Christmas poultry preparation, etc.

The nine robust types are Cereals, General cropping, Horticulture, Pigs and poultry, Dairy, LFA cattle and sheep, Cattle and sheep (lowland), Mixed and Other. This last category includes holdings which do not fit well with mainstream agriculture such as specialist mushroom growing enterprises, goat or equine enterprises, or those which are of limited economic importance, such as specialist set-aside, specialist grass and forage (only grass or rough grazing, with no livestock held) or non-classifiable holdings (fallow or buildings and other areas only; no SGM coefficients calculated). Such holdings may thus be indicators of diversification. Holdings are also classified according to the amount of tillage and grass area they have, and these are divided into 5 categories.[4]

Listed below are the nine robust types and the five tillage and grass categories together with the variable names used in the tables.

Type	Variable name
Cereals	CEREAL
General cropping	GENCRO
Horticulture	HORT
Pigs and poultry	P & P
Dairy	DAIRY
Cattle and sheep (LFA)	LFACS
Cattle and sheep (lowland)	LOWCS
Mixed	MIXED
Other	OTHER
0<5 ha	TILGR1
5<20 ha	TILGR2
20<50 ha	TILGR3
50<100 ha	TILGR4
100+ ha	TILGR5

2.2 Statistical issues concerning district-level data.

To prevent disclosure of individual holdings, data are suppressed by MAFF where there are less than five holdings in an area, or where a particular question in the JC is answered by fewer than five holdings in an area. While the impact of this is minimal at regional level, it can lead to more significant undercounting at district level. An example of this is the dissagregation of farm labour by sex, which leads to a loss of information particularly about numbers of female farm workers. Another example is with the breakdown by holding type.For instance, a districts may have fewer than five horticultural holdings, but these may employ a significant proportion of the local agricultural labour force, especially if the district is dominated by larger Cereals holdings

2.3 Other useful data sets

The *EC Farm Structures Survey (FSS)* provides more detailed information about farm labour, in particular about the uptake of other gainful activities (OGAs). When farm incomes are falling it becomes necessary for some farm families to supplement this with income from other sources. As a result farmers may choose to change the type of farming carried out on the holding to leave more time available for OGAs. For

[4] Further information about the classifications and other definitions can be found in MAFF's annual Digest of Agricultural Census Statistics: United Kingdom, published by The Stationary Office (formerly HMSO).

example, a change from dairying to extensive beef rearing, or from livestock to arable farming could mean less time is needed for routine farm work. The FSS provides a breakdown of the time spent on farm work (by quartiles as a proportion of the previous twelve months) for holders, spouses and other family members. In addition, it records time spent on OGAs, with a major OGA being classified as one where more time is spent on it than on farm work on the holding, and minor OGAs where less time is spent. This type of information would be most useful at local authority district level, where it could be used with other district-level data to look for patterns of change that might correlate with local economic factors. However the FSS sample is not drawn with district-level disaggregation in mind, and the sample size means breakdown to this level would also lead to severe treatment for disclosure.

There are several other data sets that give useful information on local labour market conditions. The *Annual Employment Survey* (formerly the Census of Employment) measures the total number of employee jobs annually. It is workplace-based, and gives the numbers and percentages of employees in employment by sex, full-time/part-time and 1992 Standard Industrial Classification.
The *Labour Force Survey* measures the number of people in employment. It is a quarterly sample survey of approximately 60,000 households in the UK which provides information on economic activity rates, percentage by age in employment (full and part-time), percentage of economically inactive, percentages employed by industry and occupation, and information on people in job-related training. It is also a source of information on self-employed people. The LFS also measures International Labour Organisation (ILO) unemployment rates. *JUVOS* (the Employment Service's Joint Unemployment and Vacancy Operating Systems) is another source of unemployment details. The *New Earning Survey* gives information on earnings and hours of employees by sex, age , type of work (manual, non-manual) and industry division.

Another useful analytical tool for studying local labour markets is the *ONS classification of local authority districts*. This uses the technique of cluster analysis on selected variables from the 1991 Census to provide a straightforward socio-economic indicator of the similarities and differences between areas which allows other data to be analysed in relation to the classification framework (Wallace and Denham 1996).

The classification is based wholly on data from the 1991 Census Small Area Statistics and Local Base Statistics. Initially 71 variables were used, including those representing the main dimensions of Census data (demographic, employment, socio-economic, household composition and housing), and these were reduced to 37 by identification and removal of strongly correlated variables. These final variables were then standardised using the range standardisation technique. Each variable was regarded as being of the same importance, and was not weighted, and the areas were not weighted by their population.

The choice of variables was guided by the desire to represent the main areas of demography, socio-economics, employment, housing and household composition, and to use variables used in the earlier 1971 and 1981 OPCS area classifications (or their near equivalents) together with new variables from the 1991 Census, such as ethnic group and limiting long term illness, which might be significant for area classification.

Using cluster analysis, the dataset was used to produce, for each district, a cluster of up to four corresponding districts. Then for all districts, a set of groupings was produced with similar characteristics, and these were then further arranged into broad families. This produced 6 broad families, 12 intermediate groups and 34 clusters, each being allocated a suitable descriptive name. A list of the names is given on the next page.

ONS cluster analysis of Local Authority Districts, from Wallace and Denham (1996)

FAMILY	GROUP	CLUSTER
1 Rural Areas	A Scotland	1 Highlands & Islands
		2 Uplands & Agriculture
	B Coast & Country	3 Remote England & Wales
		4 Heritage Coast
		5 Accessible Amenity
	C Mixed Urban & Rural	6 Towns in Country
		7 Industrial Margins
2 Prospering Areas	D Growth Areas	8 Satellite Towns
		9 Growth Corridors
		10 Areas with Transient populations
		11 Metropolitan overspill
		12 Market Towns
	E Most Prosperous	13 Concentrations of Prosperity
		14 Established High Status
3 Maturer Areas	F Services & Education	15 University Towns
		16 Suburbs
	G Resort & Retirement	17 Traditional Seaside Towns
		18 Smaller Seaside Towns
4 Urban Centres	H Mixed Economics	19 Established Service Centres
		20 Scottish Towns
		21 New & Expanding Towns
	J Manufacturing	22 Pennine Towns
		23 Areas with large ethnic minorities
5 Mining & Industrial Areas	K Ports & Industry	24 Areas with inner city characteristics
		25 Coastal Industry
		26 Glasgow & Dundee
		27 Concentrations of public sector housing
	L Coalfields	28 Mining & Industry, England
		29 Mining & Services, Wales
		30 Former mining areas, Wales & Durham
6 Inner London	M Inner London	31 Cosmopolitan Outer Boroughs
		32 Central London
		33 Inner City Boroughs
		34 Newnham & Tower Hamlets

Combining information from sources such asd these with district-level agricultural data would allow a better picture to be built of the interaction of farm families with the wider local economy. This would facilitate the identification of ways in which the two could mutually interact. However, at present the JC, and to a lesser extent the FSS are still primarily set up to provide information on what farmers are (traditionally) doing on their holdings.

Combining information from sources such as these with district-level agricultural data would allow a better picture to be built of the interaction of farm families with the wider local economy. Such analysis could then be used to identify ways in which to promote mutual interaction. However, at present the JC (and to a lesser extent the FSS) is still primarily set up to report on how farmers farm the land.

2.4 Mapping

Map borders for the country outlines of England, Scotland and Wales, and the English Census Regions are downloadable from UKBORDERS, an on-line retrieval system for accessing digital boundary datasets. The software used for mapping is MapInfo, a GIS and mapping package, and tables of data are geocoded to the approprtiate borders. This enables maps to be created using information from the JC.

The digitised boundary outline data has been generalised (this reduces the file size by systematically discarding data points according to a type of moving average), and although this results in some loss of precision, the maps are sufficiently accurate for the thematic mapping purposes used in this project.

Information was not readily available for the proportions of holding types for England Wales and Scotland in 1988, so the comparison is between 1991 and 1997 instead. Also, the statistics were presented differently for the three countries, so the country and region pie charts differ as follows

Countries	**Regions**
Dairy	Dairy
Cattle & sheep	LFA cattle & sheep
	Lowland cattle & sheep
Cropping	General cropping
Pigs & poultry	Pigs and Poultry
Horticulture	Horticulture
Unclassified (mixed and other)	Mixed
	Other

For the land use maps, each land use is given as a proportion of the total area on holdings. Livestock units are per 100ha of grass and rough grazing. Cereals are given as a proportion of total crops, and holding types as a proportion of all holdings.

3. Regional agricultural change, 1988-97

3.1 Land area and holdings

Land in agricultural use, including woodland on agricultural holdings, comprises over 70% of the English landscape. This section reviews changes in the percentage of agricultural land in each region, in each region's share of the national total of holdings and agricultural area and within each region in the holdings area, numbers of holdings and mean holding size.

All regions have lost some land from agricultural holdings over the decade, but this has happened at different rates in different regions (Table 1). The North West, South West and South East are losing agricultural land (as measured in the June Census) at higher rates than the national average, while in the North and Yorkshire and Humberside the rate of loss is less steep.

Table 1:The percentage of regional area in agriculture

Region	% area in agriculture 1988	% area in agriculture 1990	% area in agriculture 1993	% area in agriculture 1997	*Change 88-97*
North West	62.35	61.81	61.55	59.26	*-3.09*
South East	67.05	66.46	65.70	64.16	*-2.90*
South West	78.24	76.82	77.21	75.84	*-2.40*
West Midlands	75.43	75.14	74.79	73.53	*-1.90*
East Anglia	80.60	80.73	81.57	78.98	*-1.62*
East Midlands	80.04	79.38	80.16	78.82	*-1.22*
Yorks & Humberside	72.06	71.59	72.26	71.32	*-0.73*
North	68.29	67.89	68.11	67.59	*-0.70*
All England	**73.35**	**72.73**	**72.89**	**71.48**	*-1.86*

Source:NERC and MAFF

Table 2 shows each region's percentage of the national total of holdings and agricultural area. Throughout England the number of holdings has fallen by 7%, while the agricultural area has fallen by just over 2%. What we cannot tell from the data is how many holdings have fallen out of the main Census by becoming minor holdings, and how many have changed ownership and been incorporated into other, larger holdings to facilitate economies of scale. The percentage changes are very small and may be within the error of the Census, or may be accounted for by holdings merging, splitting or falling below the threshold for inclusion as a major holding.

Table 2:Regional holdings numbers and agricultural area as a percentage of national totals, 1988 and 1997.

