AGRICULTURAL CHANGE & ENVIRONMENT
OBSERVATORY PROGRAMME

OBS 02: CAP Reform – Implications of farm level change for environmental outcomes

Final report, October 2006

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OBS 02: IMPLICATIONS OF FARM CHANGE FOR ENVIRONMENTAL OUTCOMES - EXECUTIVE SUMMARY

Context, aims and approach to the study

1. This study is one of a suite of three projects which was carried out by a partnership between the Countryside and Community Research Unit (CCRU), University of Gloucestershire and the Central Science Laboratory (CSL), York, for the Defra Agricultural Change and Environment Observatory programme, from January to September 2006. Its aim was ‘to provide an up-to-date, enhanced assessment of the potential impacts of CAP reform on the environment by examining recent and anticipated farm change, building upon environmental links identified by previous studies and contemporary evidence.’

2. The study has gathered information from five principal sources: formal literature – published articles and reports of studies; informal literature, including the farming press and web-based media; ongoing research programmes; workshops and targeted interviews with key subject area specialists and practitioners; and close liaison with the Defra Observatory team to ensure up to date access to relevant data and policy review. These have been used to gather evidence on the detailed emerging and anticipated trends in farm change resulting from the implementation of the 2003 CAP reforms in England, and to evaluate their environmental implications and significance (broadly defined in respect of scale, geography and timing). As part of the review, an analysis of gaps in the evidence base and potential means to address these has also been undertaken.

3. The basic research methods have been largely qualitative and iterative. An initial literature review and data analysis was completed in February, followed by three workshops and four interviews with practitioners to discuss emerging findings and key issues in relation to farm change. The literature review was then updated and expanded to incorporate insights from ongoing research programmes, and in May and early June interviews were carried out with a carefully selected list of environmental experts, to produce a detailed and up-to-date assessment of the environmental implications of emerging and anticipated farming changes. Gap analysis was undertaken in respect of both farm change and environmental implications, during this process.

Key findings: farm change

Early evidence of change

4. In the short term we identify a contrast between arable, dairy, and sheep and beef sectors, in the nature and rate of adjustments. The predominant response to the reforms in the arable sector, for the time being, appears to have been ‘wait and see’, with few farms making radical changes and a resumption of cropping patterns similar to those seen in 2003, before the reforms were agreed (2004 was an unusual year, much more preoccupied with entitlement and uncertainty). This has meant a continuing, significant use of ‘fallow’ (uncropped – now GAEC 12) or formally ‘set-aside’ land within the rotation (comprising roughly 15% of the total arable area) and marginal declines in the areas sown to a variety of cereal crops (e.g. barley, oats), continuing a trend that has been apparent since 2000. Business impacts as yet appear marginal and there is no evidence of declining input use on cropped land.
5. By contrast, the predominant response to the reforms in the beef and sheep sectors seems to have been to see them as a trigger for change and already begin to make system changes, in response to the expected change in support between now and 2012. Broadly speaking, early changes appear to involve reduced recruitment into beef suckler herds among existing grass-based beef producers and changes in management strategies for common land and rough grazings in the uplands among sheep producers, which would be consistent with planned extensification and/or simplification of management systems and reduced labour input. In addition, there is some evidence of increased keeping of sheep in lowland areas, particularly among beef producers seeking to cut costs and raise income. In some cases these will be sheep newly introduced on to formerly cattle-only holdings while in others it could be expansion of existing sheep flocks while cattle herds are reduced.

6. In the dairy sector, although significant changes are occurring and a concentration of production into fewer and larger farms is evident, this is a continuing trend predating the 2003 reforms. It is clearly influenced by a host of factors – including both policy and market changes – among which the specific impacts of CAP reforms may be relatively minor. As a by-product of this change, a proportion of those marginal dairy farms that are deciding to quit milk production are moving into beef enterprises in the short term (in the longer term, further adjustments are likely due to anticipated low returns from beef). In south-west and central England in particular, conversion to organic production among more mixed, mainly dairy farms is also a marked trend.

7. It is also possible to say, even at this early stage, that these emerging patterns of change are being experienced in different ways and at different rates in different parts of the country, such that the implications for the environment will also vary according to local geography, culture and history. This was most clearly shown in the workshops, where emerging responses were differentiated by land quality (e.g. SDA/DA where DA farms face more immediate needs to adapt, but have more options), infrastructure (transport links and slaughter/processing concentration influencing development of intensive stock production), and cultural outlook (larger farms / younger generation / non-dairy holdings swifter to identify new opportunities and adapt). Change is generally more evident in the north and west than in the south-east and east, at present, but within regions, these other economic and cultural factors are also seen as important. In particular, the relative influence of ‘non-traditional’ sectors and enterprises (e.g. leisure, horses, hobby and lifestyle farming), which has been increasing generally in the past decade, varies significantly between regions and Joint Character Areas, and is already seen as an important determinant of future options in some localities. National survey data indicate significant increases in horses and non-commercial holdings since 2003, which may be related to CAP reform but could also be a statistical effect of registrations (i.e land which previously was not eligible for CAP direct payments being newly registered to receive SPS in 2005).

**Patterns of future anticipated change**

8. In overview, our findings suggest that for the foreseeable future, most farmers would be likely to continue to claim and receive support under the SPS because to choose to opt out of the system would continue to have significant negative financial implications for the vast majority of farm businesses. The comments in this section should therefore be seen in this broader context.

9. Our expectations for the sheep sector are broadly in line with previous predictions of modest change in stock numbers and a slight decline in production, but this study has added to our understanding of the key factors in decision making, in this sector,
and elaborated the likely changes in more detail. There will be significant regional variation as well as marked within-farm variation in trends across the country, and the further weakening of traditional upland-lowland linkages also seems likely. Over the next 3 to 10 years, sheep are likely to become relatively more common in lowland pastoral and arable areas, and much less common on the open moorland (not the in-bye) of uplands. This will be particularly significant if, as suggested by practitioners, hill farmers decide that it is more cost-effective to concentrate their production on better and more accessible land and thus progressively abandon moorland management.

10. Beef cattle are likely to become less numerous across England as a whole. Again, the trend is consistent with previous findings, but this study has identified regional and subregional trends which enable more careful environmental appraisal of their implications and potential policy responses. The implications are for marked declines in the uplands, increases at least temporarily in traditional dairying areas (as less efficient dairy businesses use beef as an exit route), and extensification—modest decline in numbers—in the more marginal parts of current mixed and arable farming areas. Cattle may also disappear from the least productive parts of existing lowland semi-natural grazed habitats such as heathlands and marshlands, unless they—and the infrastructure and skills that their management requires—can be sustained here on purely environmental management (as opposed to viable production) rationales. This appears most likely if they are able to enter the higher tier Environmental Stewardship scheme and that, in turn, will depend upon scheme resources and targeting over this critical period. Successful niche and organic marketing may also play a role, here, where these management approaches develop.

11. Dairy farms are likely to continue on their current trend of becoming less numerous, larger scale businesses, distributed less evenly across the country. They are likely to decline in upland and arable areas and concentrate in lowland situations where grass growth and an increased area of maize forage production will be favoured climatically and culturally over all-arable systems. However, these trends appear only weakly affected by the CAP reforms. It is still too early to establish the degree to which cross compliance and GAEC conditions, in conjunction with implementation of the EU Water Framework Directive in the UK, will affect this basic pattern due to their potential (in theory, at least) to counter or alter the incentives towards spatial concentration and intensive land and stock management. Increased conversion to organic production is also likely to continue, irrespective of this question. In the uplands and the east where dairying is anticipated to see the greatest declines, high-value niche marketing will sustain a minority of producers.

12. In more productive arable areas, it seems likely that larger scale, block cropping of wheat and rape and simplified rotational systems—in which fallows play a significant role replacing second wheats, barley and other cereals—will become more dominant. Sugar beet production will contract, while the extent of horticulture may remain stable overall, although crop choices in this sector will vary according to EU and global market fluctuations as well as energy price trends, irrespective of CAP reform impacts. Where land leaves regular cropping, grazing by horses, amenity tree planting and non-farming use are likely.

13. In less productive arable areas (as defined at a sub-regional or JCA level), simplified systems would tend to be a less attractive prospect for large scale operators, due to lower returns. Likely parallel or alternative trends in these areas appear as follows.
- Persistent fallow land is likely to be an important short to medium term phenomenon as small patches of less accessible/productive land fall into relative disuse (managed minimally to claim SPS).

- Some land is likely to go to built development – particularly where new housing on greenfield sites is already favoured, under other government policies (e.g. south and east England). Although the total impact is small - probably less than one per cent of the arable area in 5 years – impacts would be highly concentrated and thus locally significant.

- A potentially significant area of crop land will be diverted into renewable energy production, mainly using annual crops. Rape is particularly favoured as a widespread option, but wheat could also feature, while short rotation coppice and sugar seem likely to be more localised and dependent upon processor-led initiatives. This trend could also affect productive arable land, if relative prices improve significantly, where it could be expected to reduce the proportion of fallow and set-aside in these areas.

- Some arable farms may become more mixed enterprises, particularly if associated with farm diversification into leisure, adding value/direct sales, and/or organic farming, where livestock production offers the potential to enhance the value or scope of the diversified activity, despite its significantly lower returns as a commodity option.

- Other areas may see minor shifts into different outputs including novel and niche crops (herbs, pharmaceuticals, fibres), wine, and fruit and vegetables in the coming 5 to 7 years. The latter depends critically upon the future status of the FVP authorisation procedures, and the scope for opportunistic entrants into a market which is currently heavily controlled by the major multiple retailers. In localised areas where currently there is a mix of livestock (often dairying) and cropping, one possibility will be for maize or cereals to replace temporary grass as the main source for silage production. This would be supplemented by production of high-protein fodder, to support increases in relatively intensive livestock enterprises (beef finishing, outdoor pigs) in these locations.

14. Where land remains cropped, there are divergent views about trends in input use. Many published studies predict declines in both rates and areas of pesticide application, while practitioners tend to be sceptical of this and the empirical evidence from recent years does not appear to support the general assumptions of the predictive models. However, both the literature and practitioners anticipate a trend of declining use of chemical fertilisers, as more farmland is affected by NVZs and the adoption of precision farming techniques, while the persistence of fallowed land within rotations will also reduce frequency of application.

15. In all areas, the influence of non-commercial and/or non-agricultural farmland management will strengthen as a result of the reforms (e.g. lifestyle farming, or environmentally-motivated landownership and management), as will the scale of land used for horses and recreational pastimes. This continues an existing trend but the implications of the reform are for a relative acceleration of the trend as farming revenue declines with decoupling, in the short to medium term (3-5 years). Where land leaves commercial agriculture for leisure or lifestyle use, the related impact upon land values and the structure of holdings is often such that the reversal of this process becomes highly unlikely.

16. There is also the potential for significant areas of land to be taken out of production and managed in accordance with the rules of the Single Payment Scheme (GAEC 12), on a ‘minimal-cost’ basis. In arable areas this may well occur as a continuing practice on the smallest and least productive sites but elsewhere there is
likely to be a variable annual pattern, with different land leaving and entering production each year. In effect, this would mean a continuation of the recent phenomenon of significant areas of fallow land (15% of cropped area) in arable areas, but the total extent of this area should increase slowly over the next 5 years or so. In livestock areas, ‘GAEC12’ land is perhaps more likely to be long-term and involve the most awkward and least productive areas of land – e.g. rushy pastures, overgrown heather where there is no grouse interest, gorse and bracken stands. This kind of land could amount to an increasingly significant proportion of farmland in some parts of the country, including upland and lowland heath areas, and common land. However, both its spatial pattern and extent will depend upon individual landownership and tenure. It will be influenced by the relative quality and scale of landholdings as well as by other factors such as the family labour force and/or succession plans, and will therefore present a very varied pattern of development, across the country.

17. One final point worth consideration is the impact of CAP reform on explicit environmental management through the effects of firstly, cross compliance and GAEC rules, and secondly, from its likely effects upon the uptake of the new agri-environment schemes and movement from existing schemes to the new scheme. Generally it would be expected that the introduction of the new cross compliance and GAEC rules should bring about a gradual improvement in basic environmental management standards on farms, regardless of how they are changing. However, this will depend upon how clearly standards are defined and how well they are enforced, as well as how compatible they are with other trends in farming practice and thus the extent to which farmers choose to continue to claim SPS if these payments decline in future. Good information and advice are likely to be an important element in securing benefits from these developments, and it is likely to be some years before such benefits can be demonstrated. Similar points apply to ELS uptake as it spreads across more productive areas of lowland England.

18. In respect of agri-environment schemes in marginal areas, we suspect farms will increasingly diverge between those who choose an explicit environmental route for future management, and those who decide instead to focus on enhanced profitability through conventional production. In the latter case the only scheme they might join is ELS and their farming may be concentrated upon their better land, while the rest is managed under GAEC 12. In the former case, they will apply for HLS and perhaps also OHLS and achieve more environmental benefits than currently (whether or not they are already in ESA or CSS schemes). Thus compared to the current situation where many of these areas have significant ESA and CSS uptake, environmental impacts could diverge significantly between and within farms, and across local areas, depending upon the choices made and available resources. If farmers opt for ELS or leave schemes altogether when their ESA or CSS agreements end, rather than entering HLS, capital work on farms (e.g. wall and hedgerow restoration) would probably decline. There is also potential for localised intensification of grassland sward management on in-byre land, and undergrazing on moor and heath, leading to bracken and scrub encroachment as well as over-mature heather and increased fire risks.

Environmental Implications

19. These patterns of emerging and anticipated farm change give rise to a wide range of environmental implications in respect of government and Defra’s environmental priorities. The table summarises key points in relation to anticipated changes and their impacts in relation to main areas of environmental interest.
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<td><strong>Arable areas</strong></td>
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<td>1. Expected declines in the area sown to (spring) barley and sugar, in favour of winter wheat or rape (for either food or biofuels). More block cropping of these simplified rotations. A continuation of the recent increase in maize area.</td>
<td><strong>1. Soils, water and air:</strong> Could lead to reduced erosion from increased crop cover over winter - depends upon soil management and vigour of crop growth in the autumn (- poor emergence could still leave soils vulnerable to erosion). More maize would tend to increase erosion/soil sediments in water. Crop shifts imply more nutrient loading in water and potentially higher pesticide (fungicide) use, but not necessarily increased levels in water. Neutral for air and climate. Simplified rotation impacts depend critically upon management techniques – whether low-cost but prophylactic (negative), or precision inputs (positive). <strong>Biodiversity, landscape and historic environment:</strong> generally negative for biodiversity and landscape interest due to more uniform crop types and lack of winter stubbles. However, could be mitigated by change 2. Little impact on historic features (already threatened in these areas).</td>
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<td>2. Because less land is cropped for food and feed, the area of fallowed (GAEC12) land increases in less profitable areas. Alternatively, more of this land is cropped for biofuels (this depends upon energy policy).</td>
<td><strong>2. Soils, water and air:</strong> Benefits from fallow, subject to good compliance with GAEC conditions: i.e. to establish good cover and exercise restraint in applying inputs or wastes. Neutral or negative impacts from biofuels because of a reduced area of fallow, compared to the current situation. Use of glyphosate on fallows or rape (pre-harvest/ploughing) negative for air and water. Biofuels offer climate benefits if they replace oil/coal/gas. <strong>Biodiversity, landscape and historic environment:</strong> important benefits from fallow for biodiversity and historic assets - ideally would want a mix of rotational/fixed where fixed is targeted at protecting important features/extending habitat. More Biofuels in place of fallow would negate the benefits.</td>
</tr>
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<td>3. Some grassland and other biodiverse areas maintained by extensive grazing in environmental schemes and projects</td>
<td>3. Generally beneficial for all environmental priorities but highly dependent upon available resources from agri-environment and other sources (e.g. LIFE, Heritage Lottery, EU convergence and competitiveness funding, etc.).</td>
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<td>4. Some intensive livestock enterprises expand (beef finishing, outdoor pigs), along main transport links, onto land vacated by arable (probably still in rotation)</td>
<td><strong>4. Soils, water and air:</strong> Impacts on soils and water (disposal of manures, localised poaching) would tend to be negative, notwithstanding GAEC, but localised. Negative impacts on air (ammonia, more methane production) <strong>Biodiversity, landscapes and historic environment:</strong> negative for knock-on damage via soils and water but some potential benefits if these units maintain local land use diversity and field boundary infrastructure is enhanced.</td>
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<td>5. Slow / modest increase in novel crops, wine, and if FVP restrictions are eased, horticulture.</td>
<td><strong>5. Soils, water and air:</strong> Permanent crops can be positive or negative for soil and water, subject to management techniques. Benefits for air (reduced losses of soil N). Horticulture and vines may increase water demand but as controlled, may have minor impact. Horticulture as currently practised can be negative for soils and water (higher nutrients, pesticides, compaction issues at harvest). <strong>Biodiversity, landscape and historic environment:</strong> polytunnels negative for landscape, but otherwise, many of these crops can introduce diversity into otherwise monotonous habitat so potentially also beneficial for landscapes and biodiversity. Negative for historic environment.</td>
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| **Pastoral areas** | **1. Soils, water and air:** Negative, with more poaching and erosion along tracks and by gates, more N&P losses from compacted soils, some losses from increased maize areas, increased methane and ammonia. GAEC Soil plans may reduce damage.  
**Biodiversity, landscape and historic environment:** negative for biodiversity and historic features in these locations, although landscape interest likely to remain. |
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<td><strong>2. Slow expansion of the organically farmed area in middle England and the South West</strong></td>
<td><strong>2. Benefits for biodiversity, landscapes, soils and water through reduced nutrient loading and improved soil management. Reduced livestock emissions to air. Neutral for historic elements (a balance of positive effects on field boundaries but possible negatives from more ploughing and root crops)</strong></td>
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**Biodiversity, landscapes and historic environment:** general benefits from extensification but if cattle disappear, some biodiversity/landscape loss – significant if on currently valuable sites for these attributes. |
| **Uplands** | **1. Soils, water and air:** benefits short term - reduced erosion on currently overgrazed areas, reduced water pollution and enhanced peat protection (carbon sequestration benefit). Potential negatives longer term (5+ years) – increased fire risk from over-mature vegetation which could lead to greater peat erosion.  
**Biodiversity, landscapes and historic environment:** on overgrazed sites, benefits for all 3; on undergrazed sites, rapid declines in wildlife and slower landscape quality decline, risk of damage to historic features from scrub growth. |
| **1. Extensification on out-bye and open moor** | **2. Soils, water and air:** some positive - reduced poaching from cattle, but potential riverbank/margin damage from sheep will persist or increase. Reduced emissions to air from fewer cows.  
**Biodiversity, landscapes and historic environment:** mainly negative due to less varied grazing, less need for buildings and landscape infrastructure maintenance. |
| **2. Stocking increases on in-bye land, and balance of stock shifts in favour of more sheep and fewer cattle.** | **3. Potentially negative impacts on soils and water, landscapes and historic features (also possibly biodiversity), from reduced active maintenance and restoration of field boundaries and buildings.** |
| **3. Farms enlarge and simplify management regimes**  
Both lowland and upland areas across the country: | **1. Soils, water and air:** Risk of damage to soils from overgrazing and localised poaching and compaction.  
**Biodiversity landscapes and historic environment:** negative for grassland diversity and landscape feature maintenance (also more electric fences), increased damage to historic features. May promote traditional hay making on adjacent farms which would be beneficial for biodiversity and landscapes. |
| **1. More land (perhaps 5%, by 2013) shifts into equine use** | **2. Soils, water and air:** most options would tend to bring benefits from reduced inputs, livestock and soil disturbance but some uses could increase compaction and erosion (e.g. motocross).  
**Biodiversity, landscapes and historic features:** depends on past and new management – could be positive (active, interested or allow more diversity to develop) or mildly negative (neglect leads to...)** |
| **2. More land (perhaps 5%) shifts into amenity / leisure or lifestyle uses.** |  

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**x**
3. More land (probably less than 2%, nationally) is lost to development.

4. Cross compliance conditions encourage better environmental management.

5. More land enters the ELS scheme, particularly in lowland and arable areas.

6. Notably in uplands (where former scheme uptake is most significant at a landscape scale), sharply varied impact of agri-environment scheme choices (ESA/CSS to ES).

to decline of existing features and increased homogeneity).

3. Negative for soils, water and air - ceased ecosystem functions. Negative impacts on biodiversity, landscapes and historic environment can sometimes be mitigated by good design and increased variety of local niches/features (e.g. gardens, trees, etc).

4. Should be beneficial for all aspects by ensuring and/or raising standards on all farms, but critically depends upon how many comply (effective enforcement), how well they comply (good advice and information), and whether farms choose to remain in SPS when payments begin to decline (2008). We assume most will claim, at least up to 2013.

5. Little short term impact but may have medium to long term general benefits from continued feature maintenance, better input management.