Region	year	Nat. % of holdings	Nat. % of area
	1988	7.72	11.17
	1997	7.92	11.32
	% change	*2.59*	*1.31*
North West	1988	8.25	4.77
	1997	7.76	4.64
	% change	*-5.68*	*-2.69*
Yorks & Humberside	1988	11.32	11.79
	1997	11.14	11.94
	% change	*-1.53*	*1.32*
East Midlands	1988	11.20	13.28
	1997	10.97	13.38
	% change	*-1.98*	*0.80*
West Midlands	1988	12.85	10.22
	1997	13.11	10.20
	% change	*2.03*	*-0.23*
South West	1988	23.66	19.57
	1997	24.73	19.65
	% change	*4.54*	*0.40*
East Anglia	1988	8.38	10.75
	1997	7.93	10.78
	% change	*-5.38*	*0.30*
South East	1988	17.60	18.44
	1997	17.00	18.07
	% change	*-3.42*	*-2.00*
Total		100.00	100.00

Just under quarter of all the holdings recorded in the June Census are located in the South West and these account for just under 20% of the total national hectarage of agricultural land. The North, North West and East Anglia have the smallest percentages, just under 8% by 1997. By the end of the decade, the South West, West

Midlands and the North have slightly increased their share of the total holdings, while all other regions had less.

East Anglia, while decreasing its share of holdings by over 5%, retains its share of the nation's agricultural land, suggesting that here the mean holding size has increased; this is confirmed in Table 3. A similar pattern occurs also in Yorkshire and Humberside. The South East and North West appear to be losing land to agriculture, as their share has fallen by 2% and 2.69% respectively and their share of holdings has also decreased. Some of this may be due to change of land use, and data compiled by the CPRE (1993) suggests that in the South East and the South West more land is being converted from rural to urban use. But the table above also suggests that agricultural holdings are becoming more concentrated in the South West, together with the North and West Midlands.

Table 3: Regional changes in the area, number and mean size of holdings in the June Census, 1988-97

	Total area of holdings in JC			Total number of holdings in JC			Mean holding size		
Region	1997	Change 88-97	% *change*	1997	Change 88-97	% *change*	1997	Change 88-97	% *change*
North	1038383	-10784	***-1.03***	11398	-576	***-4.81***	87.62	3.48	***3.97***
North West	425419	-22063	***-4.93***	11177	-1619	***-12.65***	34.97	3.09	***8.84***
Yorks & H'side	1095544	-11277	***-1.02***	16042	-1516	***-8.63***	63.04	5.25	***8.34***
East Midlands	1227769	-18966	***-1.52***	15799	-1572	***-9.05***	71.77	5.94	***8.28***
West Midlands	935525	-24273	***-2.53***	18871	-1063	***-5.33***	48.15	1.43	***2.96***
South West	1802425	-35166	***-1.91***	35603	-1101	***-3.00***	50.07	0.56	***1.12***
East Anglia	989034	-20318	***-2.01***	11421	-1588	***-12.21***	77.59	9.01	***11.61***
South East	1657757	-73731	***-4.26***	24466	-2835	***-10.38***	63.42	4.34	***6.84***
All England	9173853	-216569	***-2.31***	143955	-11194	***-7.21***	60.53	3.20	***5.29***

There has been a loss of *holdings area* in all regions (Table 3), but with the greatest percentage loss in the North West (down nearly 5%) and the South East (over 4%), which also had the greatest loss of hectarage. These correspond with the losses of national share in Table 2.

The South East has lost the greatest *number of holdings* (over 2,800) while North has lost the fewest (just over 570). The greatest percentage losses occurred in the North West (down over 12.5%) and East Anglia (down 12.21%). Again, this is born out in the figures from Table 2.

In 1988 the North had the largest *mean holding size*. This remains the case in spite of changing little over the decade in comparison to East Anglia, which had the largest increase (as suggested also in Table 2). Mean average size of holdings has changed least in the South West. The North West, Yorkshire and Humberside and the East Midlands all show increases of over 8% in mean holding size, and this together with the fall in numbers of holdings, suggests some incorporation of smaller holdings into larger ones, to benefit from economies of scale.

3.2 Changes in numbers and proportions of EC farm types

Table 4:National changes in holdings types[5]

Holding type		1988	1997	change	% change
Pigs and poultry	no.	6887	4733	-2154	***-31.28%***
	Nat.%	4.45%	3.33%	-1.12%	
Horticulture	no.	11061	8032	-3029	***-27.38%***
	Nat.%	7.14%	5.65%	-1.49%	
Dairy	no.	24150	17785	-6365	***-26.36%***
	Nat.%	15.59%	12.50%	-3.09%	
General cropping	no.	15413	11367	-4046	***-26.25%***
	Nat.%	9.95%	7.99%	-1.96%	
Mixed	no.	12905	11096	-1809	***-14.02%***
	Nat.%	8.33%	7.80%	-0.53%	
LFACS	no.	11190	9633	-1557	***-13.91%***
	Nat.%	7.22%	6.77%	-0.45%	
LOWCS	no.	29638	30698	1060	***3.58%***
	Nat.%	19.14%	21.58%	2.45%	
Cereal	no.	20338	20889	551	***2.71%***
	Nat.%	13.13%	14.69%	1.56%	
Other	no.	23305	27994	4689	***20.12%***
	Nat.%	15.05%	19.68%	4.64%	
All holdings	no.	154887	142227	-12660	***-8.17%***
	Nat.%	100.00%	100.00%		

The picture here is one of a decline in the what can be regarded as the more labour intensive farm types and a rise in those where, theoretically, there will be more time available for OGAs. Hence Pigs and Poultry, Dairy, Horticulture and Mixed holdings have seen the greatest percentage decline, Cereal, LOWCS and Other holdings are increasing in number.

In terms of the national balance of holding types, Dairy holdings have seen their share fall by three percentage points while Other holdings have increased their share by nearly five points. This again suggests more opportunities for diversification and taking on OGAs if farmers are changing to less labour-intensive types of farming.

[5] The total numbers of holdings and the total percentage change varies slightly from those in Table3. This may be due to suppression of numbers. However, both show a decline in the number of holdings overall by between seven and eight percent.

Table 5: Regional changes in numbers and proportions of EC farm types.

Reg		CEREAL	GENCRO	HORT	P&P	DAIRY	LFA CS	LOW CS	MIXED	OTHER	ALL TYPES
N	1997	1012	112	71	157	1902	3205	2390	760	1518	11127
	Change 88-97	35	-89	-106	-80	-617	-350	427	-187	272	-695
	% change	3.58	-44.28	-59.89	-33.76	-24.49	-9.85	21.75	-19.75	21.83	-5.88
NW	1997	477	637	792	433	2636	1021	1954	419	2621	10990
	Change 88-97	26	-313	-268	-307	-815	-28	-79	-148	286	-1646
	% change	5.76	-32.95	-25.28	-41.49	-23.62	-2.67	-3.89	-26.10	12.25	-13.03
Y&H	1997	2839	1799	518	815	1640	1879	2338	1501	2478	15807
	Change 88-97	-102	-492	-194	-315	-599	-274	114	-271	425	-1504
	% change	-3.47	-21.48	-27.25	-27.88	-26.75	-12.73	5.13	-15.29	20.70	-20.70
EM	1997	3926	2212	773	450	1310	642	2646	1319	2324	15602
	Change 88-97	164	-1068	-188	-234	-563	-81	172	-147	318	-1627
	% change	4.36	-32.56	-19.56	-34.21	-30.06	-11.20	6.95	-10.03	15.85	-9.44
WM	1997	1738	1303	980	525	2680	1000	5094	1761	3587	18668
	Change 88-97	192	-255	-222	-185	-879	-171	-11	-349	727	-1153
	% change	12.42	-16.37	-18.47	-26.06	-24.70	-14.60	-0.22	-16.54	25.42	-5.82
SW	1997	2584	610	1463	1002	6521	1886	10524	2751	7901	35242
	Change 88-97	365	-224	-331	-276	-2200	-653	791	-273	1583	-1218
	% change	16.45	-26.86	-18.45	-21.60	-25.23	-25.72	8.13	-9.03	25.06	-3.34
EA	1997	3019	3568	825	582	110	0	784	807	1519	11214
	Change 88-97	-208	-1049	-432	-277	-81	0	73	-36	327	-1683
	% change	-6.45	-22.72	-34.37	-32.25	-42.41	0.00	10.27	-4.27	27.43	-13.05
SE	1997	5294	1126	2610	769	986	0	4968	1778	6046	23577
	Change 88-97	79	-556	-1288	-480	-611	0	-427	-398	751	-2930
	% change	1.51	-33.06	-33.04	-38.43	-38.26	0.00	-7.91	-18.29	14.18	-11.05
ENG	1997	20889	11367	8032	4733	17785	9633	30698	11096	27994	142227
	Change 88-97	551	-4046	-3029	-2154	-6365	-1557	1060	-1809	4689	-12660
	% change	2.71	-26.25	-27.38	-31.28	-26.36	-13.91	3.58	-14.02	20.12	-8.17

All regions have experienced the decline in Dairy, Pig and Poultry, Horticulture and Mixed holdings and the rise in Other holdings noted above. There are now fewer holdings relying mainly on livestock with the exception of lowland cattle and sheep(LOWCS) holdings, which one could argue are less labour intensive than Dairy or LFA cattle and sheep (LFACS)holdings. The decline in Mixed and General cropping holdings also implies a move towards specialization, where labour requirements may be easier to predict and control, which may in turn leave time for OGAs where necessary. Increases have occurred in the types of holdings where diversification and off-farm enterprises may be more easily taken up. For example, numbers of Cereal holdings, where activity tends to come in short intense bursts during the year, have increased in all but two regions, East Anglia and Yorkshire and Humberside. Changes in LOWCS holdings have varied between a rise of over 20% in the North to a fall of nearly 8% in the South East. Where there have been rises in the numbers, these may reflect a change of enterprise from dairy to beef. For example, in East Anglia the fall in numbers of Dairy holdings (down by 81) is similar to the rise in the numbers of LOWCS holdings (up by 73). (This also ties in with the substitution of beef for dairy cattle; see the section on livestock changes) In other areas, though, the fall in Dairy holdings is well in excess of any rise in LOCASH and, where applicable, LFACASH holdings.

3.3Changes in holdings by tillage and grass area.

Here holdings are categorised according the size of their arable area. There has been a decline in all groups except the 5-20ha group (Table 6). This seems surprising, perhaps especially the decline in the numbers of holdings with the largest hectarage of tillage and grass. Bearing in mind that these are numbers of holdings, and not farms, one explanation may be associated with the way in which holdings are defined on farm amalgamation or alternatively even that this represents pre-emptive action against the possible limits placed on the total of support payments per 'farm'.