6. For all attributes, implies losses where environmental management declines as old agreements are not replaced by ES ones (but still subject to GAEC), but gains where HLS agreements, in particular, are taken up. Could imply higher standards of basic management, overall but may result in lower level of feature restoration if HLS uptake is not widespread. These comments apply equally to agreements across the rest of England but the impact, as most of these are for individual, more isolated sites, will be less marked outside the uplands.

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**Gap Analysis**

20. The research identified a number of areas where there are gaps in existing datasets and other sources of information which are relevant to the analysis and discussion of CAP reform impacts upon the environment. Some of these gaps related to information about the nature and extent of farm change, while others were particularly focused on how that is likely to be affecting environmental assets.

21. Gaps in information on farm change include a need for more information to be gathered on the structure of the farm business as opposed to land holding. The Defra June survey cannot indicate the scale of farming practised by individual businesses nor the complex nature of management control over land which is contract-farmed or held in similarly indirect ways. It was felt this was an important factor in predicting farm response to policy changes. In addition, gathering more detailed information on the nature and significance of diversified and non-farm incomes and enterprises which can influence farming motivations and decisions, was recommended. Both of these gaps might be addressed by modifications to the Farm Business Survey, while estimates of business size could also be made by cross-linking June Survey holding numbers to SPS claims using the Rural Land Register (although this would not pick up contract farming).

22. Better information on the kinds of farming system in place on different farm units across the country would be extremely useful for predicting responses to policy change in more depth than is currently possible. Distinguishing indoor from outdoor livestock enterprises for beef and pigs, and arable systems of continuous cropping versus rotation, would be a useful method of identifying trends through shifts between categories and thereby key changes in environmental impacts. It may be possible to consider a modification of the June survey which would enable a crude systems classification. Alternatively it might be addressed via appropriate new questions in the Farm Practices Survey (FPS), and it would also be possible to monitor the spread of some explicitly labelled ‘systems approaches’ such as LEAF and Organic-registered land, around the country. Another key issue for June survey
is to consider revising the ‘farm type’ categories to enable more detailed investigation of the ‘other’ type. There is a need to distinguish commercial farms from leisure and lifestyle holdings and to monitor the anticipated development of more diverse types as a result of the reforms.

23. More detail on historic and current land use practices, particularly in grassland areas in relation to grassland and semi-natural vegetation management, would be valuable in enabling more accurate estimation of the likely impacts of changes in stock numbers and types resulting from the reforms. In addition, more detailed information on crop husbandry practices in relation to timing of crop sowing, input applications and mixes, harvest time and management of the post-harvest surface, is critical to anticipating environmental impacts of change in arable areas. The FPS may offer a route to investigating these questions. Finally, some more robust data on the environmental impacts of land use change from sheep and/or cattle grazing to grazing by ponies and horses for leisure use, in different situations around the country, would seem warranted (e.g. to understand if the purpose of keeping horses affects the management regimes used, and how impacts depend upon soil type, topography, existing sward quality, etc.).

24. In respect of environmental data, improved biological monitoring of water quality, as well as monitoring for agricultural pollutants including pesticides and veterinary products, were recommended, as was an increased incidence of, and more flow-related, monitoring in the agricultural stretches of water catchments where diffuse pollution from agriculture is known to be an issue. For biodiversity it was suggested that better data on taxa other than birds, on arable farmland in particular, would be valuable as a method of triangulating the current reliance on bird species as an indicator of farmland biodiversity. However, further work would be needed to identify suitable taxa and optimal methods.

25. Enhanced data on the spatial patterns and occurrence of different landscape features and historic elements (scheduled and non-scheduled) at Joint Character Area (or even finer-grained) level would also be particularly valuable for ongoing monitoring of impacts. Improved aerial/remote imagery may offer one possible route to achieving this at reasonable cost – this should be pursued in collaboration with CQC developments, to maximise scope for synergies.

26. This study has particularly highlighted the importance of developing and enhancing qualitative, as well as quantitative, tracking and reporting systems over the next few years, as patterns of change emerge more clearly. In our view it is essential that the Observatory should continue to check and evaluate both the formal and the grey literature (including agency, NGO and practitioner reports and journals, as well as farming press) and discuss emerging patterns with practitioners and environmental experts at regular intervals, to assess the trends and impacts and consider appropriate intervention strategies. Reliance only on quantitative and regularly collected datasets will not be sufficient to provide Defra with evidence of change as it occurs and to enable action to be taken sufficiently rapidly to address any significant impacts.
1. PROJECT AIMS AND FOCUS

This project forms one of a suite of three projects being carried out by external consultants for the Defra Agricultural Change and Environment Observatory programme, during the first half of 2006. Its aim was:

   To provide an up-to-date, enhanced assessment of the potential impacts of CAP reform on the environment by examining recent and anticipated farm change, building upon environmental links identified by previous studies and contemporary evidence.

This aim was broken down in Defra’s project brief into five distinct tasks, as follows.

1. assess the current picture in terms of the implementation of CAP reform, at farm level, in England;
2. building on existing literature on the environmental impacts of CAP reform (where possible, at farm level), provide up-to-date assessment of the implications for the environment both in the short term and longer term of the 2003 CAP reforms;
3. highlight specifically any recent or emerging data on the farming sector which has the potential to have significant implications for the environment;
4. provide an overall up-to-date assessment of the implications for a wide range of Defra’s environmental priorities, highlighting where the conclusions may differ from previous analysis and issues for further investigation;
5. highlight and prioritise gaps in existing research that need filling in order to understand fully the farm level environmental impacts of CAP reform.

The project is addressing these aims by gathering information from 5 sources:

- Formal literature – published articles and reports of studies
- Informal literature, including the farming press and web-based media
- Ongoing research programmes
- Workshops and targeted interviews with key subject area specialists and practitioners
- Close liaison with the Defra Observatory team to ensure up to date access to relevant data and policy review.

The work began in December 2005 and was completed in September 2006. During that time the project team met four times with the Defra Steering group to discuss progress, refine the approach and consider the emerging findings.
2. METHOD AND APPROACH

2.1 Overview

The basic programme of work was organised around an iterative process, whereby an initial literature review and data analysis (in particular, of June survey data from 2003-2005) informed the gathering of key practitioner information from workshops about the scale, pace and direction of farmer reactions to CAP reform around the country. The findings from these workshops were then used to trigger a second round of literature review, some targeted follow-up interviews and an investigation of ongoing research programmes. Following this and drawing from the findings of the systematic review of impacts under OBS 03, a range of targeted expert interviews was carried out to ensure the most up to date and comprehensive knowledge about the environmental impacts of changing practices in the ways suggested from the literature, ongoing research and workshops. Following the interviews any further critical literature sources, as suggested from these interviews, were investigated and if necessary, the survey data re-interrogated to check for any specific subtleties suggested from the interviews.

Each of these stages is now described in more detail.

2.2 Initial literature review and data analysis

An initial literature review was carried out between January and March 2006 and key implications distilled for each of three main classes/situations of farms:

1. cropping farms – including arable and horticultural holdings
2. lowland livestock and dairy farms
3. upland farms, which will be almost exclusively livestock farms with mainly sheep and beef production.

To complement the review, a rapid analysis of Defra June Survey data, firstly using the national summary and then data for individual Joint Character Areas, from 2003 to 2005, was undertaken, to look for any signs of the kinds of change predicted from the literature, or for any potentially contradictory trends.

2.3 Workshops and additional practitioner interviews to identify farm changes

Three workshops with practitioners were held around the country:

1. a lowland livestock and dairy workshop in Taunton on 20 February
2. an upland farming one in Hackthorpe, near Penrith, on 1 March
3. an arable and horticulture one in Peterborough, on 3 March.

At these events, a selected group of invitees including public and voluntary sector farm advisers, scheme extension officers, land agents, farmers/farmer representatives and estate owners was brought together for a half-day’s discussions. A morning discussion session examined their knowledge and views about what changes are occurring in each key farm sector as relevant to their particular workshop, and bearing in mind other non-CAP and/or non-policy influences upon change. An afternoon session then sought to examine the geography and pace of change, attempting to characterise how changes might be occurring differently in different parts of England and how other varying influences upon land use might
interact with farming change in the short and longer term. A brief final discussion then sought views on how best the key changes might be monitored by Defra, over the next few years – suggesting what key indicators should be identified and how they might be tracked. Details of the workshop attendees and the common workshop programme for all three events are given in Annex 1.

Following these events, a small number of face to face interviews was undertaken to pick up detail on specific sectors or specific concerns raised at the workshops which could not be covered in those events, due to a lack of appropriate expertise around the table. These particularly sought to cover the more specialist farm sectors/outputs and the extent to which CAP reforms might affect them over the coming years. A total of four interviews was undertaken, covering pig and poultry sectors, sugar beet production, and the beef sector.

2.4 Literature update and investigation of ongoing research programmes

From the workshops and from continued scanning of emerging reports and reviews in the relevant media sources, an update to the literature review was undertaken in May 2006. At the same time, attempts were made to make contact with a number of relevant ongoing research programmes to keep abreast of their progress and potential relevance to this study. Due to resource and time constraints it proved impossible to undertake a comprehensive investigation of the considerable body of potentially relevant ongoing research so instead, a few key projects were pursued and investigated. Relevant insights from these projects have been integrated into the updated literature review, which incorporates material up to the end of May 2006.

2.5 Interviews with selected environmental-agricultural impact specialists

In the course of undertaking the literature review and workshops and in consultation with the project steering group, ideas and suggestions were gathered as to a range of appropriate experts to interview, in order to get the most informed appraisal of the likely nature and scale of environmental impacts from the patterns of farm change identified. 16 individuals were targeted covering a broad range of research expertise, of which it eventually proved possible to interview 15, in face to face interviews held in May and early June 2006. The interviews were semi-structured and linked closely to our emerging conceptual models of farm change, as identified from the earlier stages of this work. Experts were asked about the kinds of environmental impact that they would anticipate, given the possible trends outlined for different farming sectors and locations/situations, and the timescale and extent of these changes. Appropriate indicators for picking up these impacts were also discussed, and consideration was given to identifying the potential influence of other policy and non-policy variables on the change processes identified, in this context.

The list of interviewees and interview guide used by members of the project team is given in Annex 2.

2.6 Conclusions

The combined results of all stages enabled an analysis of change and environmental implications, focused around a broad division of England into three main agricultural-biogeographic situations, with some discussion of impacts by farm sectors and local areas. From this, implications for Defra’s environmental priorities were assessed. A final section drew together the gap analysis which was used as a basis for making recommendations for future monitoring.
3. LITERATURE REVIEW AND SURVEY ANALYSIS, TO END OF MAY 2006

3.1 Introduction and overview

In describing the emerging and/or predicted impacts of CAP reform upon farm level changes in England, it is possible to analyse these impacts in respect of farm businesses, and their wider sectoral and geographical contexts, considering the timescales involved in each case. However, the overwhelming majority of relevant literature is organised around key farm sectors, with only some studies examining change in particular parts of the country or for the farming industry as a whole. Thus we have organised our review around the main farm sectors of arable, dairy, and lowland and upland livestock (mainly sheep and beef), with an initial section devoted to cross-sectoral studies looking at change within the farm sector as a whole, and a final section including our own analysis of Defra’s June Survey of agricultural holdings in England.

Within each sector, some studies consider the immediate impacts of the reforms upon farm economics – profitability, production and incomes, as well as how these impacts are likely to affect short-term adjustments in land management and business practice: i.e. short term operational impacts. In addition, many sources also consider how these impacts are likely to affect the shape of businesses in relation to enterprise choice and enterprise mix and thus emerging or likely restructuring patterns, in the longer term. Then, a more restricted number of reports considers how these adjustments may interrelate with other aspects of policy – in particular, likely implications for agri-environment schemes uptake/adherence. Finally, there is a suite of reports and other material that specifically considers the environmental implications of the kinds of farm change that are being anticipated.

Thus in this literature review, our findings are divided into five main sections: a national overview, and then the four main farming sectors/situations of Arable, Dairy, Beef and sheep (lowland) and Less Favoured Area (LFA) farms, capturing both historical literature and current evidence of change or likely change. Within each of these sections, we have sorted the impacts according to the four categories of impact/implication as outlined above: immediate farm economics and short term operational impacts; likely restructuring; implications for other policy areas; and likely environmental impacts of the changes anticipated.

3.2 National overview for England

3.2.1 Impact on farm economics and short term operational impacts

Even though there is considerable variation in the scale of predicted impacts of CAP reform on the farm sector in England, studies to date suggest a number of common trends\(^1\): (GFA-RACE & IEEP, 2003; Cumulus, 2005; Defra, 2003a,b; ADAS, 2002 (Hall et al., 2003); Renwick and Hodge, 2003; QUB (Moss et al.,) 2003; SAC Harper Adams (Oglethorpe and Revell, 2003). These are outlined below.

\(^1\) These studies used a variety of modelling and other estimation techniques to simulate farm land-use and farm business management decisions into the future, but the predicted results are broadly similar.
system of direct payments (DP), where premia were paid on a per head basis for livestock and a per hectare basis for crops, influenced farmers’ production decisions. Thus once the support is decoupled, production levels would be expected to adjust downwards, to reflect the underlying profitability of alternative enterprises. For the dairy sector, the pattern is different because policies are moving more directly from price support to a fully decoupled payment and the trend is being phased in over a number of years, during which production quotas will continue to be the main limit upon output. Thus production levels are not anticipated to change significantly in the short term.

Various research projects and analysis have produced quite a wide range in the projected declines in agricultural production resulting from decoupling (Defra has commissioned a number of research projects to explore the issue – a note on findings is available on defra.gov.uk under CAP reform) and results depend on:

- the empirical techniques used
- assumptions about farmer behaviour
- whether the response is short or longer term and particularly
- the extent to which the analyses take account of a market response to the decline in production.

The extent to which the decline in production causes prices to rise, with subsequent positive impacts on profitability and output, is an important consideration. Some of the methodologies used by researchers do not allow for rising prices and these would therefore tend to overstate the decline in production resulting from decoupling. Those studies that allow for rising market prices, efficiency improvement and restructuring tend to show smaller production declines as the incentive to reduce production is diminished.

As an indication of the potential scale of the medium-term production response, the figures from the QUB study of decoupling impacts in the UK can be used (Moss et al, 2002). These are summarised in the table below.

**Table 3.1. Indications of lower production due to 2003 CAP reform in UK**

<table>
<thead>
<tr>
<th>Sector</th>
<th>% change in production level from baseline (pre-2003 CAP), projection to 2010, under different degrees of decoupling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>-4% to –11%</td>
</tr>
<tr>
<td>Dairy</td>
<td>No change under all scenarios</td>
</tr>
<tr>
<td>Sheepmeat</td>
<td>-4 to –12% **</td>
</tr>
<tr>
<td>Wheat (soft)</td>
<td>-0.3 to –0.5%</td>
</tr>
<tr>
<td>Barley</td>
<td>-0.4 to –0.9%</td>
</tr>
<tr>
<td>Rapeseed</td>
<td>-0.5 to –2.8%</td>
</tr>
</tbody>
</table>


Considering the accuracy of these predictions it should be noted that in reality, the CAP reform impact will overlay others from market developments and longer term structural change. For this reason, we anticipate that the level of response from the reforms in the sheep sector, in particular, will be less than the QUB study has predicted, by 2010. Dairy, beef and some arable farms are likely to shift into sheep production as a short-term adjustment strategy even though this would perhaps not seem a promising option in the longer term. This will replace some of the production
that will be lost in the uplands and among existing lowland sheep producers facing lower margins as a result of decoupling.

Andersons (2005) noted that the predicted declines in production are unlikely to be immediately apparent. They argued that Single Payment Scheme (SPS) effects on UK farming profitability in 2005 would not be significant as the payment was still 90% historically based and thus would tend to continue to be treated as if it were coupled, in the short term. They considered there was little evidence in 2004 that farmers planned to stop producing in 2005, cut back costs and live off the new SPS; thus radical adjustment and restructuring was not likely to start until 2006 or more likely 2007.

b. A second fairly common prediction of the studies is increased pressure to cut variable and fixed costs of production, across many farm types and sectors. This is associated with decoupling effects upon enterprise profitability. Figure 3.1 shows relative levels of profitability with and without direct payments, for different farm types by sector, in England (from Jones, 2004b).

![Figure 3.1 Effect of direct payment removal on average farm profitability](image)

This diagram illustrates clearly how the decoupling of support will reveal the relatively low profitability of existing production in different sectors across England. However, it should be remembered that in replacement of direct payments, producers continue to receive significant support through the Single Payment Scheme (SPS). So although the change affects relative sector profits it will not necessarily have significant or similar impacts upon farm incomes.

c. Defra’s RIA of the reforms forecasts no significant change in average income levels by farm type, in the short term. However, there is likely to be significant variation around the average for individual farms, as indicated by various studies (Defra, 2003b). Actual impacts for individual farms will depend upon:
the extent to which farms are willing and able to shift production to more
profitable components of their enterprise mix,
their ability to achieve efficiency gains through restructuring
their participation in rural development schemes which can provide additional
income
age/succession/investment decisions.

Some studies examine the differential impacts upon farm incomes of the gradual shift
in SPS payments from a historic to an area-based entitlement, over the period 2005-
2013. By the end of the transitional period some sectors will have gained or lost,
relative to their historic levels of subsidy. An assessment of the impacts of the Single
Payment Scheme (SPS) carried out by Defra (2005)\textsuperscript{2} provides indicative figures for
changes in farm income by farm type over the period 2005-2012.

- The main winners (with increased subsidy payment receipts over the period, all
else being equal) are identified as LFA cattle and sheep, general cropping,
horticulture and small and medium sized dairy farms.
- The main losers (with decreased subsidy payment receipts relative to past levels)
are considered to be cereals, mixed, medium and large lowland cattle, sheep,
and dairy farms.
- Within farm types, winners and losers will depend on individual cropping and
stocking patterns. In general terms there will be a transfer of subsidy from
intensive to less intensive producers.

It is thought that by 2012 a quarter of farms could lose more than 20% of their net
farm income and 4% lose 100% or more due to the shift in SPS basis, while another
10% will gain more than 100%. Regionally the Midlands, North East, South West,
West Midlands, Yorkshire and the Humber will have a net position worse than with
historic payments. However it is important to remember that these ‘winners and
losers’ are only so by reference to how their subsidy stream will alter over time,
compared to how it was in 2002. Because the starting situation involved support
which was indirectly linked to output levels per farm, this support in 2002 would tend
to be significantly higher among larger and more intensive enterprises, with the
exception of those that were outwith the main support regimes, such as horticulture.

Within farm types, there will be relative winners and losers from the shift to an area
payment, so that for example, even though, typically, cattle and sheep farms gain as
a group, it will tend to be sheep farms that gain and cattle farms (particularly
intensive beef producers) that lose. Similarly within the dairy sector, larger producers
will tend to lose, whilst smaller ones gain (Defra, 2006c). Winners are also likely to
include those growing previously unsupported crops (including potatoes and field
vegetables) whose land is now registered for SPS, because by 2012, this land will
receive the same level of subsidy as arable, grassland and set aside land.

d. In relation to farm management practices, the following changes have been
predicted:

- specialisation of cropping systems, as farms concentrate upon those crops which
appear to offer the greatest economic returns in current and future markets –
these are predicted to be predominantly wheat and oilseed rape;

\textsuperscript{2} Defra Farm Business Survey (FBS) was used to analyse the effects of various payment models.
Unfortunately it has not been possible to model the 3-zone SPS model in detail using FBS data because
moorland farms are not explicitly identified by the survey. Nevertheless it is possible to make some
general statements about impacts (and to quantify them, to some extent).
• more year-on-year flexibility of land use between arable crops and grass, although the extent of the use of this will depend upon a range of factors including farmer attitude, farm circumstances and enterprise/infrastructure economics;

• a shift towards more low-cost livestock production systems, which could involve both more extensive / less actively managed approaches as well as those involving larger intensive operations;

• cross compliance, because it mainly reinforces existing environmental standards on farms, is not anticipated to have a big impact on farm management. However the implications of the new Good Agricultural and Environmental Condition (GAEC) requirements may be for a modest improvement in soil management and protection practices, as farmers become familiar with soil mapping and the calculation of erosion risk. In addition, the ability of farms to decide to cease production on land that remains eligible for SPS, on condition only that they fulfil GAEC condition 12, may encourage an increase in fallowing or ceasing to graze various kinds of permanent vegetation.

Most commentators agree that above all, EU and world market prices will be a key non-policy factor which influence the production decisions taken by farmers on a regular basis (Defra, 2003b; Defra, 2005c; Jones, 2004a; Andersons, 2005). Exchange rates and commodity prices are thought to have far more influence than SPS, at least initially (Andersons, 2005).

In the broader context of the ongoing Doha round of WTO negotiation, the EU has already made a commitment to end export subsidies. There are also likely to be reductions in import tariffs and other controls to allow greater market access, potentially triggering further domestic policy reforms within Europe (Dwyer and Guyomard, 2006). The impact of these changes on EU prices will also depend on world demand/supply (Andersons, 2005). This uncertainty about future prices makes predictions about future farmer behaviour difficult.

There is also uncertainly about future SPS levels. Deductions will depend on levels of UK voluntary modulation and financial discipline, which could increase from 2007-8. Some commentators have predicted that SPS rates could be more than halved by 2012 (Andersons, 2005), although this probably represents an extreme in the range of possibilities. Whatever the case, it can generally be anticipated that if SPS payments are reduced, this will increase financial pressure on many farms, reducing incomes and precipitating restructuring.

Figures produced from Deloitte clients' (press release 3/11/05) accounts with year ends up to June 2005 reflect the fortunes of farm businesses across lowland England (mainly wheat, potatoes and dairy). The average profit generated from all activities by farmers in the 2004/05 year was £66/acre (£163/ha). This is a 19% decline on the previous year’s £81/acre (£200/ha). Looking forward, the firm predicts that net farm income from all activities will decline further to £62/acre (£153/ha) in 2005/06. The headline results mask the different income streams which now make up farm incomes. In 2004/05, the business of food production alone (which included farms’ area aid payments) resulted in a profit of £38/acre (£93.9/ha). The second element of profit coming from diversification (ranging from contracting and renting property to completely new businesses) increased, and contributed £28/acre (£69/ha). However, looking forward to the current 2005/06 year the SPS will give farmers three income streams, contributing to a predicted overall profit of £62/acre (£153/ha). Considered in this way, the business of producing food operates at a loss of £35/acre (£86.4/ha) profit from diversification rises further to £31/acre (£76.6/ha); while the anticipated SPS of £66/acre (£163/ha), net of estimated “cross compliance” costs, contributes to the overall profit.
Deloitte’s prediction is that over the next three years farming incomes for all activities will fall to just £48/acre (£118.6/ha) but most importantly, the mix of income streams will change dramatically, with little incentive for food production. This is attributed to weak commodity prices and rising farm costs. They say the rational response for many farms is the land being retired from food production unless prices improve in the future. Also, they believe the likely result of operating at marginal returns (i.e. with very little profit) will be a polarisation of arable farming operations. Most land will be farmed and maintained in this state on an increasingly large scale (by large-scale arable enterprises farming the land on contract), while some other businesses gain the added value of niche markets and can therefore sustain a business that is cropping relatively small acreages.

Despite these rather negative implications, early evidence is that some farmers remain fairly optimistic about the future. A Farmers Weekly survey (Farmers Weekly, 4 Nov 2005) of their barometer farmers (44 respondents of a wide variety of farm types) found the following:

- a ratio of 3 to 1 consider their fortunes are the same or better than 1991 and are optimistic about the future;
- more than half are farming more land than they did in 1991;
- three quarters expect to adopt new enterprises and several had already done so;
- more than half anticipate making major capital investments; though at the same time they anticipate making savings, mainly in machinery but also in cultivations and staff.

### 3.2.2 Restructuring implications

Decoupling is widely expected to accelerate restructuring and thereby increase productivity across the industry, over time. A worsening of the income position for some farmers is likely to give greater incentive to the restructuring of farm businesses. Conversely, an improvement in the income position of other farmers may well slow down restructuring. However, some farmers may also use an improved income position and the flexibility afforded by SPS to invest in on-farm infrastructure, diversify their businesses or invest off-farm, thus once again restructuring is favoured. There are few surveys of farmers’ investment intentions, but one survey by MDC\(^3\) (2006) found that the majority of dairy farmers (71%) intended to invest less than £25,000 in their dairy unit over the next 5 years. Those supplying a plc. buyer were slightly more likely to invest more than £25,000 than those supplying co-ops, and the percentage of farmers intending to invest >£25,000 increased with the size of annual production volume.

The QUB (Moss et al., 2002) analysis of decoupling impacts considered that although overall production levels in UK agriculture should adjust downwards with decoupling, there may be different adjustment responses to decoupled payments, at farm level. For example, some farmers may use decoupled payments to smooth income streams, while the security of decoupled payments may reduce their financial risk levels or enable them to obtain bank loans more easily. Furthermore, many farmers are known to value highly the lifestyle associated with farming, so cross-subsidisation of the business using SPS payments may enable them to continue their farming activity despite its low profitability. However, they argue that farmers may find that without direct payments, the returns from certain agricultural enterprises may cover variable costs, but not long-run re-investment costs. Major investment decisions are

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taken infrequently and therefore it may not be until a major re-investment decision arises that the farm business adjusts fully. The level and timing of this response is therefore unknown.

Nevertheless, it is anticipated that restructuring stimulated by the reforms will include the expansion of efficient farms and wider use of alternative farming arrangements. Decoupling, in principle, is thought to open the door to more exploitation of comparative advantage and thus specialisation at the regional and farm level (Jones, 2004b).

The number of farm workers employed is expected to fall, due to pressure to save costs and the development of simpler, more extensive farming systems. This is predicted to result in a smaller workforce responsible for managing similar areas of land. There is anticipated to be a commensurate loss of management skills (Cumulus, 2005). ‘The [CAP reform] agreement is likely to reduce the labour requirement for UK farms by some 3-7%, however this should be seen against the trend of a 22% fall in agricultural employment over the past 10 years’ (Defra, 2003a). Defra (2004) estimates that the decoupling agreement will also reduce employment within industries dependent on agriculture, estimated at 1-2%.

It is anticipated that the decline in the total number of farmers and farm workers will coincide with the enlargement of farm units and simplification in farming systems. A polarisation between those farms which are able to continue farming profitably and are likely to specialise and expand, and those farms which are likely to be better off by reducing or extensifying their farming activity and thus will act accordingly, has been predicted. This dichotomy of farm systems has been described as: ‘Market Managers' versus 'Environmental Managers', although there is no guarantee that those who reduce farming effort will necessarily adopt more environmental management practices and/or join available agri-environment schemes (NFU and EFFP, 2005).

A variety of reports predict land leaving agricultural production and being managed to minimum standards and/or put to non-farming uses, e.g. recreation, conservation etc., while more land is judged likely to be entered into agri-environment and woodland schemes, subject to the availability of funding. Jones (2004b) identified the following as farming business options favoured by decoupling:

- diversification (but restrained by the potential impact of some kinds of non-agricultural land use on continuing eligibility for SPS),
- increased involvement in and uptake of agri-environment schemes,
- more businesses moving into part-time farming/securing off-farm income,
- more co-operation and contracting arrangements to reduce operational costs, and
- more shifts of production into crop and livestock enterprises that were previously unsubsidised.

The knock-on implication of these changes, as identified in some studies, is an overall improvement in total income from farming, taking into account decoupling impacts and subsequent dynamic responses (i.e. enterprise changes). The RIA (Defra, 2003a) estimates that the agreement will result in an overall “increase in (UK farm) income of up to £280 million per year, which represents 12% of Total Income From Farming (TIFF) in 2002". However it should be remembered that this is a whole-industry prediction and thus it contrasts with the static predictions for average incomes by farm type, reported in the previous section.

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In the future, Deloitte (2005) anticipates Britain’s farms will be supported by three different sources of revenue: food production which will be subject to very large swings due to the vagaries of global market and the weather; income from a range of diversification investments which will be increasingly important; and EU income derived from agri-environment activity and SPS-related landscape management.

Lloyds TSB Agriculture ‘Focus on Farming Survey’ in 2003 suggested that two-thirds of farmers in England and Wales plan to start diversifying enterprises on their farms over the next five years. Currently, these enterprises account for just 8% of farm income on those farms surveyed by Lloyds, so a big growth is anticipated. The arrival of the mid-term review of CAP reform will only serve to speed this process (Farmers Weekly, 26/11/04).

Taking account of how farming fortunes have fared over this time, the firm sees three main models emerging:

1. the part-time farmer who depends on others or family labour to operate the business, and supports his cost of living from off-farm activity;

2. the diversified farmer, who generates some income from his own land, but also makes up his income by contracting or operating other on-farm diversified enterprises.

These two types will increasingly outsource their food production to:

3. the full-time professional farmer operating efficiently on a large scale, and directly engaged with the food chain.

Research examining the potential impact of CAP on the diversification activities of tenant farmers (University of Coventry and University of Hull, 2006) indicated that most respondents in a 2005 survey were either uncertain (49%) or negative (36%) about the potential impacts of the 2003 CAP reforms. Only 6% thought that the implications would be positive for their farm business. More than 40% of respondents intend, at least in the short term due to uncertainty surrounding the reforms, to carry on farming as before. 1 in 7 intend to reduce, or cease, their involvement with agriculture. Approximately 46% intend to pursue economies of scale and/or economies of scope and over 80% indicated a continued commitment to agriculture. Thus the report concludes that there is unlikely to be a mass retreat from farming in the English let sector, at least in the short-term. However some interviewees were already considering withdrawing from certain sectors (e.g. cereals, sugar beet) and fears were expressed about the survival of upland (mainly SDA) cattle production.

Most respondents did not expect to diversify as a result of the reforms. Future diversification is most likely to take place on farms that have already diversified. Four fifths of those who have not already diversified said they will not diversify in the future. In contrast, around a third of those who have already diversified are likely to diversify further because of the introduction of SPS. Wholly tenanted farms regard themselves as less likely to change or diversify in the future than all tenant farmers as a group.

A process of consolidation is predicted for the future. While the area of rented land might remain the same, or even increase, consolidation will lead to fewer and larger farms with tenanted land. It’s believed that when tenant holdings become vacant in the future, landlords are likely to rent out the bare land to remaining tenants or other farmers and to either sell or rent out the farmhouse and agricultural buildings. This will hamper tenant farmers’ ability to diversify. Traditional estate tenants and new entrants are thought most likely to struggle to compete with existing farmers who are looking to spread their fixed costs over a larger area. It is thought this will lead to the blurring between ‘tenanted’ and ‘owner-occupied’ sectors, as larger farm businesses
will farm more and more land under a mixture of agreements - owned, rented and contract.

Farmers Weekly (14 April 2006) reports that land buying activity by farmers is increasing. In 2005, the proportion of farmer buyers of farmland rose to just under 50% of all buyers, compared to 46% in 2004 and 40% in 2003 (no figures are given for areas of land bought by different buyers). It anticipates this rise will continue, fuelled by farm expansions: ‘efficient farmers are looking out for more land, those top performers will grasp new opportunities such as biofuels, new technologies and remain viable, and environmental initiatives offer additional income for enhancing whole estates’. The figures are taken from Savills (2006).

3.2.3 Impacts for Agri-Environment Schemes

GFA-RACE & IEEP (2003) consider that as a result of the decoupling of CAP supports:

- More land will be put into agri-environment schemes, particularly arable land (through the ELS) and beef and sheep grazed grassland. However the Higher Level Scheme (HLS) will be more targeted, for example, at priority catchment areas, so uptake of this scheme is likely to be less affected by decoupling.
- There will be more frequent use of farm planning tools relating to nutrients, manure/waste and soils due to a combination of cross-compliance conditions and the increased uptake of agri-environment schemes.

The initial report of the evaluation of Environmental Stewardship (CSL, 2006) shows some small but statistically significant differences in uptake between regions. Despite small actual differences in numbers, horticulture, specialist poultry and farms in SDAs were significantly less likely to enter the scheme than remaining types (except ‘other’), whilst cereals, general cropping, mixed and lowland cattle and sheep farms were significantly more likely to enter. Small farms (less than 50ha) were less likely to enter than medium or large farms. Farms with a non-agricultural enterprise were more likely than those without, and fully or partly rented farms more likely than wholly owned farms, to enter the scheme, though again differences were not large. Previous scheme experience made no difference to ELS entry, but those that had been in a previous agri-environment scheme were more likely to consider the Higher Level Scheme (HLS) than those who had not.

Numbers of ELS agreements were highest in the South West the East Midlands and Yorkshire and Humberside, and lowest in the North-East and South East. Total numbers of OELS agreements were more strongly biased towards the South–West, virtually absent from the North-East, North-West and West Midlands regions. The largest farm type category (in absolute numbers) in the ELS was cereal farms, followed by general cropping, mixed, dairy and lowland cattle and sheep farms, although this pattern mirrors that for the total number of holdings by farm type. The pattern for OELS uptake was relatively similar, but there were proportionally fewer cereal farms and more dairy, mixed and lowland cattle and sheep farms. Proportionally more small farms and fewer large farms entered OELS, and they were more likely to be rented and to have had a previous agreement than those entering ELS.

Uptake of individual options was strongly skewed, with a small proportion being taken up in large numbers of agreements, and over half the options adopted by fewer than 5% of agreement holders. The most popular options among those entering ELS were hedge, ditch or hedge and ditch management, protection of infield trees in grassland,
field corner management on arable land, permanent grassland with low or very low inputs, and all four management plans. The pattern for OELS was broadly similar, but undersown spring cereals were favoured to a greater extent among OELS agreement holders.

Although these results give some indication of ELS uptake, caution is needed in interpreting early figures because of problems with the Rural Land Registry (RLR) which led to delays in the setting up of agreements. In particular, farms not previously in the IACS system (e.g. horticulture, specialist pigs and poultry) are less likely to have had their mapping completed and would therefore have been unable to enter the scheme immediately following its launch.

### 3.2.4 Environmental impacts

Clearly, the environmental impacts of the SPS will depend on how farms respond and particularly, the extent to which they restructure their farm businesses in response to farm income changes. A report by Lobley *et al* (2002) investigating the implication of change in structure in agricultural businesses found that the effects of previous restructuring on the environment included polarisation between intensively managed dairy farmers and extensive livestock businesses. It also found that increased diversification is associated with a reduction in land use intensity but also with less time for countryside management activities, and suggested that total job losses via restructuring are likely to be small. It found that traditional agricultural restructuring was still strongly associated with increasing intensity: agricultural restructurers are almost 2.5 times more likely to be intensifying than the sample average. Conversely, a large proportion of on-farm diversifiers were extensifying.

Previous research investigating the environmental implications of agricultural liberalisation (Potter *et al*, 1999) identified three principal types of environmental effect from restructuring:

- Short term, direct environmental consequences mostly associated with in-field changes to farming practice such as intensification, and change in cropping and grazing patterns.
- Medium term, indirect environmental consequences resulting from broader strategies of change such as changes associated with on and off farm diversification, agricultural integration and traditional agricultural restructuring (i.e. significant shifts in enterprise structure such as dairy expansion and specialisation, which would also bring about changes to infield farming practice).
- Longer term, delayed environmental consequences arising from decisions to leave farming precipitating movements of land into the hands of existing farmers, new entrants and residential farmers and other land holders. These longer-term changes are perhaps the most difficult to identify but the significance of lagged effects in agriculture should not be underestimated because structural adjustment tends to be postponed until the next generation.

In respect of the particular impacts of decoupling support, the most relevant study is that conducted by GFA-RACE and IEEP in 2004, for Defra. This report predicted that decoupling could result in the following pattern of farm restructuring:

- Continuing specialisation.
- Concentration of production in most productive regions (eg dairying in South West).
- Overall reduction in beef and lamb production.
Outdoor pig production could expand under certain circumstances.

- Farm amalgamations with a trend towards larger farms; also a trend towards larger dairy herds and higher yielding cows.
- Continuation of smaller dairy and stock farms through the development of added value products and local sales.
- Increase in the number of part-time or hobby farms as land is released following the restructuring of businesses.
- Increased use of contractors and/or the sharing of labour and machinery to reduce fixed costs.
- Removal of unprofitable/marginal land from production, with this land either being not managed at all or being used for amenity or other purposes.

GFA-RACE & IEEP (2003) consider the environmental impacts of these changes as both positive and negative. They summarise the trends as shown in the table below.

Table 3.2 Summary of anticipated environmental threats and opportunities from decoupling, in England

<table>
<thead>
<tr>
<th>Environmental opportunities</th>
<th>Environmental threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>A reduction in inputs, including artificial fertilisers and pesticides leading to improvements in water quality and biodiversity.</td>
<td>Specialisation and concentration in some sectors, especially cereals and dairying, leading to localised adverse impacts. Could include: increases in water pollution; greenhouse gas emissions; soil erosion, compaction and contamination; and increased levels of ammonia and acidification. There could also be loss and degradation of habitats with further declines in farmland biodiversity; and loss and degradation of landscape features such as hedgerows and damage to archaeological features.</td>
</tr>
<tr>
<td>An increase in fallow land leading to: a reduction in soil erosion, soil compaction and pollution of watercourses; the provision of habitats for farmland biodiversity; and a reduction in damage to archaeological features. The extent of these benefits depends on the management of fallow land. Some increase in heterogeneity of habitats if land is taken out of production or managed for conservation purposes.</td>
<td>Reductions in the labour force and an increase in contract farming leading to loss of countryside skills and management practices and loss of local knowledge and stewardship. Less diversity of crop and grazing patterns resulting in increased homogeneity of habitats with consequences for biodiversity and landscapes. Increased field sizes and loss of boundary features.</td>
</tr>
<tr>
<td>Reductions in livestock numbers that will promote a reduction in greenhouse gas emissions; improve air quality and reduce acidification by reducing ammonia emissions; reduce soil erosion, poaching of land and pollution of water courses by nitrates, slurry and sheep dip; reduce grazing pressure on important habitats and improve the condition of SSSIs, especially in the uplands, with benefits for biodiversity; and prevent damage to undergrazing or cessation of grazing leading to: a decline in condition of some SSSIs and other important wildlife sites; loss of landscape character; and a switch to alternative, possibly more damaging, land uses (eg some recreational activities). A reduction in suckler cow numbers in absolute and relative terms leading to greater difficulties in achieving environmentally sensitive cattle-based grazing regimes on some important</td>
<td></td>
</tr>
<tr>
<td>archaeological features</td>
<td>habitats and wildlife sites, including SSSIs. Note cattle numbers are likely to fall more steeply than sheep numbers.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>An increase in the incentive for farmers to enter land into agri-environment schemes and increased funding helping to: reduce impacts on soil, air and water; improve habitat management and reverse declines in farmland biodiversity; protect and manage landscape features such as hedgerows and protect archaeological remains. Also potentially increased incentive for the development of scrub and woodland subject to the development of supporting rules and adequate funding.</td>
<td>Reduced incentive to enter land into agri-environment schemes and woodland schemes due to insufficient payment rates leading to a theoretical loss of environmental benefits in the future.</td>
</tr>
<tr>
<td>The Single Farm Payment can be transferred or traded. There is uncertainty of the implications for the environment, in the potential transfer and trade of SFP entitlements.</td>
<td></td>
</tr>
</tbody>
</table>

Source: derived from text in GFA-RACE and IEEP (2004)

The study also noted likely diverse environmental impacts on part-time and hobby farms, depending on the land management practices employed by new owners. Lobley et al (2002) notes that although the assumption is often that farm diversification is benign, it can be associated with poor management (Little, 1998).

In its conclusions, the GFA-RACE & IEEP (2003) report stated that the proposal to decouple payments must be seen in a positive light but the negative impacts on the environment cannot be disregarded, particularly where they occur in areas of high environmental value. Some impacts, both positive and negative, seem likely to be confined to specific regions or localities.

### 3.3 Arable sector

#### 3.3.1 Impact on farm economics and short term operational impacts

Research by the National Farm Research Unit and Andersons Business Consultants (Food East news, 2003) illustrates the scale of change in enterprise profitability as a result of decoupling. It calculates that a typical combinable crops farm with wheat, oilseed rape and set-aside would be making an average gross margin of £200/acre (£494/ha) pre-reform, falling to a net return of £75/acre (£185/ha), when contract charges and fixed costs are deducted. After reforms the same farm would see its net return drop to -£15 acre (£-37/ha); however with SPS of £90/acre (£222/ha) the income position remains the same.

Using Farm Business Survey data for arable farms, Renwick and Hodge (2003) modelled long term marginal costs of farm production and identified the proportion of cereal farms that were capable of returning a profit in the absence of subsidy, across a range of different cost and price structures. The results of this are presented in Table 3.3. Thus, at 2003 cost levels and wheat prices, only 44% of cereal farms would be profitable without support. They would therefore expect 56% of cereal production to cease on decoupling, if farmers responded simply to this economic signal. However it is recognised that the average production cost per tonne masks a
range, meaning at least some apparently loss-making farms would actually be close to break-even. Thus with modest cost reductions and/or price rises, a much higher proportion of cropping becomes viable. These figures exclude rent and finance costs, which for some could be significant, pushing them into a loss situation. Renwick and Hodge (2003) estimated that East Midlands farms were on average expected to receive a net margin per hectare, in the absence of direct subsidy, of minus £13. A greater proportion of farms may be profitable on higher quality land and vice versa for low quality land. Larger numbers of farms are profitable in Agricultural Land Class grade 1-2 than other areas.