Table 6 : Regional changes in tillage and grass holdings, 1988-97

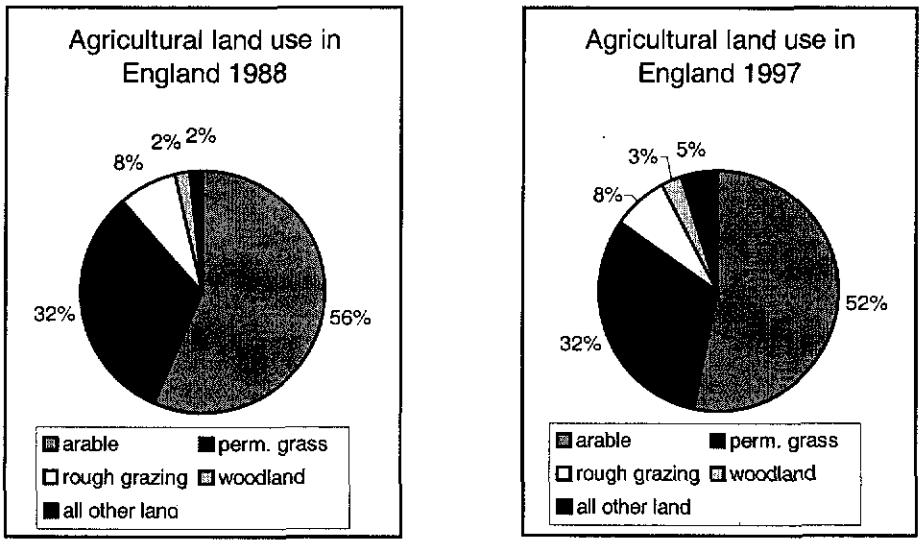
Region	Year/ change	TILGR1 0-5ha	TILGR2 5-20ha	TILGR3 20-50ha	TILGR4 50-100ha	TILGR5 100+ha
North	1997	1683	2172	2630	2686	2191
	change 88-97	59	-11	-529	-194	114
	change	3.63	-0.50	-16.75	-6.74	5.49
North West	1997	2598	3197	2862	1705	618
	change 88-97	-735	-239	-465	-112	11
	change	-22.05	-6.96	-13.98	-6.16	1.81
Yorks & H'side	1997	3200	3728	3472	2868	2637
	change 88-97	-640	-146	-433	-319	-103
	change	-16.67	-3.77	-11.09	-10.01	-3.76
East Midlands	1997	2544	3888	3487	2580	3236
	change 88-97	-681	4	-406	-351	-143
	change	-21.12	0.10	-10.43	-11.98	-4.23
West Midlands	1997	3742	5284	4157	3137	2452
	change 88-97	-536	96	-283	-203	-161
	change	-12.53	1.85	-6.37	-6.08	-6.16
South West	1997	6933	9808	8571	6125	4051
	change 88-97	-403	631	-909	-370	-35
	change	-5.49	6.88	-9.59	-5.70	-0.86
East Anglia	1997	2683	2244	2134	1681	2661
	change 88-97	-540	-171	-574	-168	-138
	change	-16.75	-7.08	-21.20	-9.09	-4.93
South East	1997	6424	6202	4204	2797	4189
	change 88-97	-1558	52	-399	-427	-504
	change	-19.52	0.85	-8.67	-13.24	-10.74
All England	1997	29807	36523	31517	23579	22035
	change 88-97	-5034	216	-3998	-2144	-959
	change	14.45	-0.59	11.26	8.33	4.17

The South West continues to have the greatest numbers in all groups except TILGR5, where the South East has marginally more, and lost comparatively few over the decade, especially TILGR5 holdings.

The biggest fall in TILGR5 holdings occurred in the South East, where they fell by 10.74%, whereas in the North and North West numbers increased slightly. At the other end of the scale, the greatest losses in TILGR1 holdings occurred in the North West (down 22.05%), the South East (down 19.52%) and East Anglia (down16.75%).

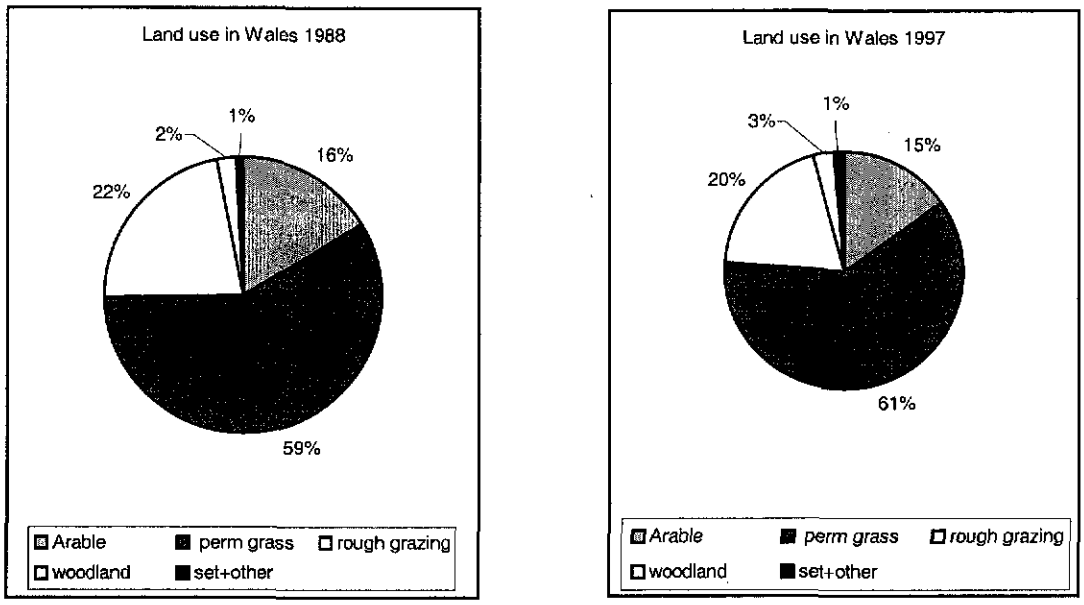
3.4 Changes in land use and agricultural outputs

Diagram 1: Agricultural land use in England, 1988 and 1997



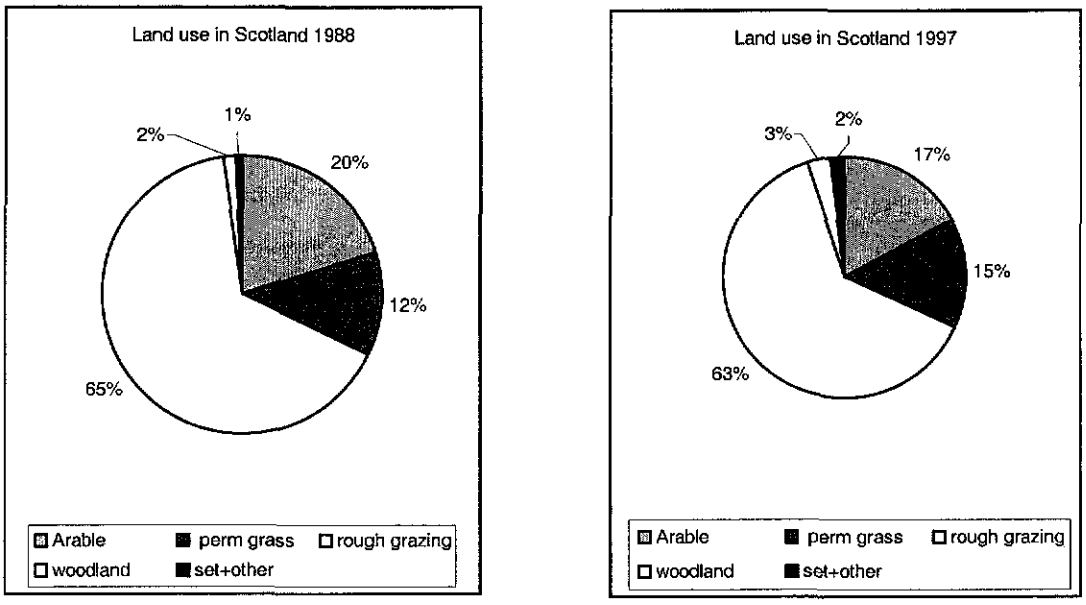
The biggest changes in agricultural land use in England appear to have resulted from the introduction of set-aside and the various Farm Woodland Schemes (Diagram 1). The proportion of arable land in England has decreased by 4% while woodland and all other land (which includes the set-aside element) have increased by 1% and 3% respectively. Overall, though, there has been no change in the proportion of agricultural land used for rough grazing and permanent pasture.

Diagram 2: Agricultural land use in Wales 1988-97



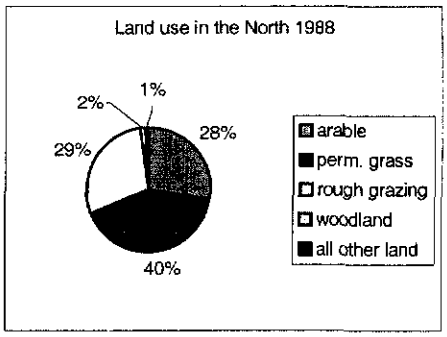
The amount of arable land has also decreased in Wales, but Diagram 2 above also shows an increase in permanent pasture and woodland, while the introduction of set-aside has had relatively little impact here compared to England. There has also been a decrease in the proportion of rough grazing.

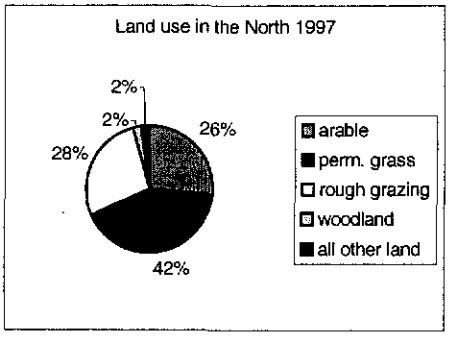
Diagram 3: Agricultural land use in Scotland 1988-97

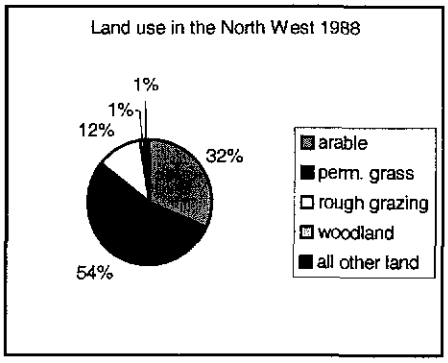


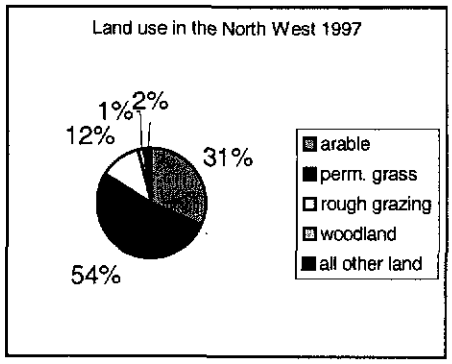
Scotland has seen a bigger decrease in the proportion of arable land than in Wales and more appears to have been put into set-aside. Again, as with Wales, the proportion of permanent pasture has increased and there has been a reduction in rough grazing and an increased in farm woodland (Diagram 3).