**Table 3.3 Impact of cost reductions and price changes on proportion of profitable farming in the UK**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Average Cost / tonne</th>
<th>£60</th>
<th>£70</th>
<th>£80</th>
</tr>
</thead>
<tbody>
<tr>
<td>At current cost (Excl. rent)</td>
<td>71</td>
<td>44</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>Reduction in costs of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 per cent</td>
<td>64</td>
<td>69</td>
<td>88</td>
<td>95</td>
</tr>
<tr>
<td>20 per cent</td>
<td>57</td>
<td>85</td>
<td>95</td>
<td>99</td>
</tr>
<tr>
<td>30 per cent</td>
<td>50</td>
<td>95</td>
<td>99</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Renwick and Hodge, 2003*

This study was updated in 2006 (RBU, 2006) using data from farm business survey and the special study of cereal production from the previous year, to examine the distribution of current profitability following decoupling and consider the impact of price changes and structural change upon profitability in the longer term. The study concluded that the impact of decoupling in the short term would be very weak – in terms of both profitability and production – for wheat.

The Andersons/NFRU report (Food East News, 2003) notes that EU underlying market support for cereals is likely to be further weakened by the Doha WTO round outcome; and that the end of export subsidies and further reductions in import tariffs and other controls will affect price, as will world demand/supply. OECD analysis (OECD-FAO, 2005) states that international wheat prices are expected to fall in real terms by around 11% over the next 10 years. Deloitte (2005) predicts that the average farm will face significant arable production losses unless there is a marked rise in commodity prices.

By contrast to these rather dramatic results, some European studies suggest minimal impact of decoupling on production in the arable sector. For example, the results of quantitative predictive modelling by OECD (2004) for Europe is shown in Table 3.4. For this study, 5 000 complete sets of factor substitution and supply elasticities were drawn for every crop and every country in the EU-15 and responses modelled for a range of scenarios. Table 3.4 summarizes the impact of the “maximum decoupling” scenario on land allocation, yields and extensification. The results are presented in terms of the average change and its standard deviation across all the stochastic simulations.
Table 3.4 Analysis of a maximum decoupling scenario: impact on area allocation, yield and extensification for the EU-15

<table>
<thead>
<tr>
<th></th>
<th>Wheat</th>
<th>Oilseed</th>
</tr>
</thead>
<tbody>
<tr>
<td>% change in area</td>
<td>-2.2</td>
<td>-2.8</td>
</tr>
<tr>
<td>% change in yield</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>% change in production</td>
<td>-0.3</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

Source: OECD, 2004

The EC has published an 'Impact Analysis' (CEC, 2003) using computer models which suggests that while crop areas may reduce a little, yields will rise, such that overall production will remain static and farm incomes will rise. The models predict that the area of rye will fall the most - by 21% in 2004/5, followed closely by the area of durum wheat, which is expected to fall by 11% by 2008/9. The soft wheat, barley and maize area is predicted to drop by between 0.8% and 1.9%. Overall cereal area would reduce by 2.6% or 900,000 ha. Oilseed area is forecast to slip by around 3%. It is expected that an increase in voluntary set-aside (0.7 m ha) and growth in the area of energy crops (0.9 m ha) will compensate for these reductions. The reduction in the total area of crops would take place in the more marginal areas and on low quality land, so the average EU yield would increase.

A number of studies have assessed the likely economic impact of decoupling on the UK arable sector in terms of changes in production levels and price, with varying results. The QUB analysis of the UK (Moss et al, 2002) estimated that decoupling would have a marginal impact on the main crop sectors (cereals and rapeseed). They argued that crop producers would show a limited response to decoupled payments since the facility to claim voluntary set-aside with respect to pre-existing arable area payments means they were already ‘decoupled’, to a certain extent, before 2005. Consequently, a predicted modest reduction in production results in a marginal price increase under their decoupling scenarios (relative to the baseline), with impacts greater in the rapeseed sector because this crop has been more dependent on area payments than cereals, in the past (Table 3.5).

Table 3.5 Arable: Percentage change from baseline (no decoupling), UK, 2010

<table>
<thead>
<tr>
<th>Decoupling scenarios</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK Soft wheat:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Price</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.3</td>
</tr>
<tr>
<td></td>
<td>+1.1</td>
<td>+0.8</td>
<td>+0.5</td>
</tr>
<tr>
<td>UK Barley:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Price</td>
<td>-0.9</td>
<td>-0.6</td>
<td>-0.4</td>
</tr>
<tr>
<td></td>
<td>+0.8</td>
<td>+0.6</td>
<td>+0.3</td>
</tr>
<tr>
<td>UK Rapeseed:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production Price</td>
<td>-2.8</td>
<td>-1.6</td>
<td>-0.5</td>
</tr>
<tr>
<td></td>
<td>+3.3</td>
<td>+2.3</td>
<td>+1.3</td>
</tr>
</tbody>
</table>

Scenario A – assumes there is no production response to the decoupled payment.
Scenario B – assumes a production response is attributable to 30 per cent of the decoupled payment.
Scenario C – assumes a production response is attributable to 60 per cent of the decoupled payment.

Source: Moss et al, 2002

Jones (2004a) also argued that the effects of decoupling on the combinable crop sector would be of a less fundamental nature than with beef and sheep, as subsidy is less closely tied to production. Like Moss et al (ibid), he suggested that in a sense the set-aside payment already offered the cereal farmer a decoupled payment not
linked to production – at least on 50% of the area (although it has only been since 2002 that the set-aside payment has been at the same level as the area payment for cereals and oilseeds).

Commentators (Defra, 2005c; Andersons, 2005) have argued that outside influences would be most significant in farmers’ restructuring and cropping decisions:

- there would be probably some move out of cereals but this will be dictated more by grain prices than CAP reform.
- sterling currency fluctuations would have a big effect on what farmers grew, on farmers’ outlook.
- farmer response, and the impact of decoupling, will depend very much on the price; if prices are low, there will be a completely different reaction than if prices are high.

Andersons (2005) state ‘there is little doubt that at current crop prices the race is on for further advances in productivity to enable UK combinable crop farmers to compete on the global market. Research⁵ suggests that decoupling will encourage arable farmers to cut costs and that wheat production cost savings of £5 to £10 per tonne might be possible’. The following options are thought to be open to arable farmers:

- Take land out of production and use the amenity value of land more fruitfully
- Have an outside contractor and annually make the choice to ‘grow or not to grow’
- Have a full time contractor to maintain the land, with the owner keeping the SFP and the entrepreneur taking the risk and the profit
- Look to expand the farm acreage by profiting from inexpensive rents from those disinclined to farm.

They also predict ‘A greater concentration on winter wheat and a reduction in break crops (including peas and beans despite the coupled supplementary payment). A retreat of production from marginal land including that which is steep, in small and awkwardly shaped fields, on poor draining land and in high rainfall areas. This retreat is partly as a result of decoupling and partly as a result of cross-compliance conditions such those governing tillage on slopes. However we may expect to see production advance into areas which are in rotational grass (possibly currently in dairying) but are otherwise suitable for cropping, and possibly part of the sugar beet area once sugar sector specific support is removed.’

Jones (2004a) also considers post-MTR margins might make farming the low return parts of farms and even parts of fields not worthwhile, especially if prices are low. These include poorly drained areas; areas exposed to vermin damage; off lying land especially in small parcels; difficult land to work – obstacles, slopes, small and irregular fields; land with recurrent weed problems, mosaic virus etc., difficult soils – blow away sand, heavy clay; and headlands of fields, especially alongside water courses. He believes there is already a trend towards taking some of this land out of production or putting it in grass or set-aside, but that the process may go further.

In terms of anticipated farm cropping practice changes GFA-RACE & IEEP (2003) and GFA-RACE (2004) list the following.

- Fertiliser applications being even more closely targeted to crop requirements.

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- Manure/slurry being tested (where this is cost effective) to ensure the nutrient value is fully accounted for.
- Lower fertiliser applications due to stock extensification.
- Pesticides being even more closely targeted to minimise costs and environmental effects.
- Simplified rotations possibly leading to increased reliance on the chemical control of pests and diseases, using older, cheaper and less selective chemicals.
- Cultivation costs being reduced where possible, for example through minimum tillage systems or similar with larger, more specialised machinery and fewer passes.
- Subsoiling, mole ploughing, underdrain maintenance and new drainage will be maintained but very targeted.

The extent of fallow/set-aside land

Presentations at an Andersons Seminar (Andersons, 2006b) predicted wheat production may fall as marginal land comes out of production, but there will be more domestic use of wheat as well, with the Cerestar plant at Manchester for sweeteners and Wessex grain’s bioethanol plant in Wiltshire using wheat as raw material. However, a large amount of UK wheat is still used in animal feeds so anticipated changes in the structure of the UK livestock industry might reduce current usage levels.

Market pressures are thought likely to lead many farmers to maximise their voluntary set aside – i.e. land left fallow and managed under GAEC condition 12. Analysis in ‘Arable Farming’ (16/12/03) shows that yield would have to exceed 9t/ha at £80/t or 12t/ha at £60/t to make it worth growing wheat compared to set aside (current average yield is 8t/ha)\(^6\). However many farmers will find it impossible to reduce fixed costs to the extent required for a high proportion of set aside, plus they enjoy farming and want to produce food. GAEC condition 12 states that farmers must establish and maintain a cover crop on fallow land, making fallow not an entirely cost-free option (although this can be done by natural regeneration and green cover is no longer required by 1 March if the land is to be returned to cropping in the following year). Thus the level of fallow may well not differ radically from that seen in recent years. However, the situation is different in the dairy sector, affected by set-aside for the first time as a result of the reforms. According to Farmers Guardian (Jan 27 2006) arable farmers wishing to put down more than the required area of set aside will find dairy farmers willing to pay them to take on their set aside entitlement and responsibilities.

Many commentators emphasise that businesses will take time to adjust. Andersons (2005) states that ‘crop areas are unlikely to plummet in the UK in the near future. Generally strong balance sheets enable farmers to take a long view and allow time to adjust to the new economics of cropping’. Participants at the Defra seminar (2005c) agreed, saying ‘There would be certainly be a ‘wait and see’ approach, information was a little bit late this year for people to fully take it on board and it would be autumn of next year when it will have a much bigger impact. For some, it would be business as usual until retirement.’

Research by Andersons (Farmers Weekly, 15 June 2005) suggests that it may not be sensible for growers to cut back production and rely on decoupled payments as, although some costs will fall or disappear, many businesses will face residual fixed

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\(^6\) assuming the cost of running the farm in set aside matches the decoupled payments and the growing cost of wheat is £720/ha
costs that remain high enough to undermine profits. They suggest that even cutting back by not cropping poor corners or less productive fields is unlikely to help profits unless machinery or labour costs are also cut. "It’s surprising how low the breakeven yield is likely to be in these poorer areas, it’s probably worth growing even if you are only getting 5t/ha (2t/acre)". Also, some agronomists caution against a shift to wheat-fallow rotations as ‘analysis shows that such a rotation halves gross margins unless accompanied by reduction in fixed costs’ (FW July1-7 2005).

A CPM report (2005) states that with spring barley only around 70t/ha it looks like a number of farmers in England will abandon the crop, many will increase winter wheat drilling and use alternative break crops like spring beans to maximise their first wheat. It cites a farmer in the Scottish borders who abandoned spring barley in favour of fallow because he had variable land and yield, making it worth putting 25% down to fallow (or cover crops/ beans), and first wheat on the rest. This avoided a £11,000 shortfall in net margin if he had grown crops on all the land. However the article suggests that a majority of farmers will be forced to continue cropping 90% of their land so their fixed costs can be spread as widely as possible. It claims that most growers are continuing with a similar level of winter sowings in 2005 as in other years (see section 3.6 for figures from the Defra December 2005 survey on this issue).

Andersons (2006a) warns against hasty decision of putting land into fallow because soil slumps and land structure deteriorates as does capital value; prices are fickle – particularly for OSR; fixed costs cannot be unfixed if land is not productive, and the negative margin needs to be significant before it is correct not to crop.

There is apparently no sign of Deloitte's (2005) arable or root crops farmers cutting back on production or getting out, because a good autumn and forward prices of wheat >70/t and 150/t for OSR were apparently ‘enough to persuade arable doubters to sow again’.

**Enhanced energy cropping prospects**

Farmers are able to use their compulsory set-aside for growing non-food crops and still retain SPS. With increasing interest, research and development and the potential for oil prices to continue to rise, it is proposed by some that the area of such crops will slowly increase over time at the expense of permanent or rotational set-aside managed for environmental benefit. This trend may increase if a higher rate of compulsory set aside were introduced in future years (for example, if production increased so much in the New Member States that large intervention stocks accumulated). Defra seminar participants (Defra, 2005c) considered that there was already some interest in using set aside land for alternative crops like biofuels, although many people are waiting to see if energy crops and other alternative crops prove more viable now that oil prices have risen significantly. Overall, increases in energy crops are expected but many are skeptical about the scale and duration of this trend.

Renwick and Hodge (2003) calculated that energy crops would have to produce the equivalent of a gross margin of £150-200/ha before they could be competitive at the prices prevailing at that time. It is anticipated that there will be little or no crop premium for the supply of crop feedstocks to biofuel markets, as feedstock represents a significant part of the cost of biofuel production. Therefore, some have commented that there is unlikely to be sufficient financial incentive to encourage significant shifts in current rotations. Profitability for growers will depend on optimising appropriate inputs to maintain yield output where returns are based on £/tonne of production. However, there could be limited expansion in current areas of wheat and oilseed rape. (HGCA, 2005). The HGCA view has been that under current market conditions it is most likely that a proportion of the conventional crop will be
sold speculatively for fuel use where the price is favourable, with feedstocks supplemented by vegetable oil, oilseed, cereal or biofuel imports. While it is not clear what, if any, expansion in feedstock crop area is likely to be stimulated by future additional support measures or fuel price rises, any expansion of the Oilseed Rape (OSR) area is most likely to occur in areas already dominated by OSR. Grain for ethanol production will most likely be derived from diversion of existing crops to industrial production. HGCA does not anticipate that there would be significant use of set-aside for cereal biofuel production, due to rotational constraints and the better agronomic opportunities offered by using this for oilseed rape for bioethanol. The opportunity for expansion of the cereal acreage is limited by its existing dominance in UK arable rotations.

Under government commitments to increase the use of renewables, by 2010/11 all fuel used in UK must contain 5% biofuels. If all of this were bioethanol, it would require 9.5mt wheat or >1m ha; if all were biodiesel this would require 6.6mt OSR or 1.8m ha (Andersons, 2006b). These levels of supply cannot be met by UK producers without major impacts on supply to other markets. Table 3.6 shows the anticipated demand of some facilities already constructed or under construction.

Table 3.6 Some facilities in the UK and their expected demand for biofuels

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Location</th>
<th>Type</th>
<th>Demand</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Sugar supplied to Green Energy</td>
<td>Wissington</td>
<td>Bioethanol</td>
<td>Non quota C⁷ beet</td>
<td>70m litres /yr</td>
</tr>
<tr>
<td>Green Fields Spirits</td>
<td>Hendridge</td>
<td>Grain</td>
<td>330,000t wheat through contracts with Wessex Grain from Dorset, Somerset and Wilts</td>
<td>100,000t fuel</td>
</tr>
<tr>
<td>Greenenergy</td>
<td>Immingham</td>
<td>Biodiesel</td>
<td>Contracts available for 2006 for 160,000t OSR (10% UK crop) for any 00⁸ variety at market price. Farmers asked to sign up to a set of Biodiversity Guidelines</td>
<td>100,000t</td>
</tr>
</tbody>
</table>

Andersons also make reference (2006b) to new plants in Spain and France also potentially sourcing raw materials from the UK, in the next few years.

An aid of €45 per hectare for land used to produce energy crops was agreed under the 2003 CAP reforms and has been available from 2004, but on set-aside land, only short rotation coppice (SRC) and miscanthus are eligible for this aid). In addition, establishment grants for SRC and miscanthus have been available since 2006 under the England Rural Development Programme.⁹

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⁷ C means beet which is produced over the amount allowed by the quota which gets no price support, under the current EU sugar regime

⁸ 00 is a specific group of oilseed rape varieties distinguished by particular genetic traits

⁹ (Defra http://www.defra.gov.uk/farm/capreform/background/pdf/agreement-summary.pdf)
GFA-RACE & IEEP (2003) consider that non-food crops, including oilseeds under contract, will become relatively more attractive in future. Some commentators are more confident than others about the future of these crops, for instance Guy Asker of Saxon Agriculture quoted in Fwi (12/11/2004) said ‘non food production is central to the future of UK agriculture under the SFP’. Attendees at the Defra Seminar (2004) thought there would be limited opportunities for switching crops as farmers in the UK cannot grow the full range of crops that are available within Europe, also they have big investments in specialist machinery and so will not find it easy to switch.

Other reports suggest increased interest in growing novel crops of various kinds. Linseed (Arable Farming 16/1/2006) apparently ‘has a poor reputation because of farmers’ bad experiences’. The area of linseed had been stable in the UK for some time (c.30,000 ha) because it is a difficult crop to grow but ‘with the likelihood of increased OSR, a non cereal, non brassica crop would be useful’. It is also a low input crop with minimal fertiliser requirements. FW (2/9/05) ‘Time to widen the crop search’, reported a revival in linseed in spring 2005 – the area planted has been doubled. Prices are improving, and it can be grown for industrial use on set aside. Also, Hemp contracts for 2006 for fibre not on set aside are available for £100/t of fibre. Pharmaceutical contracts are available for borage, echium and camelina (not on set aside) crambe and hemp seed and fibre (which can be grown on set aside).

The reforms mean that for the first time, unsupported sectors such as horticulture will benefit from SPS, although on newly registered land only the area element of the payment can be claimed, so support will rise slowly over time. There was concern that horticulturists would suffer adverse competition as the high subsidies paid for formerly IACS-eligible arable land could have an impact on the marketplace in the transitional period. As a result of this concern, within the legislation there is a list of crops - (soft) fruit, vegetables, and potatoes (also known as FVP crops). Under the regional payment system in England, land being used to grow these crops is able to trigger SPS payments, but only if the farmer has been issued with special entitlements, called FVP “authorisations”. The aim of this measure is to minimise the adverse competition effect mentioned above, by limiting the area of SPS-eligible land on which these kinds of crop can be grown.10 The long-term future of this measure is uncertain, but in its absence a modest expansion of the horticultural area might otherwise have been anticipated. Horticulture is currently constrained by overseas competition as well as these authorisation constraints. The vegetable area in 2005 was the lowest on record, probably due to the FVP entitlement process. Pressure from imported potatoes is anticipated to limit cropping in UK (Andersons Seminar, 2006). The presumption in the farming press is that root crops and vegetables will continue to be grown as part of a rotation in general cropping areas, with these crops being relatively more attractive than previously, but crop area dependent on market demand and physical factors such as water availability.

The English Wine Producers Association predicts that the amount of land used for viticulture will increase by 1,000 acres (404.7 ha) by 2010, accelerating a growth that has already seen a 10% rise since 2000 (Sunday Telegraph May 21, 2006). In some part, this could be stimulated by the CAP reform process due to lower returns to other types of production but as vineyards do not qualify for SPS, this impact is likely to be marginal.

10 Without such a measure, farmers with former AAPS eligible land could currently grow FVP crops on land which is already receiving high levels of SFP, while those whose established FVP crops were only newly registered for SFP would only be receiving the small area-based element of the decoupled payment: this would clearly have put them at a competitive disadvantage. The area element of SFP will rise over time to 2012, by which time the level of payment on former AAPS-eligible land will be the same as on newly-registered land, so the problem should disappear.
Sugar – in decline

Reform of the sugar regime and the likely adoption by British Sugar (BS) of a post-reform outgoers' scheme, as well as factory closures and contract reorganisation, will prompt significant change with many areas leaving sugar production. However, some believe that in many cases sugar beet will remain the most profitable option for a break crop (Andersons, 2006a)\(^\text{11}\). As detailed in table 6, BS has potential to make biofuel from sugar at its Wissington factory (FW 20/1/06). However sugar is not eligible for energy crops aid, and the significance of this particular development is uncertain.

Changing crop areas

The total area sown to cereals over the last season shows a slight decrease according to the 2005 HGCA Planting Survey\(^\text{12}\). The results indicate that wheat and barley plantings are slightly down on last year, although there are increases in both rapeseed planting and the area under set-aside. The survey results show a total wheat area of 1.93M ha and a total barley area of 0.91M ha, 3% and 8% lower than 2004, respectively. There is an increase in the planted area of oilseed rape, up 6% to 0.53M ha. The area under set-aside also rose, up 14% to 0.59M ha. Nearly all regions in England reported a fall in the planted wheat area, with only the West Midlands recording a rise. Across key English regions wheat plantings are 4% lower for eastern region, 6% lower for East Midlands and 3% lower for Yorkshire. A mixed picture was also seen for spring barley, with the majority of the regions reporting a decline and only four regions in England showing a rise. The total English area is forecast to drop by 1% on 2004. Winter barley plantings are forecast to be 0.37Mha representing a fall of 43,000 ha, or 10% on 2004. ‘Strategic Grains’ predicts a 2006 harvest area largely unchanged despite SPS, and output up 5%. For 2007 a bigger effect of SPS is expected and higher home usage.

Andersons reported in a seminar in early 2006 (Andersons, 2006b) that no decline in cropped area was expected (Table 3.7): in their view, cropping will depend on price rather than decoupling. The proportion of Maize will increase because of livestock demand and that of OSR will increase but not as much as many have forecast because, despite biofuel demand, the oilseed market is already globally open. OSR yields have not increased since the 80s, this is the same for beans and peas, and Andersons suggests that farmers have reached their maximum area of OSR with regard to its role in the rotation. For sugar, Andersons (2006b) reported that that indications for 2005 showed another large crop which will prompt thoughts about reducing area in 2006. For potatoes there has been a reduction in growers to around 3,200 and a continued concentration and consolidation of the potato industry because of lack of demand.

\(^{11}\)http://www.fwi.co.uk/Articles/2005/10/31/90357/Beet+yield+challenge+key+to+UK+crop's+success.html

\(^{12}\) Completed questionnaire forms from 3,000 producers across Great Britain were analysed to calculate the survey results giving a response rate of 60%.
Table 3.7 UK Crop Area forecasts

<table>
<thead>
<tr>
<th></th>
<th>'000 ha</th>
<th>Av 1999/03</th>
<th>2006</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td></td>
<td>3,153</td>
<td>2,835</td>
<td>2,755</td>
</tr>
<tr>
<td>Of which winter wheat</td>
<td></td>
<td>1,853</td>
<td>1,780</td>
<td>1,760</td>
</tr>
<tr>
<td>Maize</td>
<td>116</td>
<td>125</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>OSR</td>
<td>391</td>
<td>510</td>
<td>510</td>
<td></td>
</tr>
<tr>
<td>Linseed/proteins</td>
<td>305</td>
<td>290</td>
<td>290</td>
<td></td>
</tr>
<tr>
<td>Set aside</td>
<td>646</td>
<td>715</td>
<td>759</td>
<td></td>
</tr>
<tr>
<td>Of which cropped</td>
<td>78</td>
<td>90</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>TOTAL AAPS crops</td>
<td>4,611</td>
<td>4,475</td>
<td>4,439</td>
<td></td>
</tr>
<tr>
<td>Sugar beet</td>
<td>172</td>
<td>134</td>
<td>110</td>
<td></td>
</tr>
<tr>
<td>Vegetables / other</td>
<td>207</td>
<td>246</td>
<td>266</td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>165</td>
<td>140</td>
<td>140</td>
<td></td>
</tr>
<tr>
<td>Fruit and nursery</td>
<td>54</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Grass (&lt;5 years)</td>
<td>1,220</td>
<td>1,250</td>
<td>1,290</td>
<td></td>
</tr>
<tr>
<td>Grass (&gt;5 years)</td>
<td>5,474</td>
<td>5,750</td>
<td>5,750</td>
<td></td>
</tr>
<tr>
<td>Total excluding woods, rough grazing</td>
<td>11,903</td>
<td>12,045</td>
<td>12,045</td>
<td></td>
</tr>
</tbody>
</table>

Source: Andersons, 2006b

3.3.2. Restructuring Implications

Renwick and Hodge (2003)\textsuperscript{13} suggested that, although short term changes would be minimal, in the long term a significant reduction in arable production is anticipated. In the short term, farm incomes are generally higher with decoupled payments, particularly for the least profitable farms. In the long run however, as farmers consider investment decisions, cost-margin analysis suggests decoupling will result in a significant reduction in cereal cropping and output. Under ‘plausible’ price and restructuring assumptions (prices remain at £60-70/tonne and there are cost reductions of 10-15% per annum) they estimated that wheat production could be expected to fall by between 10-30% over the long term. The updated study (RBU, 2006) suggested that in the longer term for each £1 fall in wheat price between £80 and £60 per tonne, an additional 2.5 per cent of production becomes unprofitable, and this will generally tend to be on lower yielding land which would go out of production. However, if farms were able to cut costs through adopting the most efficient cost structures, over time (for example through contract farming by the most efficient operators), this could significantly increase their ability to make profits, such that at 2004 prices (£67.4/tonne for feed wheat), all but 5 per cent of production would be profitable. This would imply a much lower decrease in overall output than the figures estimated by the earlier studies.

However, even without decoupling it has been claimed that market pressures are likely to lead many farmers to maximise their fallowed area. A report in Farmers

\textsuperscript{13} Two methods were used. Farm-type programming modelling allows assessment of income effects across arable enterprises but ignores price and restructuring impacts on production, as well as understating the performance of the most efficient farms. This is likely to overestimate the long-run impacts of decoupling on production. Survey-data analysis of costs and profitability in the wheat sector, provides a broader framework for assessment, which seeks to allow, in a relatively broadbrush way, for both price changes and supply responses through restructuring.
Weekly (28 April 2006) put the arguments in the following terms: ‘Some farmers are rethinking their rotations and including a fallow. Those who have acquired more land find they can run the new operation without further investment in men or machinery. The fallow land eases operations planning because a large amount of land can already be cultivated before harvest. The spread of manure is easier and wheat yield increase is anticipated. Fallow leaves more N in the soil and based upon Rothamstead figures, the fallow contribution is worth £24/ha alone. However, now that cover crops are not required on GAEC 12 land, fallow may be cultivated and left bare and there is concern that on light soils this land will be at risk from soil erosion’.

The National Farm Research Unit and Andersons report (Food East news, 2003) predicts a large decline (25%) in area sown to crops (from 9m acres (3.64m ha) in 2005 to 7m (2.83m ha) in 2007), a drop (30%) in the number of active combinable crop producers (from 53,400 in 2005 to 33,000 in 2007), with a corresponding increase in the size of arable units. They suggest that those exiting the industry would be small farmers on grade 4-5 land not capable of producing 3.25t/acre (8t/ha). However, an Andersons spokesman suggested the structural changes would take a long time to work through the system since ‘farmers are not snappy decision makers’ and cultural and social issues such as family and age will all buffer against immediate change. The report notes the sensitivity of predictions to future price and policy changes. It anticipates that with future deductions, the SPS could more than halve by 2012. If so, an English combinable crop farmer receiving an AAPS payment in 2004 of £240 per hectare might find it has declined in real terms to £115 per hectare by 2012. This would clearly have a much greater impact upon farm income, all else being equal, leading to likely restructuring.

A report for EEDA (Andersons, 2003) predicted a large cut in income for arable farmers in the Eastern region. It calculated that average farm businesses across the region would lose 16% or £48m of support by 2012. There are concerns that modulation would hit farmers in the East hard – in this study, modulation was predicted to reach 19% by the end of the period.

Regional yield data suggest that output reductions are most likely to occur in the north and south west of England (GFA-RACE, 2004), and hill and upland areas are likely to be hit hardest (Cumulus, 2005). In these areas, it is considered that most land removed from arable cropping is likely to revert to productive grassland to support developing livestock enterprises. Remaining arable cropping is likely to be simplified with more cereals rotated with grass/forage crops, in some cases linked to ELS arable options.

Greater use of contractors is anticipated (Defra, 2005c; GFA-RACE & IEEP, 2003) also a tendency towards more contract farming. In the Lobley et al (2002) study on restructuring, contract farming was thought likely to grow with farm restructuring: this would continue an already established trend in the sector.

A study by Ramsden (2003) on East Midlands cereal farms predicted that in the long run, cropping would cease on all representative farm types except general cropping farms (where the returns from root crops were sufficient to maintain production). In every scenario run by the model they used (Farm-Adapt) all farms were predicted to revert land to permanent set-aside. However it is expected that the aggregate effect of this on a large scale would be for a positive impact on market prices, so that a proportion of farms would remain in production.

A study on the likely impact of CAP reform for East of England region (Andersons, 2003) said “Potential variation in a number of factors makes it difficult to accurately predict future cereal production in the region. At the one extreme if prices remain at current levels (around £60 per tonne) it will result in a high proportion of cereal enterprises being unprofitable and as a result, if farmers genuinely decouple their...
SPS, they will cease production. In practice it is likely that the higher yields in the east of the region, coupled with a pursuit of cost reduction and land moving to more efficient producers will reduce the potential exodus. At most, taking marginal land out of production, it is expected that the reduction could be 20%. Cereal production is likely to centre on Lincolnshire and Nottinghamshire and with it an increase in specialist wheat production, at the expense of lower quality / lower value cereal and legume crops, using grass or OSR as a break”.

The general predictions for the arable sector are that there will be a long term decline in the level of production and area of land cropped. Efficient farms will expand and there will be wider use of alternative farming arrangements. Specialisation and simplification of cropping systems will result, with a move to larger areas of winter wheat, increased areas of fallow, reduced input levels and reductions in fixed labour costs (GFA-RACE & IEEP 2003). Participants at a Defra seminar (Defra, 2005c) suggested that cropping land might be given up, but that it would often be taken up by a neighbour instead.

Economic analysis (GFA-RACE & IEEP 2003; Defra, 2003) suggests that the shift in the basis of the single payment scheme will have an important bearing on future impacts. With a single flat-rate area payment in 2013, cereal producers will be relative ‘losers’, when compared to a SFP based purely on historic payments. Cereal growers are also likely to incur the greatest decrease in income due to compulsory and ‘voluntary’ (UK-levied) modulation because these are the farms whose direct subsidy payments make up a greater proportion of their income (GFA-RACE & IEEP 2003). Thus sources (GFA-RACE & IEEP 2003; UC 2003) anticipate that the transition in payments will lead to:

- an increase in the trend towards simplified arable systems with a move to larger areas of winter wheat, with oil seed rape as the preferred break crop, where profitable.
- reduced input levels,
- reductions in fixed labour costs,
- a switch from break crops towards cereals,
- the removal of more land from arable cropping into permanent or temporary “fallow”, some removal of marginal areas and restructuring of fields, and
- small reductions at the margins, as farmers do not try quite so hard to use total field areas.

However Jones (2004a) considers that the arable sector may benefit from land being taken out of livestock production and moving into arable. It will not be possible to plough up permanent pasture, but rotational grass formerly used for dairying or beef and sheep might start to be used for cereal farming, or just be cropped more frequently within a mixed farming system, where stock and crops move around the farm, year on year. GFA-RACE & IEEP (2003) consider that there will be more variable land use between arable crops and grass, although the extent of this will depend upon a range of factors including farmer attitude, farm circumstances and enterprise/infrastructure economics. Farmers Weekly (2 September 2005) was less convinced, saying that growing cereals on livestock units may guarantee straw and grains but low prices and rising costs mean this should be carefully assessed. ‘Many farms would be better off extending grazing over the arable land, increasing sward clover content, reducing N use and buying in cereal and straw’.

Others have speculated about a potential for former crop land to move into livestock production. Andersons predict that grassland and permanent pasture areas will increase, on arable farms. If land of low fertility becomes available it may be used for
extensive livestock. If a farmer fallows and the land is fenced, he may consider going into sheep (Andersons seminar, 2006b).

The study on implications for the East Midlands (NFU and EFFP, 2005) suggested “dramatic change in the structure of farming in the East Midlands is not expected, especially in the short term. In the longer term, farming in the East Midlands, like the rest of the UK, is vulnerable and long term losses will not be sustainable, especially if the amount delivered through the Single Farm Payment starts to decline in absolute terms. The likely response to CAP reform in the East Midlands is summarised as:

- an overall decline in cereals grown in the region but this will be more marked in the West, with production levels broadly similar in the East
- an increase in specialist wheat production, at the expense of lower quality / lower value cereal and legume crops, using grass or OSR as a break, especially in the Eastern Counties
- a fall in feed barley production
- increase in voluntary set-aside of around 15%, especially in the Western Counties
- intensification of extensive grass-fed beef systems on lowland grass in the West;
- a reduction of full-time labour units of around 10%
- long term fall of about 10% of beef numbers
- some substitution of lowland beef for sheep in the West.

The report also describes current trends: ‘expansion of arable acreage and joint ventures have seen some farm units merge, to optimise machinery use and efficiency. Dealers remark how almost every trend to "kit up" has started in this region with the adoption of wider spray widths and use of tracked power units being just two, diverse examples’ (Farmers Weekly, 2 February 2006). Apparently the east is the region where previous national trends to buy machinery have started, suggesting that Defra should look to the east to see how farmers now deal with the need for more efficient arable farming and machinery use.

### 3.3.3 Implications for Agri-environment schemes

It is widely anticipated that more land in arable areas will be put into ELS following decoupling, but uptake of AES in arable areas is currently low: at present the East of England region only secures 8% of national funding for Agri-Environment Schemes. Early figures support these predictions of ELS growth (CSL, 2006).

There is some evidence that agronomists in arable areas are changing their focus from providing technical information and product advice towards environmental stewardship, according to an article in FW about Frontier Agriculture. "The two areas will run in parallel," said the firm’s Edward Downing. "Farmers will still be cropping high yielding land, but on the less productive areas they should be farming wildlife instead." Frontier is apparently training all its agronomists to assist with environmental issues as well as product advice (Farmers Weekly, 13 January 2006). This report would tend to suggest a significant increase in land entered into AES in the near future, in arable areas.
3.3.4 Environmental impacts

GFA-RACE & IEEP (2003) suggest that overall, the reform proposals are likely to bring some positive benefits to the environment in arable areas, predominantly in the east of the country. Reductions in inputs and an increase in fallow land as a result of decoupling should lead to positive environmental impacts including:

- an increase in habitats for arable weeds and a range of vertebrate and invertebrate species, especially overwintering birds (fallow);
- an increase in semi-natural areas and ecotones (transition areas between two distinct, but adjoining, ecological communities); for example woody vegetation on field and woodland margins;
- a decrease in soil erosion and soil nutrients;
- an improvement in water quality, and reduced flood risk; and
- a reduction in CO\textsubscript{2} emissions due to carbon sequestration and reduced fossil fuel use.\textsuperscript{14}

However they note that positive effects on biodiversity and landscapes will largely depend on the management of non-cropped areas, rather than an increase in such areas per se. At the same time, negative impacts on landscapes and the cultural heritage of arable areas are also thought likely in some circumstances (GFA-RACE & IEEP, 2003). These could include:

- less diversity of habitats due to simplified cropping systems;
- decline in habitat quality e.g. hedgerows if inappropriately managed;
- loss of biodiversity; a decrease in water quality; reduction in landscape diversity as larger blocks of land are managed in a uniform manner.

- of particular concern include potential negative impacts on biodiversity - such as farmland birds and rare arable plants – where production intensifies and rotational set-aside declines. These negative effects are likely to occur over small to medium sized areas at regional level but could be of high impact where they do occur.

Lobley et al (2002) found that specialisation and simplification of farming systems following restructuring in the Fakenham area was associated with a simplification of farmland mosaics, resulting in larger monoculture blocks and a consequent loss of grassland niches for a range of species. Anticipated growth in the use of contractors brings with it concerns over the 'level of care' applied to land management. The concentration of management into fewer and fewer hands was thought likely to promote greater landscape uniformity in an already uniform landscape.

GFA-RACE & IEEP (2003) consider it unlikely that cross compliance will offer a solution to any negative environmental problems and agri-environment schemes may not be financially attractive on those farms where financial problems are likely to arise. However these comments were made prior to the full details of GAEC being published. Cross compliance may have a positive environmental impact in respect of soil conservation, in high risk situations such as sugar beet or cropping on steep ground (GFA-RACE, 2004).

There was a concern that orchards would be grubbed up (removed) in 2005, as farmers attempted to maximise the land eligible for the SPS (letter by Sustain to Defra, March 2004). However, perhaps because Defra eventually chose a relatively

\textsuperscript{14} Note: Impacts of the anticipated reduced input use on GHGs are less certain because the release of nutrients in gaseous form depends upon a range of management practices and local environmental conditions.
broad definition of those ‘traditional’ orchards which could qualify for SPS, no
evidence has emerged that this has indeed occurred.

GFA-RACE (2004) analysed the impact of farm restructuring on pollutants and
consider that changes in farming practice will help to reduce levels of N and P in
ground and surface waters. They judged that these reductions could be significant in
many parts of the country, as farmers are likely to be much more focused on
reducing input costs and targeting N and P use to crop requirements. However, some
increases in N and P were expected, probably on a localised basis and within
specific catchments, with potential increases in root cropping in East Anglia, East
Midlands, South East and South West regions. Siltation levels are thought likely to
reduce overall as a result of a smaller cropped area, but with a greater reliance on
contractors and reductions in farm labour potentially encouraging inappropriate
management practices, there could be a significant risk of siltation in those areas that
remain in crops.

Reductions in pesticide use and more targeted use of pesticides should result in
reductions in pesticide levels in ground and surface waters (GFA-RACE, 2004).
Reductions are especially anticipated in the South East, East Midlands, East and
Yorkshire and Humberside regions. The use of cheaper, less selective chemicals
may however present problems for biodiversity.

HGCA (2005) states ‘At current grain prices and in light of future uncertainty over
returns, all cereal and oilseed rape growers are scrutinising the value of crop inputs
to justify and optimise their use which will minimise potential adverse environmental
impacts. In addition, many negative effects of cropping can be moderated or
mitigated by adopting different management practices, either on a whole field basis
(e.g. through Integrated Crop Management and sustainable farming techniques or
precision application of inputs) and/or through measures targeted at particular field
crops (e.g. spring cropping to provide overwinter stubbles) or field margins (e.g. agri-
environment schemes) to support biodiversity in farmland landscapes. Therefore,
there is potential to significantly influence the environmental footprint of UK cereals
and oilseed crops.’

On pesticides in particular, in the period 1994 to 2004 there has been an increase in
area treated of 42% but a decrease in weight of active ingredient applied, of 4%. This
implies that more land is being used to grow crops treated with pesticides, but that
the average dosage per hectare has fallen significantly, or farmers have switched to
newer products which work as effectively with lower weights of active ingredient.
Despite an increase in the average number of sprays and the number of products
available, the weight of active ingredient applied has fallen over the last 10 years due
to a move to use products which are more active at lower doses and reduced rates
summarised as follows. Organochlorine insecticides were not recorded in 2004,
these are high-dose substances which have been phased out. Organophosphate
insecticides, which are similar, declined in area by 78%. Conversely, applications of
pyrethroids (which are used at lower rates) increased almost 300% since 1994. The
use of the desiccant sulphuric acid declined by 32%, with a decrease of 21% in
weight of active substance applied. Conversely, fungicide use increased by 56% (in
hectareage), but the weight applied increased by only 14%, reflecting lower dose
applications in 2004 compared to 1994. The area treated with herbicides increased
by 44% but the weight applied increased by only 25%. Much of this pattern is due to
increased use of sulfonylurea herbicides (applied at lower rates), replacing older
molecules, for example mecoprop, which had much higher recommended rates. The
use of growth regulators increased 54% by area, 15% by weight, molluscide usage
decreased 32% by area, 37% by weight, and there was little difference in nematocide
usage by area, although a 3-fold increase in weight applied. This reflects a significant increase in use of 1,3-dichloropropene as the favoured nematicide, now, which is a higher rate substance. Finally, the number of products used, and therefore the degree of tank mixing, increased from an average of 7 products per crop in 1994 to almost eleven per crop in 2004. Increases in maize production in dairy farming regions – South West, North West and West Midlands in particular – may underlie increases in the use of some pesticides, and hence greater pollution risk in some catchments in these regions.

In sum, the figures do not appear to indicate reduced pesticide usage prior to CAP reform, but more a gradual evolution of the types used, combined with an expanded area of land upon which they are applied. Unfortunately there is very little more recent data from which to check whether CAP reforms are now affecting pesticide usage decisions, but it seems likely that these pre-existing trends will continue. The Pesticides Forum 2005 report of indicators reflecting the impacts of pesticide use reports some data for winter wheat (an useful indicator as this crop accounts for 45% of the UK cropped area and thus a significant proportion of pesticide use) suggests that the background level of use has increased in recent years (since 2002), following a perceived requirement for increased inputs to counter the development of herbicide and fungicide resistance problems.

However, this report also gives some indications that the levels of pesticide contamination in water have been decreasing for a number of years prior to the CAP reforms. Data for the level of pesticide contamination of surface freshwaters is available for 1998–2004. For 2003, there was an 18\%\textsuperscript{15} reduction in samples over 0.1\(\mu\)g/l, compared with the mean for 1998-2002 (using improved methodology). For 2004, this drop was maintained, with a 19\% reduction in samples over 0.1\(\mu\)g/l, compared with the mean for 1998-2002. The maintained reduction in levels of contamination is encouraging, since 2004 experienced wetter weather in the autumn and during periods of pesticide application compared with 2003. The result is thought to reflect ongoing work by the Voluntary Initiative to ensure best practice in the use of pesticides.