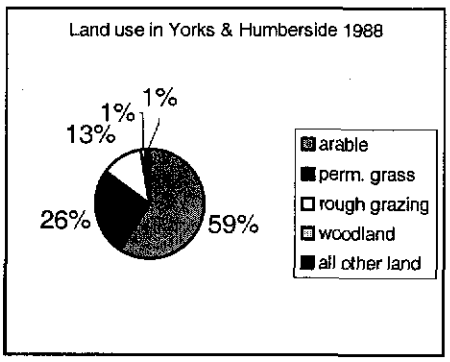
Diagram 4:Land use in the English regions, 1988-97

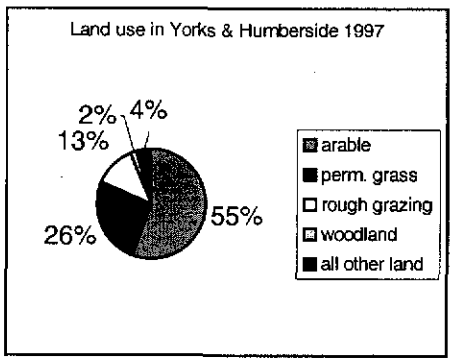


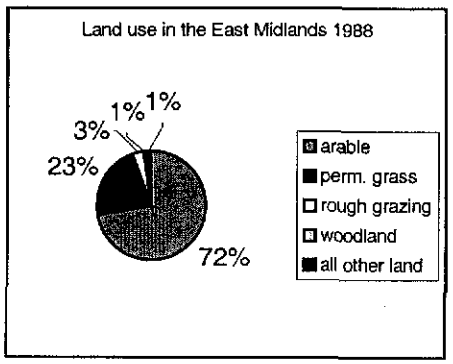


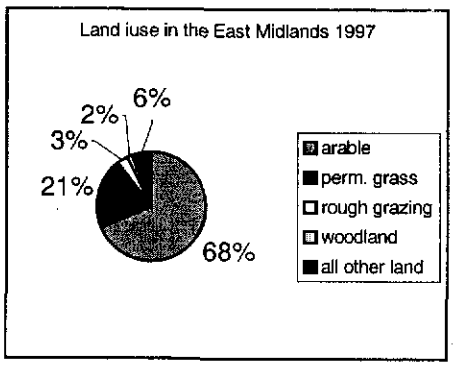


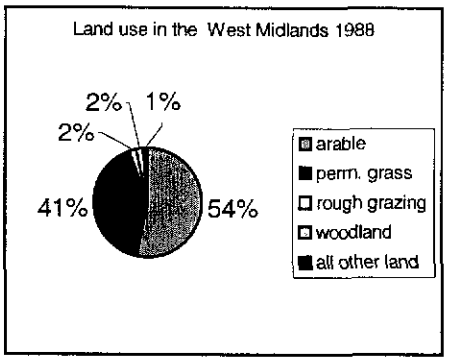


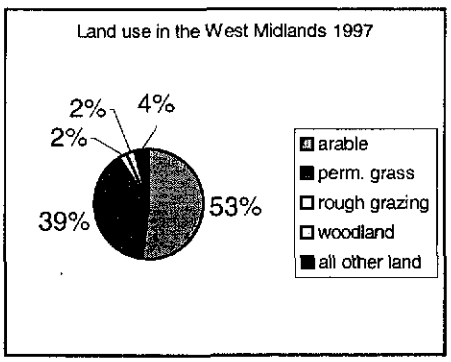


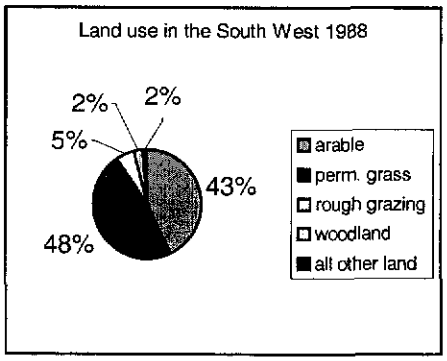


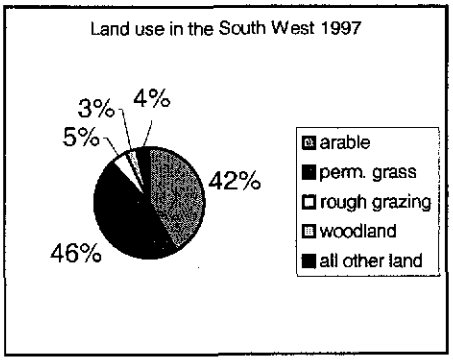


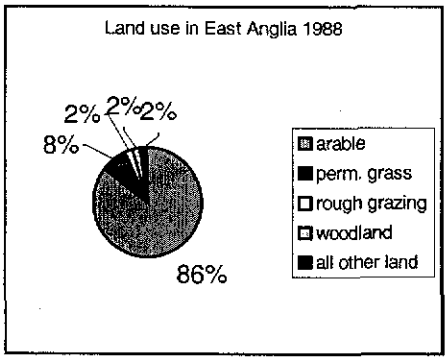


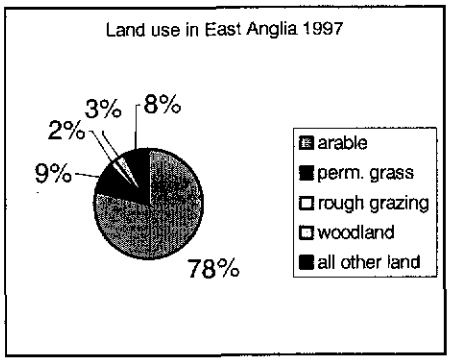


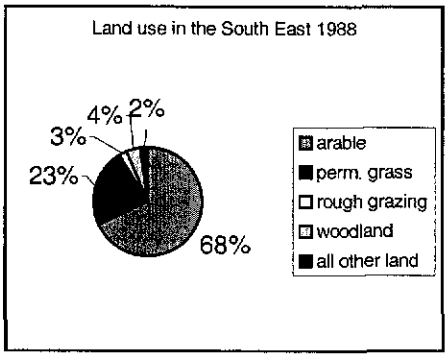


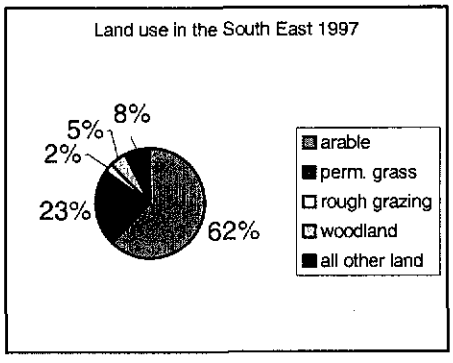












Within the regions of England there are variations due mainly, it would appear, to the existing balance of land use in each region (Diagram 4).

ARABLE

On the whole, the larger the proportion of arable land in a region, the greater has been the decrease in that proportion over the decade, and the larger the subsequent rise in other land. Regions with between a quarter to half their agricultural land in arable (North, North West and South West) in 1988 have seen this reduced by around 1-2%. Regions with between half to two-thirds (West Midlands, Yorkshire and Humberside and East Midlands) have varied more in the amount of decrease, ranging from 1% in the West Midlands to 6% in the South East. The remaining regions (South East and East Anglia) with the largest arable proportions have lost between 4 to 6% over the decade.

PERMANENT PASTURE

Here the proportions have remained relatively steady in all regions with changes of around 1-2% over the decade. The pattern of change is less clear than with arable land; the North West, which has the greatest proportion, has remained steady, while the South East, with the next greatest proportion, has decreased by 2%. Other regions now have a greater proportion of permanent pasture, especially the North (up 2% to 42%) and East Anglia (up 1% to 9%).

Nationally there was a continuing decline in the total area of permanent pasture of some 5.6%. While the rise in the North may be expected given the increase in sheep numbers it is less easy to account for in East Anglia, where cattle and sheep numbers have fallen. However, pig numbers have risen here, and it may be a combination of the rise in beef numbers, an increase in outdoor pig production and possibly pasture for horses (for which we have no data) that accounts for the rise here. The introduction of environmental schemes might also be a factor.

ROUGH GRAZING (SOLE RIGHTS)

Rough grazing accounts for around 7.5% of all agricultural land recorded in the June Census, and this is found mainly in the north of the country. The North has the greatest proportion of its agricultural land as rough grazing (just under 30%), followed by the North West and Yorkshire and Humberside with around 12%, and then the other regions have only 5% or less. The proportions of rough grazing land has remained relatively steady, with only slight falls in the North and the South West.

WOODLAND

Although only accounting for below 3% of farm land in the June Census, farm woodland area has increased in all regions over the decade, probably due to the implementation of various woodland planting schemes. The South East has the greatest proportion of farm land in woodland, and increased this from 4 to 5% over the decade.

ALL OTHER LAND

The main cause of the increased hectarage in this category over the decade is the introduction of set-aside, especially the scheme under the reform of the CAP in 1993. This is included in the category in the June Census figures, hence the increase from under 2% of all agricultural land in 1988 to nearly 5% by 1997. This is reflected also in the proportional changes, with the an increase from one to five percent in the East Midlands and from two to eight per cent in East Anglia and the South East, which correspond with the fall in arable proportions.

Because of the influence of the introduction of set aside, change here may be better assessed by using data from 1993 (Table 7); even so the increases may reflect participation in the earlier voluntary set-aside scheme. Even so, while the proportion of land defined as 'other' is small, some areas have seen large rates of increase.

Table 7: Changes in 'other' land by region, 1993-97

Region	Area of other land 1993	Area of other land 1997	Change 1993-7	% change
North West	6738	9991	3253	48.28%
South West	40199	67590	27391	68.14%
South East	68232	122223	53991	79.13%
North	11573	22397	10824	93.53%
East Anglia	36478	74499	38021	104.23%
West Midlands	18710	39248	20538	109.77%
Yorks & H'side	18217	48187	29970	164.52%
East Midlands	25438	67983	42545	167.25%
All England	225585	452118	226533	100.42%

The change in hectarage is very uneven between the regions; the North West had the smallest area (9991ha in 1997), and made the smallest percentage gain (48.28%), while the South East had a large initial area (122,223ha. in 1997) and increased its hectarage by 79.13%. The highest percentage gains were in the East Midlands and Yorkshire and Humberside, with increases in excess of 150% followed by the West Midlands and East Anglia, with increases of just over 100%.

3.5 Changes in cropping, horticulture and grassland

CEREALS

Table 8: Changes in cereals hectarage

Region	Cereals as % of ag. area 88	Total cereals area 97 (ha)	Change in area 88-97	*% change in area 88-97*
South West	23.26%	362149	-65319	***-15.28%***
North West	14.57%	55425	-9772	***-14.99%***
South East	43.52%	647032	-106428	***-14.13%***
East Midlands	46.22%	531424	-44800	***-7.77%***
West Midlands	30.58%	271408	-22102	***-7.53%***
Yorks & H'side	39.02%	403768	-28126	***-6.51%***
East Anglia	53.78%	509147	-33725	***-6.21%***
North	15.21%	153617	-5951	***-3.73%***
All England	34.62%	2933971	-316223	***-9.73%***

As might be expected with the introduction of set-aside, cereals hectarage has decreased in all regions over the decade (Table 8). But while the East Midlands and the South East had the largest share of the national hectarage in 1988, the South East lost a much greater area (down 106428ha, or 14.13%) compared to the East Midlands (down 44800, or 7.77%). As a result, the East Midlands now has the largest share of total cereals hectarage. In contrast, the North, with only 15% of its agricultural area in cereals, changed little with a decrease of 4%.