In terms of the top nine pesticides\textsuperscript{16} most frequently exceeding 0.1\(\mu\)g/L in surface freshwaters in England and Wales (% samples) there is a general downward trend in contamination levels over the 7 year period from 1998 – 2004. However, for five of the nine pesticides (IPU, mecoprop, 2,4-D, simazine and atrazine) levels in 2004 were slightly higher than in 2003. This may be due to the wetter weather in 2004. These data therefore suggest that positive changes in farm practice may be reducing pesticide impacts upon water, despite increased usage of a variety of substances over wider areas of land.

Some farmers are opting for reduced tillage systems to save labour and fuel costs (UK Soil Management Initiative, 2002, 2005), Farmers Weekly has run several articles promoting these approaches (8/9/05; 23/12/05, 27/1/06). Although the LIFE and SMI projects demonstrated environmental gains from Integrated Crop Management or reduced tillage, there is still debate about this (see Davies and Finney, 2002). A Simba spokesman suggest that “around 80\% of crops are established by ploughing, but many farmers are thinking about using reduced tillage systems. It may take time for them to catch on, but once they realise how they can

\textsuperscript{15} expressed as percentage of samples greater than 0.1 \(\mu\)g/l.

\textsuperscript{16} Of the top nine pesticides measured by the indicator, simazine and atrazine are now subject to restricted use and will be banned completely after 2007. Of the other 7 pesticides mecoprop, isoproturon and 2,4-D have passed the review process and can continue to be marketed. Decisions on MCPA, diuron, chlorotoluron, and dichlorprop are still pending.
cut their costs, I am sure they will be widely adopted.\textsuperscript{17} SMI estimates that 30-35% of the arable area was under reduced tillage systems in 2002/3, more on the big farms (www.smi.org).

HGCA (2005) considered the environmental impacts of biofuel crop feedstock production (wheat and OSR). The impact depends on whether crops grown for biofuel markets are managed differently to those destined for food and feed markets and whether the current crop area expands to meet any increased market demand. Production of biofuels could occur on land previously cropped, or take place on set-aside, utilising land deemed 'surplus to current requirements. Diversion of crops from existing market outlets to biofuel markets will have least effect on local management practices and environmental impacts. The most significant negative impacts are likely to occur where biofuel cropping expands into what otherwise would have been naturally regenerated set-aside. The authors conclude there is little difference in the environmental impact of growing crops for food or biofuel use (HGCA Research Review 54, pp 83–88), but cultivating set-aside for these crops has overall a negative impact. Diversion of some current production from food to industrial use offers some limited benefits in terms of opportunities to reduce inputs. However raw material production on set-aside will have negative impacts – particularly on biodiversity,

For the East Region, environmental impacts that might be anticipated are according to GFA-RACE & IEEP (2003):

• Area payments could speed up restructuring in the arable sector exacerbating negative impacts on a range of environmental indicators. Soil erosion, pressure on water resources, loss of biodiversity and damage to archaeological sites are already prevalent in the region;

• Similarly, area payments may exacerbate the loss of livestock from the region making it difficult to maintain the quality of important habitats such as neutral and wet grasslands and heathland;

• Area payments may speed up the rate of restructuring leading to increases in loss of labour, already substantial in this region. Loss of traditional land management skills and insufficient labour for conservation management could result;

• Improved levels of funding for Pillar II are likely to result in positive environmental impacts in the region as more land is brought into environmental management agreements;

• More woodland planting may occur on less productive agricultural land (eg marginal arable land) subject to supporting rules and adequate payment rates.

The EEDA report (Andersons, 2003) envisaged in the east that grazing livestock numbers will continue to decline. “Negative rents” can be contemplated where – to comply with livestock numbers – a farmer pays a grazier to provide animals rather than selling grass to him. However, grassland management in the region, already poor, may deteriorate without clear requirements.

3.4 Dairy sector

3.4.1 Impact on farm economics and short term operational impacts

Analysis by Moss et al (2002) for the UK dairy sector shows little impact of full decoupling as there were no direct payments linked to milk production until 2005 and

\textsuperscript{17} http://www.simba.co.uk/press_releases/pr_280206.html
these were initially modest. EU milk production quota levels govern milk production, and consequently, decoupling the modest premium exerts little impact on projected dairy cow numbers, output levels and commodity prices (see Table 3.8).

Table 3.8 The UK Dairy Sector: Percentage Changes from the Baseline (no decoupling) in 2010

<table>
<thead>
<tr>
<th>Decoupling scenarios</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk production</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dairy cows</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dairy milk price</td>
<td>+0.1</td>
<td>+0.1</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: Moss et al, 2002

Nevertheless, a survey by Deloitte (Press release, 5 November 2005) showed that the fall in milk price in 2005 had a dramatic effect on dairy profitability. The report stresses that the single most important factor in profitability, regardless of system, is the milk price achieved.

It is predicted that with decoupling of support, the shift towards an area payment, and in the context of further cuts in guaranteed prices, dairy farms are likely to lose out from the 2003 reforms, relative to other farming sectors (Jones, 2004a). The higher the output per hectare, which is a function of yield and stocking rate, the more likely they are to lose. If they are maize or whole crop cereal growers then they will be more likely to lose out because they will have also received arable area aid payments in the past which will be higher than the flat rate area payment they will receive on this land by 2012. According to Jones, dairy farmers will lose out unless they average less than 7,750 litres per hectare (3,135 litres per acre). Intensive units with ‘flying herds’, growing maize forage and achieving high yields are most likely to be worse off and extensive grass based dairy farms with lower yields and rearing their own replacements will fare better. Those who rear their own replacements should lose out less than those with flying herds.

3.4.2 Restructuring implications

The impact of decoupling is likely to be one of accelerating existing trends – concentration of production in the most productive dairy farming regions together with larger herd sizes and higher yields. GFA-RACE & IEEP (2003) predict that some dairy farms will not be able to compete and will exit the sector.

Cumulus (2005) predicts the continued decline of the dairy sector in the LFAs. Recent trends have shown a significant decrease in the number of dairy farms in the LFAs (50% in the DA over 1992-2004, and 24% in SDA). Dairy cow numbers have also declined but not quite to the same degree (42% in the DA, 1992-2004, and 19% in SDA) indicating a concentration of production onto fewer farms, a trend consistent with the rest of the country.

Decoupling and market reforms are anticipated to accelerate this restructuring of dairy farms. Herd sizes and yields will continue to increase and production is likely to be focused in more productive areas. Renwick and Hodge (2003) identify that this

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18 a herd or flock, usually of cattle or sheep where animals are continually being purchased into or sold from the herd or flock, so that they do not generally remain in the herd or flock for a normal productive life.
change is influenced by relative profitability, with upland dairy farms being much less profitable on average than lowland dairy farms. That said, a relatively small number of upland dairy farms, especially in DAs, are likely to continue producing for both commodity and niche markets.

The ADAS Farmers’ Voice Survey of 2004 (ADAS, 2005a, 2005b) found that in aggregate, farmers intended to further reduce the number of dairy cows by 9% and that there would be a concentration of dairy cows onto specialist dairy farms.

Defra seminar participants (Defra, 2005c) thought that:

- There would be increasing polarity of dairy herds, that they would become much more specialised and much larger. A figure of 1,000-cow herds was mentioned; this may not be accurate but with the average herd size currently being 70 cows, it’s an indication of the way things are going.

- These dairy herds may be sited along the motorways – the M5 & M6, preferably near a junction – very large herds, very specialist, with highly concentrated management systems which are not really interested in the calves produced in terms of making them available to the beef industry, constantly driving to reduce the cost of production per litre in the hope that a lower unit cost against a very unfriendly milk price will help to keep them in business.

It is important to note that these restructuring patterns in the dairy sector have existed prior to the reforms. Lobley et al (2002) looked at previous restructuring of dairy farms and its impacts in Devon, where upgrading and expansion of the dairy sector has occurred and there has been considerable investment in farm infrastructure (such as milking parlours and farm tracks) alongside considerable increase in herd size.

While there is conflicting evidence on the exact proportion of dairy farms that have ceased production between 2003 and 2005 there is agreement that the reduction is substantial. Colman and Zhuang (2005) estimate a reduction of 11.7% in England while the Dairy Hygiene Inspectorate puts the figure at 14.8%. What is clear is that one in ten dairy farmers have ceased production since 2003.

Colman and Zhuang (2005) investigated the changes between 2002/03 and April 2005 on a sample of 369 specialist dairy farms in England and Wales (i.e. only dairy farms which qualify under this category of farm type in Defra’s June Survey). A higher proportion of those farms that had ceased production were located in the LFA. Most of the farms19 that had dropped dairying had expanded existing or started new enterprises. The majority of farmers (66%) had focused on beef production, while a quarter of farmers (27%) had either expanded or started a sheep enterprise. The introduction or expansion of an arable enterprise was undertaken by 16 per cent of farmers. A range of non-mainstream and non-agricultural activities had also been undertaken by a small number of farmers including leasing out land, converting farm buildings, producing hay for sale and producing goats’ milk. Only one farmer had left farming altogether and sold the farm.

The survey found evidence of the further concentration and intensification of the industry indicated by larger herd sizes and increased yields. Most of the farmers ceasing production operated small herds. The herds remaining in production during the period had, on average, increased their production by 5.3% (an increase of 2.65% per year). Average herd size increased in four out of five regions (Table 3.9).

The survey also found evidence that land use on dairy farms was becoming more intensive. While most farmers who remained in milk production had not changed

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19 N=44.
their stocking rates in the previous two years (72.0%), where there had been a concerted change (i.e. 2 years in succession) most farmers (15.1%) had increased stocking rates as opposed to reducing them (1.9%)²⁰

Table 3.9 Change in average dairy herd size on specialist units only, 2002-5, England and Wales*

<table>
<thead>
<tr>
<th>Region</th>
<th>Av. Herd size 02/03</th>
<th>Av. Herd size 04/05</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>North and North East</td>
<td>103</td>
<td>114</td>
<td>+10.6</td>
</tr>
<tr>
<td>North West</td>
<td>106</td>
<td>112</td>
<td>+5.5</td>
</tr>
<tr>
<td>East</td>
<td>101</td>
<td>101</td>
<td>-0.3</td>
</tr>
<tr>
<td>South</td>
<td>126</td>
<td>136</td>
<td>+7.5</td>
</tr>
<tr>
<td>South West</td>
<td>104</td>
<td>110</td>
<td>+4.9</td>
</tr>
</tbody>
</table>

* note – these herds will tend to be larger than those for all dairy units

Source: Colman and Zhuang (2005)

It was clear that the majority of dairy farmers (80%) were anticipating treating the SPS in ways coupled with agricultural production. Over half the farmers interviewed (58.2%) said that the SFP would help them remain in dairy farming and just over half (52.4%) said they intended to use at least part of the payment to invest in the dairy enterprise (Table 3.10). None said the introduction of the SFP had changed their plans.

Table 3.10 Specialist Dairy Farms: Intention for using the Single Payment

<table>
<thead>
<tr>
<th>Intention</th>
<th>% of dairy farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest in dairying</td>
<td>52.4</td>
</tr>
<tr>
<td>Invest in other farming enterprises</td>
<td>19.4</td>
</tr>
<tr>
<td>Invest in diversification</td>
<td>8.5</td>
</tr>
<tr>
<td>Support current family expenditure</td>
<td>37.4</td>
</tr>
<tr>
<td>Invest in pension or other security</td>
<td>20.4</td>
</tr>
<tr>
<td>Treat as a non-farming income source</td>
<td>19.8</td>
</tr>
<tr>
<td>Assist you to continue in dairying</td>
<td>58.2</td>
</tr>
</tbody>
</table>

Source: Colman and Zhuang (2005)

When asked about their intentions over the next five years almost half of the farmers (46.6) said they were intending to increase production while 8.7% planned to cease production altogether (Table 3.11).

Table 3.11 Specialist Dairy: intentions for milk production for the next 5 years

<table>
<thead>
<tr>
<th>Intention</th>
<th>% of dairy farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expand</td>
<td>46.6</td>
</tr>
<tr>
<td>No change</td>
<td>32.2</td>
</tr>
<tr>
<td>Decrease</td>
<td>4.0</td>
</tr>
<tr>
<td>Cease</td>
<td>8.7</td>
</tr>
<tr>
<td>Uncertain</td>
<td>8.4</td>
</tr>
</tbody>
</table>

²⁰ In this study, stocking rates were defined as numbers of livestock units divided by the total agricultural area on the holding. Since these farms were specialist dairy farms, the vast majority of their land area will be devoted to the dairy enterprise.
However, a survey of farmer intentions carried out by the Milk Development Council (MDC) (2005 and 2006) reports that the decline in the number of dairy farms may be slowing (Table 3.12). The survey found that the proportion of dairy farmers planning to give up dairying fell dramatically between 2004 and 2005 with a slight increase in 2006. The survey also found that the level of uncertainty within the industry has fallen since 2004. The MDC suggests that farmers are more willing to make decisions about their future in the industry that in previous years. This may have been triggered by an increased understanding of the decoupling of agricultural support payments. The number of farmers planning to increase production over the next two years increased by 10% between 2004 and 2006.

Table 3.12 Dairy farmer intention during the next two years

<table>
<thead>
<tr>
<th>Intention</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expand</td>
<td>16</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>No change</td>
<td>37</td>
<td>50</td>
<td>46</td>
</tr>
<tr>
<td>Leave</td>
<td>26</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Uncertain</td>
<td>21</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

The lack of profitability was the major reason given for leaving the industry (82%). The survey also confirmed the continuing financial pressure experienced by dairy farmers reporting that ‘significant’ numbers expressed their intention to quit if milk prices dropped further.

Recent analysis by Defra (Clothier, 2006b) of June 2005 census data for the dairy sector showed a continued decline in cow numbers which more than offset the increase in average milk yields, leading to reduced milk production. Dairy production is becoming concentrated in the West of England, due to cow numbers reducing faster, on average, in the East than in the West. The greatest rate of reduction has been on holdings not classified as “specialist dairy”, more so in the East of England. On lowland specialist dairy holdings, declines are related more to herd size than region - in general the larger the herd size, the less of a reduction (except for much smaller herd sizes of 10 to 40 cows).

The data indicate that whilst the largest farms continue to increase cow numbers, the number of these farms is not increasing. Thus the average number of cows per holding in England has fallen in each of the last two years because the proportion of holdings with less than 70 cows has increased. Crude analysis suggests local increases in cow numbers do not appear to be increasing stocking densities at JCA level. Compared to 2000, stocking densities on holdings with dairy cows had reduced in almost all JCAs in 2005. The 2005 analysis indicates that on average, holdings increasing dairy cows also increased their grassland area. For those holdings leaving dairying but remaining in agriculture, replacement enterprises appear to be suckler cows and, particularly in the East, sheep.

There were increases in the area of maize across all regions (both on holdings with dairy cows and without) in the year to June 2005 particularly in the South West. Nationally the total maize area in 2005 was some 3.6 times higher than in 1990.
The Defra analysis also used ADAS’ Farmers’ Voice 2005 survey data (Defra, 2006) to look at farmer intentions in the context of CAP Reform. Figures in Table 3.13 show intended patterns of change among dairy farmers.

**Table 3.13 Intended pattern of change in dairy cow numbers among dairy farmers, 2005 to 2010**

<table>
<thead>
<tr>
<th>Intended patterns of change</th>
<th>% respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>no significant changes to dairy cow numbers</td>
<td>61</td>
</tr>
<tr>
<td>Cease having dairy cows</td>
<td>20</td>
</tr>
<tr>
<td>Decrease dairy cows</td>
<td>3</td>
</tr>
<tr>
<td>Increase dairy cows</td>
<td>16</td>
</tr>
<tr>
<td>Start new dairy enterprises (proportion of current dairy farmers)</td>
<td>0</td>
</tr>
</tbody>
</table>

**Source:** ADAS Farmers Voice survey, Defra 2006

Table 3.13 gives farmers’ stated intentions for changes in numbers of dairy cows due to CAP reform and other causes, compared to findings from the 2004 survey. This shows that farmers in 2005 intended a significantly larger reduction in the numbers of dairy cows, compared to intentions in 2004.

**Table 3.14 Intended reduction in dairy cattle numbers from 2005 to 2010**

<table>
<thead>
<tr>
<th></th>
<th>Dairy Farms*</th>
<th>Other Farms</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of respondents</td>
<td>175</td>
<td>33</td>
<td>208</td>
</tr>
<tr>
<td>Intended change in numbers, 2005 – 2010 %</td>
<td>-13%</td>
<td>(-12%)</td>
<td>-13%</td>
</tr>
<tr>
<td>Intended change in numbers after CAP reform (from 2004 survey)</td>
<td>-8%</td>
<td>-19%</td>
<td>-9%</td>
</tr>
</tbody>
</table>

*The majority of dairy cows (84%) are located on specialist dairy farms.

**Source:** as for table 3.13

Of particular note is the change in the rate of decline indicated by dairy farmers in the South West. In the 2004 Survey the expected reduction for the South West was 8% compared to an 18% reduction predicted (in the period 2005-2010) from the 2005 Survey. The size of the farm would appear to have some association with the intended change in dairy cow numbers. The larger the farm, the lower the predicted fall in dairy cow numbers. Small farms intend an overall decline of 45%, medium sized farms, a reduction of 24%, whereas for large farms the intended reduction is 7%. Those farmers with dairy cows were more likely than any others to indicate that they would cease production altogether.

The data provided by respondents were also used to derive estimates of stocking rates as a proxy for grazing pressure, by adding up all the grazing livestock units on each farm and dividing by the number of forage hectares. Farmers completing the

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21 Almost all dairy cows are situated on either large (68%) or medium (30%) sized farm businesses. The remaining 2% of cows are on farms defined as small businesses.

22 20% of those with dairy cows indicated that they intended to cease production over the next 5 years compared to 5%-8% of other cattle and sheep enterprises and 3%-8% of combinable crop growers.

23 Grazing livestock units (GLU) are calculated according to the food requirements of each livestock type. E.g. Dairy cows – 1GLU, Dairy followers – 0.5GLU.
survey predicted that, on average, their stocking rates would fall by 0.25 GLU per hectare on dairy holdings in the period 2005 to 2010.

The Defra report also notes that December 2005 participants of Defra’s Farm Business Survey (FBS) were asked to participate in a study led by Nottingham University’s FBS unit examining farmer intentions for the period up to Autumn 2007, in the context of the Single Farm Payment. Among respondents with a dairy enterprise, 55% indicated that they may expand their dairy enterprise, 15% indicated that they may reduce it and 15% indicated that they may cease the dairy enterprise.

Information in the literature about the potential attraction of organic production for dairy farmers looking to increase their incomes is very limited. However, Farmers Weekly reports that increased demand for organic milk has led to a price increase to farmers by 3.6p/l by the Dairy Farmers of Britain co-operative. Seasonal payment schemes account for the difficulties of producing organic milk in the winter, in spring and summer excess organic milk will still go into conventional markets. (Farmers Weekly 21 April 2006). This suggests that among the various restructuring options, organic conversion is likely to be attractive to a proportion of dairy farms.

3.4.3 Impacts for Agri-Environment Schemes

Cross compliance is thought likely to have only a limited effect on improving environmental performance. To date, agri-environment schemes have not been attractive to dairy farmers due to the relative profitability of the sector and the low payment levels offered by schemes in comparison. This situation seems unlikely to change significantly in the short term unless specific measures can be targeted at tackling issues in the dairy sector through the Entry Level Scheme.

Explaining Defra’s cross compliance programme, Duncan Forbes (Chief Executive, Kingshay Farming Trust) said meeting the basic requirements was possible for most dairy farmers to achieve. “They must all consider the Entry Level Scheme. Accumulating 30 points/ha to qualify for an additional payment of £30/ha is within most farmers’ reach. In comparison, the Higher Level is competitive and targeted at those farms with features worthy of extra protection.”

He argued one of the biggest issues is supplementary feeding on swards with less than 25% ryegrass, and the answer lies in rotational feeding to prevent concentrated poaching. Oxfordshire producer David Christensen said this problem had been overcome on his 480-cow unit by simply chaining together a handful of feed troughs and welding runners to their base to facilitate movement. He said: “As cross compliance stands, we don’t have much to fear. The new regime has led me to take the view we have a ‘new’ customer to sell a service to - the taxpayer, and like in any business the customer is always right.”

3.4.4 Environmental impacts

The impact on the environment of restructuring is judged likely to be largely negative with increasing pressure on soil, air and water resources, further declines in biodiversity and loss of landscape diversity in those areas where dairy farms concentrate and become larger. These impacts are predicted to occur across medium sized areas of land, particularly in the regions where dairy farming is already predominant. Apparently there are 4 herds of over 1000 cows currently in England, of which 3 are in the west, in or near Nitrate Vulnerable Zones. The cows are fed animal

24 11 March 2005 Dairy farmers must embrace change and opportunities – RABDF conference: British dairying facing the future, getting at the facts
by-products and forage maize, so there are significant environmental implications for shipping in feed and disposing of manure, for example (Defra RDS, pers. comm.). However, where land leaves dairying and moves into more extensive livestock production, there could be benefits to biodiversity and water, soils and air. It should be noted that both these trends appear likely to have occurred irrespective of the impact of the 2003 CAP reforms.