TEMPORARY AND PERMANENT GRASSLAND

Table 9: Changes in grassland hectarage

Region	Grassland as % of ag. area 88	Total grassland area 97 (ha)	Change in area 88-97	*% change in area 88-97*
South East	31.75%	475705	-73968	***-13.46%***
East Midlands	27.97%	314985	-33732	***-9.67%***
West Midlands	54.09%	475502	-43662	***-8.41%***
South West	62.58%	1067074	-82876	***-7.21%***
North West	66.14%	277807	-18176	***-6.14%***
Yorks & H'side	32.46%	343335	-15911	***-4.43%***
North	50.01%	516187	-8511	***-1.62%***
East Anglia	10.40%	106138	1175	***1.12%***
All England	41.07%	3576731	-278985	***-7.24%***

Grassland area (excluding rough grazing) has declined in all areas except East Anglia, which saw a slight rise of 1175ha (1.12%) over the decade (Table 9). The greatest loss of hectarage was in the South West (down 82876 ha, or 7.21%), while the greatest percentage loss was in the South East (13.46%, or 73968ha). However the South West still has ten times the hectarage of grassland than East Anglia.

OTHER CROPS

Table 10: Changes in other crops hectarage

Region	Other crops as % of ag. area 88	Total other crops area 97 (ha)	Change in area 88-97	*% change in area 88-97*
Yorks & H'side	11.73%	126671	-3124	***-2.41%***
North	3.09%	35034	2623	***8.09%***
East Midlands	16.19%	219518	17613	***8.72%***
South East	11.90%	246949	40858	***19.83%***
West Midlands	9.22%	106136	17685	***19.99%***
North West	4.18%	23365	4665	***24.95%***
East Anglia	23.64%	307868	69220	***29.01%***
South West	3.87%	144592	73545	***103.52%***
All England	10.51%	1140132	153066	***15.51%***

Again, changes here are affected by the introduction of set-aside Only one region, Yorkshire and Humberside, showed a slight decline in hectarage. The doubling of hectarage of other crops in the South West reflects perhaps the fact that they only accounted for 4% of all crops at the start of the period, although other regions with similar proportions and smaller starting hectarages have not seen such an increase (Table 10)..

HORTICULTURE

Table 11: Changes in horticulture hectarage

Region	Hort. crops as % of ag. area 88	Total hort. crops area 97 (ha)	Change in area 88-97	*% change in area 88-97*
South East	2.66%	36323	-9790	***-21.23%***
North West	2.03%	7354	-1733	***-19.07%***
East Anglia	4.73%	38692	-9055	***-18.96%***
North	0.12%	1037	-203	***-16.37%***
East Midlands	3.40%	37367	-5051	***-11.91%***
West Midlands	1.57%	13652	-1413	***-9.38%***
South West	0.58%	10670	1	***0.01%***
Yorks & H'side	1.43%	18738	2910	***18.39%***
All England	2.00%	163832	-24336	***-12.93%***

In 1988 2% of total agricultural area in England was in horticultural crops, and this declined to 1.79% by 1997 (Table 11). Horticulture is concentrated in East Anglia, the East Midlands and the South East, and all three experienced declining hectarages over the decade. However, the East Midlands only lost around half the area of the other two (5,051ha., compared to 9,055 for East Anglia and 9,790ha. for the South East). The only region to gain hectarage was Yorkshire and Humberside, up 2,910ha, or 18.39%, but it still remains in fourth place in terms of total horticultural hectarage.

3.6 Changes in livestock numbers and stocking densities

There are great differences in livestock changes between England, Wales and Scotland (Table 12). England has seen much greater percentage losses in cattle numbers than Scotland and Wales, where fall have been modest. On the other hand pig and sheep numbers have remained almost unchanged in England, while Wales has lost 20% of its pig herd over the decade and in contrast Scotland has increased its pig numbers by 38%. Both Wales and Scotland have seen modest gains in their sheep numbers.

Table 12:Changes in livestock numbers

	total cattle nos 97	change 88-97	*% change*
England	6449490	-540092	***-8.37%***
Wales	1323,000	-18,700	***-1.39%***
Scotland	2078,900	28,300	***1.38%***

	total pig nos 97	change 88-97	*% change*
England	6617092	-118233	***-1.76%***
Wales	98,600	-26,300	***-21.06***
Scotland	644,900	177,500	***37.98***

	total sheep nos 97	change 88-97	*% change*
England	19221664	-57614	***-0.30%***
Wales	10915,100	618,600	***6.01***
Scotland	9563,200	313,700	***3.39***

As the changes in cattle numbers could be affected by the BSE crisis, changes throughout the decade are detailed in the following three tables.

Table 13: Changes in total cattle numbers

	cattle nos 88	%change 88-90	%change 90-93	% change 93-95	%change 95-97	%change 88-97	cattle nos 1997
North	896292	0.67	-2.43	0.48	-1.59	-2.87	870534
North West	590480	1.84	-0.50	0.06	-1.25	0.00	590509
Yorks & H'side	675051	-0.44	-3.93	0.01	-2.46	-6.60	630518
East Midlands	655687	0.39	-5.50	0.37	-4.89	-9.52	593282
West Midlands	963129	0.71	-5.03	-1.15	-3.45	-8.72	879150
South West	2156283	1.83	-4.53	0.75	-4.08	-6.04	2025973
East Anglia	215491	2.13	-9.25	-0.82	-7.45	-14.93	183315
South East	837169	-1.14	-11.08	5.03	-12.51	-19.23	676209
All England	6989582	0.82	-4.94	-0.04	-3.70	-7.73	6449490

Over the decade as a whole total cattle numbers have fallen in all regions except the North West, where they have remained essentially stable (Table13). The biggest fall in both numbers and percentage occurred in the South East, down 160,960 or 19.23%. There was also an overall decline in the size of the dairy sector, ranging from a fall of 11.33% in the North West to over 29% in East Anglia and the South East. However, there was an increase in all regions in the size of the beef sector.
What is interesting here is that while East Anglia and the North West have the lowest regional cattle totals, East Anglia has nearly 15% fewer cattle by 1997, whereas the North West has retained its cattle numbers. This may reflect the fact that farmers in East Anglia have more options in terms of a change of farming regime. The breakdown in the table above also shows that the changes are uneven throughout the decade, with little change in 1988-90, falls in all egions between 1990 and 1993, patchy changed between 1993 and 1995, and again falls in all regions between 1995 and 1997 when the BSE crisis was a major issue.

However, concentrating on total cattle numbers alone masks any changes in the balance between dairy and beef numbers in the regions.

Table 14: Changes in Dairy numbers

	Dairy nos 88	%change 88-90	%change 90-93	% change 93-95	%change 95-97	%change 88-97	dairy nos 1997
North	186162	-2.11	-6.32	-1.19	-3.64	-12.96	162033
North West	256538	-0.48	-3.34	-3.46	-4.52	-11.33	227465
Yorks & H'side	164243	-2.28	-5.70	-3.46	-4.65	-15.18	139315
East Midlands	158009	-0.74	-8.14	-4.13	-7.14	-18.82	128265
West Midlands	286206	-1.25	-5.13	-2.80	-5.73	-14.16	245673
South West	718767	-1.96	-6.26	-1.67	-6.81	-15.79	605263
East Anglia	42581	-2.81	-14.82	-4.84	-10.95	-29.85	29870
South East	230022	-6.92	-13.77	-5.21	-7.22	-29.41	162366
All England	2042530	-2.20	-6.82	-2.80	-6.03	-16.76	1700250

There has been a continuous decline in numbers of dairy cattle in all regions and throughout the decade (Table 14). East Anglia and the South East experienced the greatest percentage decline in dairy numbers, each losing around 30% of their dairy herd.. The North and North West both lost over 10%, while the East and West Midlands and Yorkshire and Humberside were nearer the national average loss, between 14 and 16% lower. In spite of the impact of BSE between 1995 and 1997, not all regions had their greatest declines during that time; East Anglia and the South East

in particular saw greater percentage losses between 1990 and 1993 than in the later period.

Table 15:Changes in Beef numbers

North	Beef nos 1988	%change 88-90	%change 90-93	% change 93-95	%change 95-97	%change 88-97	beef nos 1997
North	134438	11.82	4.20	1.75	0.02	18.58	159421
North West	25315	26.00	11.95	2.70	-0.29	44.44	36566
Yorks & H'side	60835	24.03	14.57	3.30	2.70	50.77	91718
East Midlands	47884	26.06	17.87	6.86	2.02	61.99	77565
West Midlands	63564	28.76	12.52	6.20	-0.34	53.35	97474
South West	134375	26.34	8.93	7.42	0.33	48.32	199302
East Anglia	22536	27.13	14.50	4.61	1.15	54.01	34707
South East	59562	33.03	10.42	6.85	-0.26	56.54	93240
All England	548509	23.52	10.29	5.13	0.55	44.03	789993

In contrast to the decline in dairy numbers there was an increase in the size of the beef sector in all regions over the decade (Table 15).

In the North, the East Midlands and East Anglia the fall in the numbers of dairy cattle is almost exactly matched by the rise in the numbers of beef cattle. In Yorkshire and Humberside the loss of dairy cattle coincided with a rise of around 25% more beef cattle while in the remaining regions the rise in beef numbers was less than the fall in dairy numbers.

The most rapid increases in beef numbers occurred between 1988 and 1990, with all regions except the North showing rises of between a quarter and a third. In subsequent periods all regions show a declining rate of increase, so that by 1995-1997 the situation was nearly stable. The effect overall was that regional increases ranged from 44% to 62%, except in the north where the increase was only 19% over the decade.

Table 16: Changes in pig numbers

Region	pig nos 97	change 88-97	*% change*
North West	287159	-94390	***-24.74%***
South East	754247	-225595	***-23.02%***
West Midlands	431207	-50951	***-10.57%***
South West	858971	-83776	***-8.89%***
North	178147	-4358	***-2.39%***
East Midlands	651688	-837	***-0.13%***
Yorks & H'side	1952284	187990	***10.66%***
East Anglia	1503389	153684	***11.39%***
All England	6617092	-118233	***-1.76%***

Nationally the pig herd numbers changed little over the decade, but again there are substantial variations between the regions (Table 16). Pig numbers fell everywhere except the two regions with the greatest numbers to begin with, Yorkshire and Humberside and East Anglia. Losses were least in the East Midlands and the North

while the North West and the South East lost nearly a quarter of their pigs over the decade. This points to a concentration of pig production into two main regions, Yorkshire and Humberside and East Anglia.

Table 17: Changes in sheep numbers

Region	sheep nos 97	change 88-97	*% change*
South East	1888681	-341998	***-15.33%***
East Anglia	267169	-18820	***-6.58%***
East Midlands	1572077	-90453	***-5.44%***
South West	3945120	-175694	***-4.26%***
West Midlands	2767088	-48948	***-1.74%***
Yorks & H'side	2554856	53100	***2.12%***
North	5126792	452203	***9.67%***
North West	1099881	112996	***11.45%***
All England	19221664	-57614	***-0.30%***

As with pig numbers, there has been little change in sheep numbers nationally, but generally there has been a rise in numbers in the northern regions (e.g. 11% in the North West) and a fall in the south of the country (e.g. 15% in the South East) (Table 17). East Anglia has the smallest share of the national flock, and this is declining, while the North, which has the largest share of the national flock, is growing, indicating, as in the case also of pig production, a concentration of sheep farming in certain regions.

By matching change in livestock numbers to area of grassland and rough grazing, it is possible to give a picture of the stocking density and, by implication, the pressure on grassland. This is done by looking at the change in livestock units per 100 ha. of grassland and rough grazing[6]. The idea of a livestock unit is based on the relative metabolic energy requirements of different types of livestock in a yearly period. If a dariy cow represents one unit, then a beef animal represents 0.75 units, all other cattle represent 0.5 units and sheep represent approximately 0.15 units (Nix 1993) Using these figures, it is possible to calculate the approximate livestock units per 100ha. of grass and rough grazing for each region.

Table 18: Livestock units per 100ha grass and rough grazing: England, Wales and Scotland

Region	livestock units per 100ha grass and rough grazing, 1988	livestock units per 100ha grass and rough grazing, 1997	change 88-97	*% change*
England	165	168	3	***1.82%***
Wales	178	206	28	***15.73%***
Scotland	58	63	5	***8.62%***

[6] This includes temporary grassland under 5 years, permanent grassland over 5 years and sole rights rough grazing.

Table 18 shows that livestock intensity has increased in all three countries. While livestock intensity has changes little in England over the decade, Wales has seen an increase of 16% in livestock units per 100ha of grassland. This is probable due to the 6% increase in sheep numbers over the decade. Scotland has also seen an increase but this is only half as great as the increase in Wales despite also seeing an increase in sheep numbers.

England has lost numbers of both cattle and sheep and seen a reduction of 7% in total grazing, while Wales has lower cattle numbers, more sheep and an increase of 6% in total grazing land and Scotland has more cattle and sheep and essentially the same amount of grazing land than in 1988.

Table 19: Regional livestock units per 100ha. of grass and rough grazing

	Units per 100ha 88	Units per 100ha 90	Change 88-90	Units per 100ha 93	Change 90-93	Units per 100ha 95	Change 93-95	Units per 100ha 97	Change 95-97	Change 88-97	% change
EA	141	140	-1	132	-8	131	-1	124	-7	**-17**	**-12.05%**
SW	167	170	3	167	-3	171	4	169	-2	**2**	**1.20%**
EM	171	177	6	174	-3	176	2	174	-2	**3**	**1.75%**
Y&H	162	166	4	164	-2	165	1	165	0	**3**	**1.85%**
SE	148	148	0	141	-7	143	2	145	2	**3**	**2.02%**
WM	195	199	4	202	3	202	0	201	-1	**6**	**3.07%**
N	154	161	7	163	2	162	-1	165	3	**11**	**7.14%**
NW	165	170	5	172	2	174	2	177	3	**12**	**7.27%**
Eng	165	169	4	167	-2	168	1	168	0	**3**	**1.82%**

The figures in Table 19 suggest a slight intensification of livestock production over the decade except in East Anglia, where extensification appears to be happening. This may in part be due to the substitution of beef for dairy cattle, and sheep for cattle, which will affect the calculations. Intensification appears to be greatest in the North and North West.

Again, breaking down the changes over the decade reveals an increase in livestock intensity in all regions except the East Anglia and the South East at the start of the period. Except for a slight decline in the North between 1993 and 1995, this increase continues in the north of the country throughout the decade. For the rest of the country, except for the West Midlands, the period 1990-1993 saw a fall in livestock intensity, especially in East Anglia and the South East. This decline continues in East Anglia for the rest of the decade, especially in the last time period between 1995 and 1997. For the rest of the country, 1993-1995 is a time of relatively little change. The last period between 1995 and 1997 sees the North , North West and South East increasing in intensity, while other regions except Yorkshire and Humberside see a reduction in intensity, with East Anglia again experiencing the greatest decline.

4. Labour changes on holdings

The categories used in the following analysis are listed below:

Total labour units per holding	F/t and p/t FPDs FPDs + spouses + f/t and p/t hired +seasonal and casual
Total regular labour units	F/t and p/t regular family and hired workers (no seasonal and casual)
Total family units	F/t and p/t FPDs + spouses + f/t and p/t family workers
Total hired units	F/t and p/t hire workers (no seasonal and casual)
Full-time family units	Male and female f/t reg family workers
Part-time family units	Male and female p/t reg family workers
Full-time hired units	Male and female f/t reg hired workers
Part-time hired units	Male and female p/t reg hired workers

Table 20: Total labour units and regular labour units per holding, England, Wales and Scotland

		total labour units per holding	reg labour units per holding
England	1997	2.71	0.84
	change	-0.21	-0.15
	% change	-7.27%	-15.05%
Wales	1997	2.26	0.35
	change	0.10	0.01
	% change	4.41%	2.91%
Scotland	1997	2.07	0.48
	change	0.08	-0.15
	% change	4.03%	-24.16%

Tables 20 to 23 show some remarkable differences between the three countries in terms of labour changes per holding. There has been a decrease in total labour units including seasonal and casual workers England but a slight rise of 4% in Wales and Scotland (Table 20). However, looking at regular labour units only without the seasonal and casual workers, the fall has been much greater in England and Scotland, although Wales is still showing a slight increase.

Table 21: Full-time and part-time family labour, England, Wales and Scotland

		fam wk per holding	ft fam per holding	pt fam per holding
England	1997	1.60	0.10	0.07
	change	-0.04	-0.03	0.00
	% change	-2.17%	-21.35%	0.82%
Wales	1997	1.81	0.08	0.09
	change	0.10	-0.02	0.02
	% change	5.91%	-17.04%	35.26%
Scotland	1997	1.67	0.12	0.07
	change	0.19	-0.04	0.01
	% change	13.17%	-27.13%	20.06%

In England as a whole there has been a slight fall in working family members per holding, whereas there has been a rise in both Wales and Scotland. All three countries have seen a steep decline in full-time family workers per holding, but whereas this has been matched by a rise in part-time family workers in Wales and Scotland, the rise in England is barely noticeable (Table 21).

Table 22: Full-time and part-time hired labour, England, Wales and Scotland

		all hired wk per holding	ft hired per holding	pt hired per holding
England	1997	0.56	0.46	0.21
	change	-0.10	-0.11	-0.01
	% change	-14.83%	-18.91%	-6.76%
Wales	1997	0.18	0.10	0.08
	change	0.00	-0.02	0.02
	% change	1.97%	-14.07%	32.26%
Scotland	1997	0.30	0.23	0.06
	change	-0.12	-0.11	-0.01
	% change	-29.17%	-32.38%	-14.21%

Full-time hired labour units per holding have fallen in all three countries, whereas part-time labour units per holding have only risen in Wales (Table 22). Overall, the use of hired labour units per holding has remained steady in Wales but has fallen in both England and Scotland.

Table 23: Regional changes in total labour units and regular labour units per holding

Region	Year\change	total labour units per holding	reg lab (ft & pt) per holding
North	1997	2.38	0.58
	change	-0.07	-0.07
	% change	-3.04%	-11.23%
North West	1997	2.70	0.83
	change	0.13	0.04
	% change	5.17%	5.32%
Yorks & Humberside	1997	2.47	0.78
	change	-0.36	-0.18
	% change	-12.85%	-19.02%
East Midlands	1997	2.85	0.95
	change	-0.13	-0.14
	% change	-4.37%	-13.17%
West Midlands	1997	2.56	0.68
	change	-0.14	-0.09
	% change	-5.36%	-11.88%
South West	1997	2.33	0.62
	change	-0.13	-0.11
	% change	-5.39%	-15.09%
East Anglia	1997	3.37	1.27
	change	-0.39	-0.24
	% change	-10.38%	-15.60%
South East	1997	3.24	1.16
	change	-0.33	-0.24
	% change	-9.22%	-17.00%

As in Table 21 it is the North West that stands out, as it is the only region not to experience a fall in regular labour units over the decade (Table 23). All other regions have seen a fall in total labour units and regular labour units over the decade, with the biggest decline occurring in Yorkshire and Humberside regular labour units.

Table 24: Family labour per holding, regions

		fam wk per holding	ft fam per holding	pt fam per holding
North	1997	1.74	0.12	0.08
	change	0.00	-0.04	0.01
	% change	-0.09%	-24.81%	16.85%
North West	1997	1.68	0.13	0.08
	change	0.03	-0.03	0.00
	% change	1.69%	-17.92%	4.15%
Yorks & Humberside	1997	1.53	0.11	0.07
	change	-0.16	-0.03	0.00
	% change	-9.43%	-21.43%	-2.46%
East Midlands	1997	1.65	0.11	0.08
	change	0.01	-0.03	0.01
	% change	0.80%	-18.60%	10.37%
West Midlands	1997	1.60	0.10	0.07
	change	-0.02	-0.03	0.00
	% change	-1.17%	-22.29%	1.46%
South West	1997	1.56	0.09	0.07
	change	-0.03	-0.03	0.00
	% change	-1.70%	-25.70%	-0.73%
East Anglia	1997	1.58	0.11	0.06
	change	-0.02	-0.01	0.00
	% change	-1.35%	-9.31%	-2.11%
South East	1997	1.51	0.09	0.08
	change	-0.02	-0.02	0.00
	% change	-1.56%	-19.36%	-5.07%

Yorkshire and Humberside has also experienced the greatest pecentage decline in family labour units per holding, with a fall of 9% over the decade, compared to changes of plus 2% to minus 2% in the other regions (table 24). There are fewer full-time family workers per holding in all regions, but the picture is less clear cut in the case of part-time family workers. Some regions have seen increases, notable the North and East Midlands, while others have seen decreases.