In relation to the specific effects of decoupling and the transition to an area payment basis for SPS however, small and medium sized dairy farms will be relative gainers. Thus they might restructure less than previously anticipated. Some have indeed speculated that they could use their ‘new income’ in the form of SPS payments to invest in meeting new environmental requirements such as enhanced manure storage and handling facilities, which could benefit soil, air and water resources (GFA-RACE & IEEP, 2003).

Some insights into environmental impacts are given by examining the impacts of previous restructuring in the sector, in different areas, as provided by Lobley et al (2002).

- In Bakewell, the area has seen a pronounced increase in the scale and intensity of dairy farming, often at the expense of small and medium sized dairy farms. Larger more intensive dairy holdings are associated with higher fertiliser and input applications, slurry storage and spreading problems as well as further improvement of wet and semi-improved grassland. Along with intensification, dairy expansion has stimulated demand for larger agricultural buildings and field enlargement has seen the loss of landscape features such as walls and damage to medieval field systems.

- In Cumbria, the number of dairy herds has significantly declined while surviving dairy farms have expanded and herds of 200 head are common in parts of the study area. This development is associated with improvement and intensification of grassland utilisation and a decline in the management of landscape features such as walls and hedges in the lower reaches of the study area. Larger dairy herds combined with generally lower labour levels are associated with ‘less attention to detail’ in terms of management of landscape features. The expansion and intensification of surviving dairy herds is also associated with greater use of silage as opposed to hay, with knock-on impacts on ground nesting birds, grassland species and implications for excess nutrients in the form of slurry.

GFA-RACE 2004 predicted that the concentration of dairy production in the South West, North West and West Midlands regions could lead to increases in N and P levels in some catchments in these regions. GFA-RACE & IEEP (2003) identified high risk areas for silation as being dairy farming regions of the South West, West Midlands and North West, where herds are intensively managed outdoors, and/or maize growing increases such as in the East, East Midlands, South East and South West. Concentration within the dairy sector may present specific problems in some catchments as farm size and herd size increase, increasing the output of organic wastes from such farms. Investment in infrastructure and improved management on such larger, more efficient farms may however help to reduce problems from organic wastes, although nutrient loading will remain a problem.

The Environment Agency states (from www.farm.org.uk):
‘More than half of the serious and significant pollution incidents from agriculture in England and Wales arise from dairy farms. The proposals to reduce the support price and increase overall milk quota are likely to further intensify milk production, especially in the south-west and northwest of England and in Wales. There are likely to be impacts on the environment, including increased threats to Bathing Water
Directive compliance. Measures to control diffuse pollution under the Water Framework Directive are also likely to affect the dairy industry.’

Lobley et al (2002) found that intensive use of grassland and high slurry applications with slurry storage and management are becoming an increasingly significant issue in Devon.

Other in-field impacts result from intensification of grassland use and the extension of the grazing season. At the same time, the need to grow more intensive energy crops to support larger herds has seen changes in the ratio of grass to arable land with some large blocks of grass being ploughed for maize and forage cereal production. This has knock-on impacts on biodiversity as maize in particular is one of the least valuable feed crops for birds (Durdin, 2002). The impact on the landscape has involved a reduction in diversity and a change in the traditional patchwork appearance of fields. The result is that, outside of protected areas, habitats are becoming increasingly fragmented while more intensively managed land has declined in biodiversity value. There has been widespread neglect of landscape features such as hedges, walls, ditches and orchards. Lowland livestock areas in the study (Lobley et al, 2002) have seen a considerable increase in the use of contractors and land management on a contract basis. This was perceived to have negative implications generally, as it implies less labour spread over a larger area and because it is associated with ploughing up to hedge bottoms and the banks of watercourses. A negative trend of greater landscape uniformity, more intensive land management (associated with dairy expansion and intensification) and neglect is predicted. The continued intensive use of grassland for dairying will be associated with an extended grazing season and more poaching. Where fertiliser use is reduced on dairy farms this is likely to be associated with greater use of supplementary feeding.

3.5 Livestock sector

3.5.1 Impact on farm economics and short term operational impacts

A number of studies have been undertaken to analyse the impact of decoupling on the livestock sector; many of these concentrate on the upland areas.

For both upland and lowland grazing livestock in England, ADAS (Hall et al, 2002) estimates there is likely to be a financial incentive to reduce stock, by 50% for small and medium sized farms and by 60-80% (down to the HFA minimum stocking density) for large farms. A principal driving force assumed by the analysis is the desire to reduce fixed costs (mainly in the form of hired labour). In the lowlands the incentive to reduce stock numbers is thought to be less on smaller farms as they have less hired labour. In the study the impact of anticipated price increases was minimal in reducing the incentive to decrease stock numbers.

Moss et al (2002) estimated that UK beef and sheep meat production might fall, relative to Agenda 2000 baseline trends, by 9% and 11% respectively by 2010 due to decoupling, which in turn might result in market price rises for beef and sheep of 16% and 23% respectively. Suckler cow production was estimated to reduce by 19%. Beef cow levels in the UK are projected to fall below pre-1992 levels. For sheep, in the early years prices fall due to large numbers of breeding animals entering the sheep meat market as farmers adjust, although prices are projected to rise considerably in the longer run in response to the decline in production arising from decoupling.25

25 This analysis however makes several import/export assumptions about trade and any reductions in agricultural protection would dampen the positive price effects of reduced EU production.
Table 3.15 UK Beef and Sheepmeat: Percentage change from Baseline (no decoupling), 2010

<table>
<thead>
<tr>
<th>Decoupling scenarios*</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cows</td>
<td>-8.6</td>
<td>-5.5</td>
<td>-2.7</td>
</tr>
<tr>
<td>Suckler cows</td>
<td>-18.9</td>
<td>-12.1</td>
<td>-5.9</td>
</tr>
<tr>
<td>Beef &amp; veal production</td>
<td>-10.6</td>
<td>-7.0</td>
<td>-3.5</td>
</tr>
<tr>
<td>Cattle reference price</td>
<td>+16.1</td>
<td>+10.6</td>
<td>+5.6</td>
</tr>
<tr>
<td>Ewes</td>
<td>-10.6</td>
<td>-7.0</td>
<td>-3.5</td>
</tr>
<tr>
<td>Sheep meat production</td>
<td>-12.3</td>
<td>-8.2</td>
<td>-4.2</td>
</tr>
<tr>
<td>Sheep meat reference price</td>
<td>+22.9</td>
<td>+15.0</td>
<td>+7.8</td>
</tr>
</tbody>
</table>

*Scenario A – assumes there is no production response to the decoupled payment.  
Scenario B – assumes a production response is attributable to 30 per cent of the decoupled payment.  
Scenario C – assumes a production response is attributable to 60 per cent of the decoupled payment.  

The figures were revised and extended by Queens University Belfast and University of Missouri (2005) to show reductions of 8% (beef meat production), 7% (sheep meat production) and 17% (suckler cow production) relative to the Agenda 2000 baseline, by 2014.

Oglethorpe and Revell (2003), using partial equilibrium modelling, suggest a long term reduction of 9.5% in beef production associated with a market price increase of 4% but a less marked impact on the sheep sector, with a reduction of 3% in lamb production with a small associated price increase. They consider that the impact of decoupling on the sheep sector is likely to be less pronounced than for beef in the uplands, as the supply response has considerable inertia to change due to the limited options for other enterprises in these areas. Much of the adjustment is thought to come from the lowland flock. Linear programming analysis was also used to provide insights about how particular farm types might respond to decoupling. When these results are aggregated to the national level they suggest large declines in production: beef production would fall by 57% and sheep meat production by 11%. However, these are long term effects from full decoupling which take no account of rising market prices, hence they are likely to overstate the impact on production.

Upland farms will be most exposed due to poor profitability (Hall et al, 2002).

Analysis of gains and losses for livestock farmers upon the gradual introduction of area payments 2005-13 concludes that the ‘winners’ are those with more extensive systems and tend to be LFA cattle and sheep, and small and medium sized dairy farms. The ‘losers’ are mixed and medium and large lowland cattle and sheep farms. (Defra, 2005c; GFA-RACE & IEEP, 2003; Jones, 2004a). The impact for beef is complicated by specific character of the historic subsidies it has received in the past, including beef special premium and slaughter premium. The farmers who will lose out the most will be those who rear beef intensively, and have little or no land to secure SPS entitlement. Two studies (Jones 2004a and Defra 2005) have predicted which types of livestock farm will be winners and losers compared to a decoupled

When price rises generated by the FAPRI analysis were incorporated into linear programming analysis, the price rise for the beef sector significantly weakened the incentive to reduce production such that total finished beef production fell by 39%, compared to a fall of 57% when no price rises were taken into account. However this had no effect for the sheep sector i.e. despite an increase in sheep prices of 23%, the incentive to reduce production remained at 11% - exactly the same as if prices do not change.

The analysis is based on the difference between 2002 subsidy levels (a proxy for ‘historic payments’) and expected SPS payment with modulation when it is entirely area based (in 2012).
regime based purely on historic payments. In the LFA fortunes will vary according to enterprise type and the degree of disadvantage, with farmers in the DA more likely to benefit than those in the SDA despite generally lower stocking rates in the SDA.

In the DA:
- Farms that are ‘mainly DA’ will gain, on average, £4,000 in payments. This is because the shift will reduce the relative level of support to arable farms and increase it to livestock farms, and DA farms will tend to include a higher proportion of livestock farms than non-DA farms, overall.
- Sheep farmers are likely to benefit more than for those with beef suckler cows. This is because they tend to stock at lower densities so their historic levels of support will have been lower.
- Dairy farmers that are ‘mainly DA’ will gain, on average, £8,000 in payments. However, they will simultaneously experience lower milk prices, as support is reduced and switched from guaranteed prices to SPS. Thus their overall level of support (coupled and decoupled) will fall, as a result of the reforms.

In the SDA:
- Sheep farmers are likely to benefit from the change to a flat rate area payment because they stock at relatively low densities, but their overall level of support will remain relatively low because the SDA area payment will be relatively low.
- Beef farmers will lose out unless they are very lightly stocked. Payments for specialist beef farmers will decrease, on average, by £7,000.
- Payments for mixed cattle and sheep farmers will decrease, on average, by £5,000 due to the cattle/stocking density effect.

In the lowlands Jones (2004a) predicts that:
- Dairy farmers are likely to lose out relative to other sectors unless they average less than 7,750 litres per hectare (3,135 litres per acre), in which case the area payments will represent a more reasonable level of compensation for price cuts. Intensive units with herds moved frequently between grazing areas, growing and/or feeding maize forage and producing high yields are most likely to be worse off and extensive grass-based dairy units with lower yields and rearing their own replacements will fare better.
- Lowland sheep producers are likely to be better off and suckler beef producers worse off than they would have been under an historic entitlement system, because of stocking density effects and the higher historic level of support for beef compared to sheep, under the CAP regimes.

National Beef Association predictions suggest a 50-70% fall in income for beef suckler units in SDA. They currently receive £250-£400 per hectare in support payments, but it is anticipated that these will be reduced to £75/ha within eight years (Agra-Europe, 20 February 2004.) By contrast, for most lowland sheep farmers the introduction of the SPS will be positive because they tend to have had lower levels of support in the past. In examples calculated by Farmer’s Weekly, sheep farmers were shown to be better off in respect of their subsidy receipts, after reforms. The lower the stocking density, the higher the gain, as payments shift from a

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28 England will be treated as two separate regions for area payments – land above the SDA line and that below (English moorland within the upland SDA receives less payment). Many upland farmers (i.e. those with DA land) will benefit from the area payment decision and see an improvement in farm incomes as a result.

29 Note: this report assumed the rate of SPS would decline over time due to financial discipline and further CAP reforms.
The GFA-RACE & IEEP (2003) report predicts that the following changes are likely in the livestock sector:

- a greater reduction in beef than sheep production;
- an increase in beef and sheep meat price in response to a decline in production;
- a move away from suckler cows to breeding ewes (in hill/upland areas) and arable cropping where possible/profitable (in lowland areas);
- many farms will intensify production by reducing stock numbers with medium and large sized farms having more incentive to do so than small sized farms. This intensification is closely linked to the loss of labour from the sector;
- hill and upland farms will be more exposed than lowland livestock farms due to poor profitability and lack of alternative enterprises;
- outdoor pig production could expand.

Reductions in stock numbers (and hence grazing pressure) are illustrated by ADAS (2005b) in case studies of different hill and upland farms (see Table 3.16). This table shows existing and estimated stocking rates for two future scenarios based on a standard measure, Grazing Livestock Units (GLUs). The existing stocking rate in each case study is shown in the ‘Pre-CAP’ scenario. The future stocking rates are shown under ‘Post CAP farmer’s intentions’ (based on farmer’s own plans) and ‘Post-CAP ADAS budget’ (where the farmer has taken on board ADAS advice to improve profitability). Considerable reductions are predicted for some cases, for Post-CAP farmer intentions.

Table 3.16 Anticipated Changes in Stocking Rates for Selected LFA Farm Case Studies

<table>
<thead>
<tr>
<th>Hill Farms</th>
<th>Pre-CAP</th>
<th>Post-CAP farmer intention</th>
<th>% change</th>
<th>Post-CAP ADAS budget</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.15</td>
<td>0.13</td>
<td>-13.3</td>
<td>0.13</td>
<td>-13.3</td>
</tr>
<tr>
<td>B</td>
<td>0.33</td>
<td>0.31</td>
<td>-6.1</td>
<td>0.29</td>
<td>-12.1</td>
</tr>
<tr>
<td>C</td>
<td>0.62</td>
<td>0.57</td>
<td>-8.1</td>
<td>0.77</td>
<td>24.2</td>
</tr>
<tr>
<td>D</td>
<td>0.74</td>
<td>0.60</td>
<td>-18.9</td>
<td>0.50</td>
<td>-32.4</td>
</tr>
<tr>
<td>E</td>
<td>0.76</td>
<td>0.60</td>
<td>-21.1</td>
<td>0.59</td>
<td>-22.4</td>
</tr>
<tr>
<td>F</td>
<td>1.22</td>
<td>0.76</td>
<td>-37.7</td>
<td>0.93</td>
<td>-23.8</td>
</tr>
<tr>
<td>G</td>
<td>2.00</td>
<td>1.70</td>
<td>-15.0</td>
<td>2.08</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Source: ADAS 2005b

The National Trust’s (NT, 2005) analysis of the financial impact of area payments for 60 tenanted farms in the Lake District, Yorkshire, Northumberland and the Peak District indicates a substantial reduction in income from support payments by the year 2012 for most farm types, under specific assumptions about a declining SPS budget due to modulation and financial discipline. The analysis suggests that the basic payments will decrease by up to 50% compared to historic payment levels. Key
factors which influence the degree of impact on individual hill farms were identified as:

- overall farm size – larger farms have more entitlements and therefore more income;
- proportion of land within the Moorland Line - farms with more land inside the Moorland Line will receive less than those with land outside this line;
- historic stocking levels - farms with intensive systems will experience a greater income reduction than those with extensive systems.

It is argued that the reduction of payment levels will have a negative impact on net farm income, and the existing lack of profitability of many upland livestock enterprises, previously obscured by CAP payments, will be revealed. Indications from NT analysis are that for upland sheep and cattle enterprises gross margins are very low and all dairy producers would have a negative net farm income by 2012. However, English Nature (2005) notes that the NT total income figures exclude income from diversification and off-farm income, and suggests that farmers will adapt their farm systems and stock numbers to a new set of circumstances. EN also points out that although the NT analysis predicts a 50% reduction in payment it is not the same as saying that the farms will be 50% less profitable under the new system. By revising their stocking rates downwards, therefore, they argue, farmers will be able to reduce variable costs whilst still taking advantage of the subsidy payment.

3.5.2 Restructuring implications

It is anticipated by ADAS (Hall et al, 2002) that hill and upland farms are likely to move away from suckler cows to breeding ewes following decoupling, due to:

- relatively attractive sheep gross margins;
- greater opportunity to improve sheep performance rather than cattle performance;
- lower labour requirement/cost for sheep compared to cattle;
- reduced exposure to market pressures with sheep compared to suckler cows;
- cross-compliance restrictions on winter grazing (GAEC 9 – overgrazing and unsuitable supplementary feeding) which could make it more difficult for farms that currently keep their cattle outdoors over winter due to a lack of suitable housing. Faced with the prospect of having to invest in a new cattle shed or deciding to quit suckler cow production, it is thought that a proportion of farms will decide to get rid of their cattle.

Dwyer (2005) summarised two studies by ADAS commissioned by English Nature, investigating the intended actions of livestock farmers in response to the CAP reforms. From the Farmers' Voice Survey 2004, the following trends were suggested:

- Out of 747 farms with livestock in the sample, 206 (28%) responded that they were maintaining or increasing profits, and of these, 58 foresaw a need for significant changes following CAP reform;
- 541 farms (72%) reported declining profits or losses, of which 200 foresaw a need or significant changes following the reform.

In the LFAs, it is considered that alongside fewer beef cattle, there are also likely to be fewer dairy cattle as dairying continues to decline and that more hill/upland farms are likely to focus on sheep production only (Cumulus, 2005). These trends are also suggested from the ADAS survey reported in Dwyer (2005). This found that on LFA
cattle and sheep farms there is likely to be a 35% reduction in suckler cow numbers and a 6% reduction in beef finishing cattle. With sheep, it is anticipated that there will be a reduction of 3% in breeding ewes\(^{30}\) and an increase of 3% in finishing lambs.

With the SPS making it possible to farm land profitably with extensive systems it is anticipated that in the LFAs the trend of increasing the area of individual farm units (owned, tenanted or under contract) will continue\(^{31}\) (Cumulus, 2005). The report considers that there will also be an increasing frequency of ‘composite holdings’ associated with hill farming areas—typically hill farms which have bought land or a farm further down the hill or even outside the LFA. Such farms have a broader range of options in adapting to changed profitability than those in particular areas. In these cases, the report argues, farm business decisions will be made on the basis of the commercial potential of different categories of land within a composite holding: SDA/DA/lowland, or Moorland/Non-moorland.

Decoupling is predicted to lead to a fall in the total number of farmers and farm workers with pressure to save costs and the development of simpler, more extensive farming systems. This will result in a smaller workforce responsible for managing the same area of land. There will be a commensurate loss of upland management skills (Cumulus, 2005).

According to Cumulus (2005), as well as taking on additional land, more farm businesses will seek to broaden their farming systems. In LFAs some hill sheep farmers are already moving into cross-breeding, using additional in-bye land and other low land, in order to obtain higher margins. This is likely to be related to a move away from traditional fell management, with ewes and lambs now being kept on in-bye land until weaning and fell or moorland areas only being used from August onwards. Participants at a Defra seminar (2005c) however suggested that only a small amount of sheep production would come down from the hills.

Based upon the farm analysis reported above, NT (2005) argues that as a consequence of negative impacts on farm incomes and lack of profitability the economic incentive to farm is gone and in many cases this will lead to ‘chaotic and unplanned loss of land management capability’ in the uplands. By contrast, the EN critique of this study suggests that farm adaptation would prevent abandonment.

Some cattle farmers are also diversifying from traditional calf production from suckler cows to rearing on and finishing cattle on more productive land and/or lowland feed lots. These finishing systems are likely to involve housing, supplementary feeding, breed changes and intensification on in-bye land. This will contrast with the more extensive use of fell and moorland (Cumulus, 2005). Defra seminar participants (2004) predicted that there will be more specialist finishing units on the eastern side of Britain where there are arable by-products and straw, and perhaps even more so in those areas of Lincolnshire and East Anglia where there are horticultural and other food industry by-products. In these cases, numbers per unit could grow to be very large by UK standards: there are already one or two of these, it is anticipated there will be more. They also suggested that there would be more concentrated finishing but still a fragmented breeding herd overall; that the average age of finishing cattle in the beef herd would reduce and that the suckler herd would ‘roll out’ over grassland which may be vacated by smaller dairy farms or marginal crops. Thus the total size of the national herd would remain the same, but occupy more land.

\(^{30}\) Consultation responses to Defra’s CAP reform proposals suggested that a 3% reduction is an underestimate for hill sheep farms with more sheep coming off high fells and moorland due to enlargement and enterprise changes

\(^{31}\) The present trends is an increase in the number of, and area covered by, larger farms (100ha and over). In SDAs, these larger farms accounted for 76% of the agricultural area (2004). By comparison only 4% of the agricultural area is covered by the smallest two categories of farm (0<5ha and 5<20ha) although these make up 54% by number (2004). The situation is less polarised in DAs.
A summary of current and anticipated trends for key agricultural indicators in LFAs, based on trends in Defra June census statistics for 1992-2004 and a range of projections in numerous reports referred to in the Cumulus report (2005), are shown in table 3.17.