Table 25: Hired labour per holding, regions

		all hired wk per holding	ft hired per holding	pt hired per holding
North	1997	0.38	0.27	0.11
	change	-0.05	-0.06	0.02
	% change	-10.70%	-19.15%	18.53%
North West	1997	0.62	0.41	0.21
	change	0.07	0.02	0.05
	% change	12.02%	4.09%	32.05%
Yorks & Humberside	1997	0.59	0.45	0.14
	change	-0.15	-0.08	-0.07
	% change	-20.26%	-15.16%	-33.34%
East Midlands	1997	0.75	0.54	0.21
	change	-0.13	-0.11	-0.02
	% change	-14.32%	-16.34%	-8.56%
West Midlands	1997	0.50	0.34	0.16
	change	-0.06	-0.07	0.01
	% change	-11.28%	-17.49%	5.32%
South West	1997	0.46	0.29	0.17
	change	-0.08	-0.08	0.00
	% change	-14.56%	-21.75%	1.83%
East Anglia	1997	1.10	0.83	0.27
	change	-0.22	-0.17	-.05
	% change	-16.82%	-17.46%	-14.81%
South East	1997	0.99	0.65	0.34
	change	-0.21	-0.18	-0.03
	% change	-17.59%	-21.60%	-8.62%

Again it is the North West that stands out as the only region to see an increase in hired workers per holding, although the increase here has been mainly in part-time hired labour (Table 25). While some regions have seen a fall in full-time labour units and a rise in part-time (the North, West Midlands and South West) others have seen a fall in both categories (Yorkshire and Humberside, East Midlands, East Anglia and South East).

5. Summary of regional changes.

The analysis abocve has shown that while some changes, such as the fall in numbers of dairy cattle have been experienced by all regions, other changes exhibit more regional variations. These are now summarised for each region.

THE NORTH

Here there has been relatively little change in agricultural area, numbers of holdings or mean holding size. The greatest proportion of holdings are livestock holdings, but while Dairy and LFACS holdings have declined in number, LOWCS numbers have risen. Despite an increasing proportion of land being in permanent pasture, the increase in sheep and beef numbers has led to a rise in livestock units per 100ha, suggestind an increased pressure on grazing land. The total labour units per holding have decreased, but there has been an increased use of part-time hired and family workers.

THE NORTH WEST

Again, there has been little change in agricultural area, but holdings numbers are down by 13% and mean size is up by 9%, suggesting there are fewer and larger holdings overall then a decade ago. There are fewer livestock holdings now, as this region seen falls in Dairy. LFACS and LOWCS holding numbers.There was also a slight rise in Cereal holdings, but the main increase has been in the numbers of Other holdings. The proportion of permanent grassland in the region remained steady, and cattle numbers overall were unchanged, despite the rise in beef numbers. The greatest percentage rise came in the numbers of sheep, and this region saw the greatest rise in livestock units per 100ha. This region was the only one also to se a rise in regular labour units per holding, and this was mostly an increase in hired workers; there were fewere full-time family workers per holding than a decade ago.

YORKSHIRE AND HUMBERSIDE

Here there was a loss of holding numbers and increase in mean holding size. The three largest propotions of holdings are Cereals, LOWCS and Other, and while Cereal holdings numbers declined slightly, LOWCS holdings increased slightly and Other holding numbers rose by 20%. This region was one of only two to se a rise in Horticulture holdings, and the fall of 3,100ha in other crops hectarage was almost equal to the rise of 2900 in horticultural hectarage. There was a fall in all types of labour units per holding.

EAST MIDLANDS

Here again there was an increase in mean holding size over the decade. The region consist mainly of Cereals holdings, and numbers remained relatively stable, whereas there were bigger increases in LOWCS (the next largest group) and Other holdings. of grassland and overall hectarage loss of grassland and decrease in the proportion of grassland in the region, meant that despite livestock losses there was a small increase in livestock units per 100ha. Again in this region there was an overall loss of farm workers per holding, but a rise in the use of hired workers per holding.

WEST MIDLANDS

This region experienced a loss of holding numbers and rise in mean holding size below the country averages. The main type of holding here is the LOCS, and numbers have changes little over the decade. LFACS holdings numbers, however, have fallen by 15%. Despite a fall in cereals hectarage the number of Cereal holdings rose by 12%, indicating specialisation in this area. There was a fall of two percentage points in the proportion of permanent grassland in the region, so that despite an overall decline in livestock numbers there was slight upward pressure on the remaining pastureland. There were also falls in all labour units, but especially in part-time workers per holding, both family and hired.

EAST ANGLIA

There were relatively few livestock in the region at the beginning of the period, but there has been an increase in pig numbers. Also, this region has seen the substitution of beef numbers for dairy numbers, although the total cattle numners have fallen . The increasein both temporarry and permanent grassland has led lower livestock units per 100ha of grassland, making this the only region to appear to have extensified livestock production. There has been an increase in LOWCS holdings together with the inevitable fall in Dairy holdings, but despite the pig increases ther has been a fall in Pig and Poultry holdings, suggesting specialisation again. There have also been falls in all categorieds of labour units per holding.

SOUTH EAST

This region has the second largest proportion of the country's agricultural holdings after the South West, but while the South West's proportion increased by four percentage points, the South East saw and equivalent fall; mean holding size also increased by 7%. At the start of the decade there was an almost equal number of Cereal and Other holdings, now Other holdings form the largest group in the region. This mirrors the largest change in land use proportions, which has been the increase in other land (which includes set-aside.) Cereals and grassland hectarage both fell by around 14%. The South East saw the largest percentage falls in total cattle numbers, the second largest % fall in pig numbers, and by far the greatest percentage fall in shep numbers. However, livestock units per 100ha of grassland still increased, due to the fall in grassland hectarage. The region has the lowest average family workers per holding at 1.51 per holding, and the highest average number of part-time hired labour units per holding, at 0.34 per holding.

6. Comparison of changes in LFA and non-LFA districts

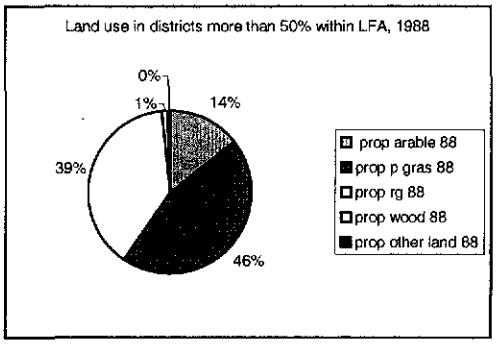
LFA areas designated by the EC and allow special measures to assist farming. There are two classifications - area A (severely disadvantaged), and B (disadvantaged). LFA B areas are less disadvantaged in terms of farming handicaps such as soil type, gradient, aspect or climate, and although farmers obtain similar treatment in terms of compensation and payment premiums, B areas receive lower rates of compensation that A areas.

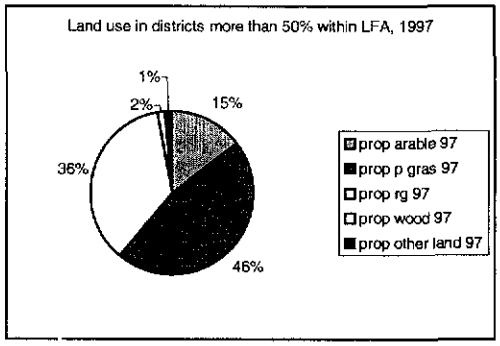
The geographical differences between LFA and non-LFA areas means different types of farming will be practised in each, with more reliance on grazing livestock in the LFA areas. This section will look at differences between the two areas and how each has changes over the decade.

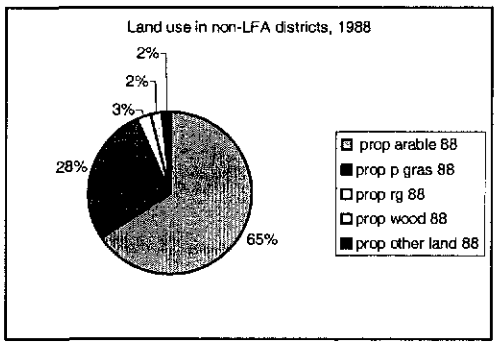
Most LFA areas are in Wales, the North and North West and South West of the country. 86% of districts in England have less than 10% of their area covered by LFA A status, while 5% have more than 50% LFA A coverage. 90% of districts have less than 10% LFA B coverage, and only 1% (3 districts) have over 50% LFA B coverage. We will therefore look at LFA A areas with regard to changes in part-time farming.

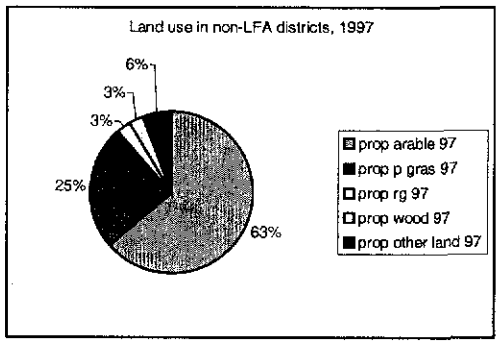
For this analysis the JC district-level data is used, and districts are aggregated up into non-LFA districts (264 valid cases) and districts with more than 50% of their area within LFA status (16 valid cases). Where data has been suppressed it has been set to zero, except in the case of numbers of holdings where it has been set to one, since suppressed districts will have more than zero holdings, but fewer than five.

Diagram: Differences in land use proportions between LFA and non-LFA district









While non-LFA districts have seen a decrease in the proportion of land in arable use, the opposite has happened in LFA districts and there has been a rise of one percentage point in the proportion of arable land over the decade. Another difference is in the amount of woodland and other land; In LFA districts this accounted for 3% of agricultural land in 1997, whereas in the non-LFA districts these two categories accounted for 9%. This shows that there is proportionately less of this type of habitat for wildlife in LFA areas. However, LFA areas do contain a much greater proportion of rough grazing land and permanent pasture. Rough grazing occupies a lesser proportion of the agricultural area in LFA districts than it did 10 years ago, although the proportion of permanent pasture has remained steady.

Changes in holding types

Table: Changes in the proportions of each holding type, 1988-97

	LFA districts			Non-LFA districts		
Holding type	Prop. in 1988	Prop. in 1997	change	Prop. in 1988	Prop. in 1997	change
Prop. CEREAL	0.02	0.03	0.01	0.16	0.18	0.02
Prop. GENCROP	0.01	0.01	0.00	0.13	0.10	-0.02
Prop. HORT	0.01	0.00	0.00	0.09	0.07	-0.02
Prop. P&P	0.03	0.02	-0.01	0.05	0.04	-0.01
Prop. DAIRY	0.21	0.16	-0.04	0.13	0.11	-0.03
Prop. LFACS	0.41	0.38	-0.03	0.0	0.00	0.00
Prop. LOWCS	0.14	0.19	0.05	0.18	0.20	0.02
Prop. MIXED	0.05	0.04	0.00	0.09	0.08	0.00
Prop. OTHER	0.13	0.17	0.04	0.15	0.20	0.05

LFACS and DAIRY holdings accounted for nearly two thirds of all holdings in LFA districts in 1988 but by 1997 this had fallen to just over a half. While LFACS holdings remain the most common type , by 1997 there was a greater proportion of LOWCS holdings and Other holdings. LOWCS, Cereal and Other holdings predominate in non-LFA districts in 1998, and by 1997 these account for around 60% of all holdings.

Changes in livestock numbers and stocking densities

While total cattle numbers have fallen by 10% in non-LFA districts, they have barely changes in LFA districts. However, there has been a much bigger percentage increase in beef numbers in non-LFA districts. Pig numbers have fallen in both districts, but the percentage fall is greater the LFA districts. Sheep numbers have increased in LFA districts, and fallen in non-LFA districts.

Table: Changes in livestock numbers, 1988-97

District type		Dairy	Beef	Total cattle	Total pigs	Total sheep
>50% LFA	1988	163184	120682	726112	191141	4861685
	1997	140792	139374	713512	167843	5251684
	change	-22392	18692	-12600	-23298	389999
	% change	-13.72%	15.49%	-1.74%	-12.19%	8.02%
non-LFA	1988	1351172	268615	4383785	5243383	8748986
	1997	1103056	420563	3930683	5167337	8155132
	change	-248116	151948	-453102	-76046	-593854
	% change	-18.36%	56.57%	-10.34%	-1.45%	-6.79%

Table: Changes in livestock units per 100ha grass and rough grazing, 1988-97

District type	livestock units per 100ha 88	livestock units per 100ha 97	change	% change
>50% LFA	141.51	150.78	9.27	6.55%
non-LFA	159.21	166.42	7.21	4.53%

The combination of the lower proportion of rough grazing and the increase in sheep numbers has meant a greater increase in pressure on grazing land in the Lfa districts than the non-LFA districts.

Labour changes

Table: Changes in the proportions of part-time FPDs in LFA and non-LFA districts, 1988-97

District type	prop ptFPD 88	prop ptFPD 97	change	% change
>50% LFA	0.25	0.33	0.07	28.22%
non-LFA	0.30	0.36	0.06	20.24%

In terms of labour changes, non-LFA districts had a greater proportion of part-time FPDs in 1988, but this has not increased as much as in the LFA districts over the decade.

7. Conclusions

This paper has reviewed the regional structural changes in agriculture over the last decade, using data available from the MAFF June Census. While some changes, such as the decline in the dairy sector, have been experienced in all regions, other changes have exhibited more regional variations. Certain regions such as the South West and the North appear to be becoming more 'agricultural' in terms of an increase in the national share of holdings, although the South West is also losing more rural land to urban use. The decline in the types of holdings associated with more labour intensive farming is compatible with the rise in part-time farmers, and part-time workers in general. This might also suggest that holdings are being farmed less intensively, but in terms of livestock units per 100ha of grassland, this only appears to be happening in East Anglia. The effect of set-aside and aid for farm woodlands has increased the proportion of woodland and non-productive (in the mainstream agricultural sense) land on holdings, which has environmental implications. However, some of the types of changes that might be associated with part-time farming, such as less labour-intensive types of farming, do not appear to have had an impact on the intensity of grassland use by grazing livestock use, or a change from arable to more pastureland, that might have wider environmental benefits. Also, there appear to be increased specialisation in cereal growing in some regions that might increase environmental pressure on the hectares involved.

With respect of LFA areas, the pressure on grazing land appears to be increasing, as stocking densities rise and, in particular, numbers of sheep appear to be concentrating into areas with more rough grazing land, while the proportion of rough grazing land is falling. This can lead to increased environmental pressure on these areas. The impact of set-aside, as is to be expected, is minimal in LFA areas. On the other hand,

permanent pasture has retained its proportion of all agricultural land in LFA areas, whereas it has decreased in the non-LFA districts. This points to a different set of environmental pressures, or different degrees of pressure, in LFA and non-LFA areas.

Appendix 7:
Drivers of Countryside Change
(Work Package 4.2)

Drivers of forestry change in the 1990s

Charles Watkins,
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National trends in forestry policy

Throughout the 1990s it was government policy to support extension of the woodland area. The 2nd Report of the Agriculture Committee of the House of Commons considered that there could be anything from one million to five million hectares of surplus agricultural land by 2015. It suggested that "the most significant alternative land use for in the next twenty years is likely to be forestry"

The presumption that afforestation should only take place on 'unimproved land' of low agricultural value (one of the principal locational factors affecting forestry throughout the twentieth century) was no longer of paramount importance. But, confidence of commercial forestry was knocked by

a) the fairly recent (1988) decision to remove longstanding tax concessions which had originally been designed to encourage planting;

b) scrutiny of the form and role of the Forestry Commission, which was separated into Forest Enterprise and the Forest Authority (1992);

c) in 1994, there was intense speculation about the possible privatisation of Forest Enterprise;

d) many changes to the detail of the woodland grant schemes available.

Broad changes in the culture of forestry and woodland management

In the 1980s there had been there had been a resurgence in interest in the management of broadleaved woodland. This renewed interest continued through the 1990s, which moreover saw an increased emphasis on the management of all types of woodland in the interests of nature conservation, landscape, recreation, shooting and the provision of public access.

The shift in aims of management reflected changing demands of the public and was reinforced by a range of new and modified policies introduced by the Forestry Commissions, English Nature, the Countryside Commission and their successor organisations.

This shift has affected, to differing degrees, all types of woodland owner from large commercial forestry concerns through to the owners of small woodlands.

The physical manifestations of this general shift in management aims included subtle changes:

a) to the size and shape of woodland stands;

b) in the mixtures of species established;

c) in establishment techniques, with a move away from plantations towards the use of natural regeneration;

d) in thinning regimes.

Large commercial woodlands, especially in Scotland and the uplands, continued to be largely coniferous, though much more attention was paid to the careful management of non-wooded land within plantations such as rides, fire breaks, watercourses, and transitional areas between woodland and semi-natural habitats.

Another key trend throughout this decade was the increasing level of acceptance of the importance of semi-natural woodlands and habitat. This was reflected in continuing support for the careful management of ancient semi-natural woodlands throughout the UK.

In practical terms this led to the protection of old areas of Scottish native pinewoods, and the encouragement of their extension through natural regeneration.

It also led to the re-introduction on a moderate scale of traditional management techniques such as coppicing and pollarding.

In lowland woodland there was a move towards:

a) longer term less intensive management away from clear cutting and replanting;

b) small scale group working;

c) the maintenance of diversity of structure;

d) the use of a wider range of species;

e) the careful management of natural regeneration through thinning, singling and coppicing became more common;

f) the application of Continuous Cover Forestry.

New Schemes and Policies

A wide range of approaches including financial incentives, specific woodland creation measures, the development of markets and the use of private and voluntary initiatives. were implemented in the 1990s. The main policy drivers introduced or modified were:

1) A better land supplement added to the Woodland Grant Scheme to encourage planting on arable land and improved grassland (1990).

2) The setting up of Community Forests and other special forestry projects near large towns and cities for recreational and landscape purposes and the establishment of the National Forest in the Midlands.

3) New management grants announced in 1990 as part of the existing Woodland Grant Scheme. These provided hectarage payments for woodland management

with higher rates for nature conservation and public recreation and management. They were introduced in 1992 to coincide with the end of transitional tax arrangements.

4) Special tree and woodland planting schemes associated with farm conservation schemes introduced by the Countryside Council for Wales, the Countryside Commission and the Scottish Natural Heritage.

Probable forestry and woodland changes, with regional variations and some indications of how signalled in CS2000

Coniferous afforestation of semi-natural habitat

This declined through the 1990's. There were considerable regional variations with most taking place in upland Scotland and to a lesser extent, Wales. Virtually non-existent in upland England. Negligible in the lowlands on heaths and semi-natural grassland. Particular attention should be paid to measuring the success of policies designed to encourage native Scottish pine woodland.

Coniferous afforestation of 'improved' habitat

Although policies were designed to encourage this type of afforestation, relatively little took place in the decade because the level of grants did not outweigh the decline in the capital value of farmland upon planting. Small patches of this afforestation occurred in the lowlands. There may be a concentration in areas designated as Community Forests.

Broadleaved/mixed afforestation of semi-natural habitat

There may well have been an increase in this type of afforestation in response to special schemes designed to encourage the establishment of native mixtures of broadleaves, such as upland birch woodlands in Scotland. Many new small farm woods may have been established on remaining fragments of semi-natural grassland.

Broadleaved/mixed afforestation of 'improved' habitat

If policies have been successful, one would expect a considerable increase in the establishment of new broadleaved mixed woodland on improved land. This is likely to consist of many new small farm woodlands, used primarily for game or landscape purposes. These may well be concentrated in areas where game shooting is particularly important (ie parts of East Anglia; Gloucestershire). There may also be concentrations in specially designated areas such as Community Forests and the National Forest.

Natural regeneration of woodland on semi-natural habitat

This will occur in relatively small patches across the UK. It is particularly likely on ungrazed, steeply sloping valley sides in the uplands of Scotland, Wales and northern

England; on lowland ungrazed heaths and commons; and on ungrazed patches of semi-natural grassland such as steep slopes in the Downs and Cotswolds.

Natural regeneration of woodland on 'improved' habitat

Generally very small-scale. Unlikely to be measured by CS 2000. There will be a tendency for some areas of managed natural regeneration to be found adjoining exiting semi-natural woodland if policies designed to increase the size of such woods are working.

Woods showing little change

Many areas of woodland will show little change over the decade.

a) This may be because of the stage in the rotation, ie even-aged plantations may show little discernible change from pole stage onwards until, perhaps, a major thinning.

b) Some mixed broadleaved woods which are carefully managed under say a continuous cover system will show little change even though valuable timber may have been removed.

c) Other woods may show no change because they are unmanaged.

d) With the move to more subtle forms of woodland management there is a strong likelihood that woods which are managed, but which show no discernible change, will be increasing in number.

Conversion of broadleaved/ mixed woodland to coniferous woodland

This should be a rare occurrence especially in England. It is most likely to take place in larger upland plantations where extensive restructuring is taking place at the end of the first rotation.

Conversion of coniferous woodland to broadleaved woodland

This should be taking place on a fairly extensive scale as formerly mixed plantation made up to the 1950's have their coniferous element removed. This is particularly likely on woods on traditional landed estates where mixed plantations have been very popular. It will also take place in mixed plantations made on ancient woodland sites.

Loss of woodland to improved agriculture

This is likely to be rare in England, with the conversion of woodland to arable land virtually halted. It is most likely to take place in heavily grazed parts of the uplands, especially in Wales.

Loss of woodland to semi natural habitat

This will have taken place frequently, but usually on a small scale. It is most likely to occur where there are specific conservation schemes to remove plantations and natural regeneration in order to restore lowland heaths, chalk grassland, sand dunes and other valued habitats.

Survey suggestions

Need to improve resolution of CS2000 in order to measure increasingly subtle changes: as foresters become more expert at 'naturalising' their woodland in the landscape, management changes become camouflaged and more difficult to discern.

Surveys of squares. Need to interview woodland owners as well as farmers.

Need to carry out detailed fieldwork to assess subtle nature of woodland change.

References

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1994 Sustainable Forestry: the UK Programme (after Rio 1992)

1995 English Nature report on Environmentally Sustainable Forestry and Woodland Management

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