Table 3.17 Estimated farming changes in English LFA 2007-2013

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy cows</td>
<td>-2.7</td>
<td>-4 to –6</td>
<td>-14 to –21</td>
<td>-2 to –3</td>
<td>Similar annual rate of decline or accelerated</td>
</tr>
<tr>
<td>Suckler cows</td>
<td>-0.7</td>
<td>-3 to –7</td>
<td>-12 to -25</td>
<td>-1.7 to -3.5</td>
<td>Increased rate of decline</td>
</tr>
<tr>
<td>Beef finishing</td>
<td>n.k.</td>
<td>-1 to 2</td>
<td>-4 to -7</td>
<td>-0.6 to -1.0</td>
<td>Modest rate of decline</td>
</tr>
<tr>
<td>Sheep and lambs</td>
<td>-1.2</td>
<td>0 to –1</td>
<td>0 to -4</td>
<td>0 to -0.6</td>
<td>Slightly reduced rate of decline</td>
</tr>
<tr>
<td>Crop and fallow area</td>
<td>-2.1</td>
<td>-4 to –6</td>
<td>-14 to –21</td>
<td>-2 to -3</td>
<td>Similar annual rate of decline or accelerated</td>
</tr>
</tbody>
</table>

* calculated from Defra June Survey Statistics (2005)

** 2007-2013 is not an estimated annual rate, but absolute i.e. over the full 7 years.

Source, Cumulus (2005)

3.5.3 Impacts for Agri-Environment Schemes

Retaining grazing where it might otherwise disappear and supporting landscape management could be achieved through agri-environment schemes but payment rates and funding levels will be critical. If area payments, in addition to decoupling, significantly reduced the returns of marginal lowland producers and agri-environment schemes were not sufficiently attractive, maintaining grazing in some areas of environmental importance could be difficult to achieve in future.

3.5.4 Environmental impacts

Extensification, loss of labour, enlargement, abandonment, relative changes in sheep and cattle and changes in intensity and systems will all have environmental impacts.

Some farmers may give up lowland livestock production and others will seek to increase farm size. GFA-RACE & IEEP (2003) note that positive environmental impacts of these changes are likely to be linked to overall reductions in livestock numbers, which could benefit climate change and soil, air and water resources.

Specific negative impacts on biodiversity and landscape interests are likely to occur where livestock production ceases and is replaced by arable or other more profitable crops, or where management input is significantly reduced. Loss of grazing from important habitats could be critical for those habitats and the species that rely on them, while less grassland in lowland areas would reduce landscape diversity. Ploughing of grassland could lead to damage of buried and field archaeological remains.

Restructuring of farm holdings associated with more intensive management systems can create specific problems leading to general loss of species, e.g. due to the enlargement of fields and the removal of (unprotected – non-species rich)
hedgerows, use of machinery and increased inputs. These impacts are likely to occur across relatively small areas of land in specific localities but have a high environmental impact where they do occur. On the other hand, where the restructuring process results in the creation of larger and more extensive management systems, a similar pattern of environmental damage cannot be assumed – much will depend upon the extent to which these new more extensive forms of management incorporate specific environmental management activities.

The importance of agriculture to the uplands is noted in a number of studies. Cumulus (2005) cites NFU as reporting that agricultural production in the English LFA is significant, some 40% of beef cows and 45% of breeding sheep are found in the LFA. These enterprises play a significant role in shaping landscapes, communities and the economy of the uplands (IEEP, 2004). Thus it is widely claimed that the loss of a critical mass of farmers, cattle and/or sheep in the uplands could result in a dramatic loss of the landscape character. Scrub encroachment onto moorland is an issue in parts of the North York Moors National Park, as a result of very low levels of sheep grazing. It is acknowledged by Government that upland areas are relatively more dependent on the agricultural sector both for employment and economic activity.

However there are significant negative environmental impacts of current hill farming practices, such as the largely unfavourable condition of many upland SSSIs, declines in biodiversity and loss of landscape quality, of which the single prime cause has been overgrazing. Today, there is evidence of negative environmental impacts resulting from both overgrazing and undergrazing (p69, ibid). In most upland areas, agriculture’s impacts upon natural resources such as soil, air and water are probably seen as less of a problem than its impacts on biodiversity and landscapes (IEEP, 2004), although the number of stock will also contribute significantly to greenhouse gas emission and thus climate change.

If farmers in the uplands respond to decoupling by reducing livestock numbers this should result in some environmental improvements, particularly where there is less incentive to keep stock beyond the ecological carrying capacity of the land. Economic analyses shown in earlier sections indicate there will be reductions in both suckler cow and sheep numbers in upland areas. This is likely to have some environmental benefits such as reduced grazing pressure on sensitive habitats.

However, significant reductions in suckler cow numbers and expansion of high performance sheep enterprises in some locations is likely to present problems in delivering appropriate grazing regimes on sensitive habitats, especially where labour input is reduced. Stock reduction could exacerbate problems of undergrazing, where this already occurs, and a further loss of suckler cows could be of particular environmental concern given the current low ratio of cattle to sheep in many areas (IEEP, 2004). Abandonment, which is also predicted by some as a response to decoupling, is largely viewed as unfavourable for the environment, although some environmental benefits could arise from small scale agricultural abandonment allowing scrub and woodland regeneration (IEEP, 2004).

To improve habitat quality for biodiversity, required changes would include more complex management systems such as grazing more cattle on grass fells during summer, using fewer sheep in many areas and applying appropriate shepherding, controlled supplementary feeding and less frequent burning of heather on grouse moors (IEEP, 2004). Some commentators believe these options might be lost with restructuring because of its impact upon farm support more broadly, and the risk that

although these things are likely to be tempered by cross-compliance and GAEC conditions, they may not disappear altogether as phenomena.
this will trigger simplification of management systems. The knowledge and skills required for carrying out such complex management may also be lost, if farm labour is reduced.

However, in considering the precise impacts of the SPS transition process, a relatively improved income position for LFA cattle and sheep farms by comparison with other sectors could result in less restructuring, or slower restructuring, than might otherwise have occurred with a SPS based on historic entitlement. The environmental impacts of this income effect are likely to be variable. Positive environmental impacts, particularly for biodiversity and landscape features, would arise if an area payment helped to maintain cattle numbers in the uplands and discouraged farmers from reducing farm labour. However, if such a payment also encouraged overall stocking levels in the hills to remain high then many of the current problems of overgrazing, soil erosion and water pollution would be likely to continue.

It is also uncertain how hill farmers would invest their new-found ‘income’. A farmer who puts up a building for overwintering sheep might be able to reduce grazing pressure on his land with a positive environmental impact, for example. Equally, some farmers may invest new income in expanding their enterprises, increasing stocking levels and generally intensifying operations, with possible negative impacts (GFA-RACE & IEEP, 2003).

Overall reductions in livestock numbers are thought to lead to reductions in organic waste in those areas where livestock farming is predominant, especially the South West (both upland and lowlands); West Midlands (mainly lowlands); Yorkshire and Humberside (uplands); North East (uplands) and North West (uplands and lowlands but mainly the former)(GFA-RACE, 2004). This could have benefits for water quality.

Potential increases in pig production in East Anglia, East Midlands, South East and South could lead to increases in N and P levels and greater risk of siltation in some catchments in these regions. (GFA-RACE, 2004). The rationale for predicting such increases is given in the GFA-RACE report, p.50 (ibid), and is largely based upon an assumption that such farms may newly qualify for SFP and thus experience a relative increase in income compared to the pre-CAP reform situation.

GFA-RACE & IEEP (2003) consider that the impact of cross compliance will generally be positive but limited and unlikely to offer a solution to all those negative problems identified in both upland and lowland areas. Nevertheless, one media report (Farmers Weekly, 14 April 2006) says that data from farm assurance inspections can be used to predict farmer performance under cross compliance: a review of the last 18 months’ inspection period showed that 1500 of farms inspected (beef and sheep inspections) did not have an adequate manure management plan. This suggests that effective cross compliance could eventually lead to significant changes.
3.6 June Survey Analysis

3.6.1 Introduction

For the purposes of this study, it was decided to make a rapid analysis of Defra June Survey data for the years 2003 to 2005. The most recent data was used, to pick up any potential trends emerging from different farms in different parts of the country, in response to CAP reform and other current developments. 2003 was preferred over 2004 as the base year, because it was felt that in 2004 the broad changes arising from the reforms were already known about, but the detail of their implementation was not, meaning that farmers were likely to behave in rather particular ways for that one production period.

3.6.2 National summary statistics for 2005 compared to previous years

Arable sector

June census figures for England 2005 give a crude indication of changes in areas sown to crops since 2003.

Table 3.18 June Survey 2003-5: changes in crop areas in England

<table>
<thead>
<tr>
<th>Land use</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total tillage</td>
<td>–0.4</td>
</tr>
<tr>
<td>Total arable land</td>
<td>–1.6</td>
</tr>
<tr>
<td>Bare fallow</td>
<td>+502</td>
</tr>
<tr>
<td>All grass under 5 years old</td>
<td>–8.3</td>
</tr>
<tr>
<td>All grasses over 5 years old</td>
<td>+4.4</td>
</tr>
<tr>
<td>Total cereals</td>
<td>–6.9</td>
</tr>
<tr>
<td>Wheat</td>
<td>–6.2</td>
</tr>
<tr>
<td>Barley Total</td>
<td>–7.3</td>
</tr>
<tr>
<td>Barley W</td>
<td>–8.4</td>
</tr>
<tr>
<td>Barley S</td>
<td>–5.9</td>
</tr>
<tr>
<td>OSR Total</td>
<td>+5.4</td>
</tr>
<tr>
<td>OSR W</td>
<td>+17.8</td>
</tr>
<tr>
<td>OSR S</td>
<td>–64</td>
</tr>
<tr>
<td>Total crops not for stock feeding</td>
<td>+6.9</td>
</tr>
<tr>
<td>Total fodder or compounding crops</td>
<td>+3.9</td>
</tr>
<tr>
<td>Linseed</td>
<td>+55.5</td>
</tr>
<tr>
<td>Flax</td>
<td>–66.4</td>
</tr>
<tr>
<td>Peas</td>
<td>–14</td>
</tr>
<tr>
<td>Field beans</td>
<td>+3.2</td>
</tr>
<tr>
<td>Maize</td>
<td>+10.4</td>
</tr>
</tbody>
</table>

(Source, Defra June survey)
These figures show a number of trends which would be anticipated from the literature review. There has been a significant increase in fallow land (though this is largely due to a switch of categories – see below - rather than a change in use), plus modest growth in rape, linseed and maize, and a modest decline in barley and oats. There is also a small decrease in wheat area. However, this may well be a feature of its shifting position in rotations, rather than the start of a sustained trend, such that farmers decided on a ‘wait and see’ policy in 2005, which meant deciding not to crop rather than make significant changes. Clearly, one needs to examine further years beyond 2005 before the trends become fully apparent.

More detail on the occurrence and function of set-aside and fallow land in the 2005 census is given in the Defra Environmental Observatory study report (Defra, 2006), which indicates how little the pattern of uncropped fallow has changed since 2003, although its classification has shifted from voluntary set aside to fallow as a result of the reforms. As anticipated, dairy farms have tended only to set aside the minimum as required under the regulations, while in the arable heartlands it is clear that fallowing is becoming a more regular element in rotational management. As yet, it is clearly too early to say that there is any real evidence of a contraction in the overall area of land being managed for cropping.

A slight reduction in wheat area is further confirmed by the 2005 December Agricultural Survey which showed a decline in area of wheat sown by 4.2% between December 2004 and December 2005. The December survey also shows a significant increase in the area of oats sown by 38.7% between December 2004 and 2005.

### Dairy sector

The Defra June Survey national summary provides some supporting evidence of a continuation in existing trends of restructuring, in that there has been a decline in dairy cow numbers between June 2003 and June 2005 (Table 3.19)\(^{33}\).

#### Table 3.19 Change in dairy cow numbers 2003-05

<table>
<thead>
<tr>
<th></th>
<th>Dairy Nos 2003</th>
<th>Dairy Nos 2005</th>
<th>Change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowland Pastoral</td>
<td>879,326</td>
<td>810,324</td>
<td>-69,002</td>
<td>-8</td>
</tr>
<tr>
<td>Arable</td>
<td>76,316</td>
<td>66,238</td>
<td>-10,078</td>
<td>-13</td>
</tr>
<tr>
<td>Uplands</td>
<td>108,070</td>
<td>100,033</td>
<td>-8,037</td>
<td>-7</td>
</tr>
</tbody>
</table>

Note: Lowland pastoral is defined as farms comprised of predominantly dairy and/or lowland cattle and sheep enterprises. Arable is comprised of farms with mainly cereal or general cropping enterprises. Uplands is comprised as cattle and sheep farms located in an LFA.

The scale of decline appears not particularly different from previous years, and certainly the suggestion from the literature review would be that any changes are as

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\(^{33}\) Lowland pastoral category (53 JCAs in total) is comprised of JCAs where combined numbers of cattle & sheep and dairy farm types more than double those of other categories. Arable category (31 JCAs in total) is comprised of JCAs where combined numbers of cereal and cropping farm types more than double those of other categories. Upland category (19 JCAs in total) represents all JCAs where the number of farms in LFA is more than double those of the other categories.
likely to result from non-policy factors such as market developments in milk pricing, as well as the impact of environmental and food safety legislation.

**Beef and Sheep**

At an aggregate national level the widespread prediction of a significant move away from beef production appears not yet to have affected the total numbers of beef animals recorded in the Defra June 2005 Survey Statistics (Table 3.20).

**Table 3.20 Change in beef numbers 2003-05**

<table>
<thead>
<tr>
<th>Region</th>
<th>Beef 2003 Nos</th>
<th>Beef Nos 2005</th>
<th>Change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowland Pastoral</td>
<td>247,393</td>
<td>274,327</td>
<td>26,934</td>
<td>11</td>
</tr>
<tr>
<td>Arable</td>
<td>101,453</td>
<td>106,365</td>
<td>4,912</td>
<td>5</td>
</tr>
<tr>
<td>Uplands</td>
<td>156,944</td>
<td>159,621</td>
<td>2,678</td>
<td>2</td>
</tr>
</tbody>
</table>

*Source: Defra June Survey of agricultural holdings*

However, a more detailed analysis reveals significant changes in the structure of the suckler beef herd (Defra Observatory, 2006). The study found that while the beef herd increased by 3 per cent there was a marked decline in the number of suckler herd replacements compared to a year earlier, both in the number of heifers in calf and the number of potential replacements (not yet in calf) aged over 2 years (Table 16). The report concluded that a significant fall in replacement numbers in 2005 is likely to result in a reduced suckler herd in 2006 and a reduction in the number of cattle available for beef production in 2007.

A number of clear patterns were also identified when the data were analysed according to region and farming type. On lowland holdings the suckler herd has increased in 2005 but the reduction in the number of heifers in calf in 2005 suggests that there will be a slow down in the rate of increase in the suckler herd in 2006, or a possible decline.

**Table 3.21 Beef (suckler) herd and replacements in England**

<table>
<thead>
<tr>
<th>Head (0000)</th>
<th>June 2004</th>
<th>June 2005</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef herd</td>
<td>730 (+/-16)</td>
<td>752 (+/-21)</td>
<td>+3.0%</td>
</tr>
<tr>
<td>Beef heifers in calf (over 2 years)</td>
<td>74 (+/-6)</td>
<td>62 (+/-4)</td>
<td>-16.2%</td>
</tr>
<tr>
<td>Beef heifers in calf (1 to 2 years)</td>
<td>39 (+/-5)</td>
<td>27 (+/-4)</td>
<td>-32.6%</td>
</tr>
<tr>
<td>Replacement heifers (over 2 years)</td>
<td>52 (+/-6)</td>
<td>33 (+/-5)</td>
<td>-36.1%</td>
</tr>
<tr>
<td>Replacement heifers (1 to 2 years)</td>
<td>109 (+/-7)</td>
<td>99 (+/-7)</td>
<td>-8.9%</td>
</tr>
</tbody>
</table>
In 2005, the regions with the greatest increases in suckler cows on lowland holdings were the North West (+6%), South West (+5%) and Yorkshire and the Humber (+5%). Apart from the North East where numbers fell by 2%, changes in suckler cow numbers in remaining lowland areas were approximately 3%.

Numbers of heifers in calf declined by 20%-25% across all regions except the North East where they fell by over one-third. Based upon relative numbers of replacements to the suckler herd, the data suggest there will be continued reduction in suckler cow numbers across all lowland regions in the coming year, particularly in the North East.

On Upland holdings there was a decline in the number of heifers in calf suggests that there may be a reduction in suckler cow numbers on such holdings in 2006. In less favoured areas, it is harder to interpret the data at a regional level. There was very little difference between regions in changes in both suckler cow and replacement heifers in calf.

Although there was an overall 3% increase in the number of suckler cows in England in the year to June 2005, the pattern is quite varied across the country when focussing on JCAs. The greater reductions tend to be concentrated in the far North East (Northumberland and the Cheviots). Increases appear more concentrated around South Cumbria and Lancashire in the North West and in the South West between Salisbury plain and the Devon Redlands – traditional dairying areas, suggesting that the increase may be arising where dairy farms are switching into beef. The Defra study also found that trends were beginning to emerge according to farm type (Table 3.22).

**Table 3.22 Changes by farm type – all holdings**

<table>
<thead>
<tr>
<th></th>
<th>Suckler cows</th>
<th>Beef heifers in first calf</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
<td>2005(a)</td>
</tr>
<tr>
<td>Cattle &amp; Sheep Lowland</td>
<td>270</td>
<td>274</td>
</tr>
<tr>
<td>Cattle &amp; Sheep LFA</td>
<td>208</td>
<td>207</td>
</tr>
<tr>
<td>Mixed</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>Cereals</td>
<td>70</td>
<td>72</td>
</tr>
<tr>
<td>Other</td>
<td>65</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>730</td>
<td>749</td>
</tr>
<tr>
<td>New holdings</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Total plus new</td>
<td>730</td>
<td>752</td>
</tr>
</tbody>
</table>

(a) 2005 classified according to 2004 farm type

---

34 NUTS1 level data. Nomenclature of units for territorial statistics (NUTS) was created by the European Office for Statistics (Eurostat) as a single hierarchical classification dividing regions into geographical sub-groups for each Member State. In England there are 5 levels. NUTS1 is equivalent to Government Office Regions. For more information see [www.statistics.gov.uk/geography/nuts.asp](http://www.statistics.gov.uk/geography/nuts.asp)

35 Holdings classified as being in less favoured areas.
The greatest reductions in replacement heifers in calf were found on extensive livestock holdings (cattle & sheep lowland and LFA) which suggests that these farm types may see some reduction in suckler cows in 2006 – particularly lowland holdings. The greatest increases in suckler cow numbers occurred on “other” farm types where the main activity of the holding in 2004 was not extensive livestock production. Half of this increase on “other” farm types occurred on holdings classified as farm type “dairy” in 2004.

At an aggregate national level the Defra June Survey shows little change in sheep numbers between 2003 and 2005 (Table 3.23).

**Table 3.23 Change in sheep numbers 2003-05**

<table>
<thead>
<tr>
<th></th>
<th>Ewe Nos 2003</th>
<th>Ewe Nos 2005</th>
<th>Change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowland Pastoral</td>
<td>2,082,955</td>
<td>2,081,299</td>
<td>-1,655</td>
<td>0</td>
</tr>
<tr>
<td>Arable</td>
<td>471,825</td>
<td>460,724</td>
<td>-11,101</td>
<td>-2</td>
</tr>
<tr>
<td>Uplands</td>
<td>1,916,649</td>
<td>1,921,158</td>
<td>4,509</td>
<td>0</td>
</tr>
</tbody>
</table>

However, a more detailed investigation of upland holdings\(^{36}\) shows that while the total number of sheep and lambs has remained stable (+1%), there are indications that the structure of the flock is beginning to change. The most notable change is a reduction in breeding ewe replacements (-14%). Whilst large increases in other male and female sheep over one year old (+93% & +105% respectively) are apparent it is too early to infer changes to flock structure from these figures as the confidence intervals are very wide and the level tends to fluctuate year on year.

**Table 3.24 Change in sheep numbers in the uplands 2003-05 (‘000 head)**

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2005</th>
<th>Change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breeding sheep 1 Yr+ for further breeding</td>
<td>1,917</td>
<td>1,921</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>North East</td>
<td>468</td>
<td>468</td>
<td>-0.01</td>
<td>0</td>
</tr>
<tr>
<td>North West</td>
<td>473</td>
<td>488</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>South West</td>
<td>353</td>
<td>336</td>
<td>-17</td>
<td>-5</td>
</tr>
<tr>
<td>Breeding sheep 1 Yr+ for slaughter</td>
<td>77</td>
<td>81</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>North East</td>
<td>16</td>
<td>19</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>North West</td>
<td>20</td>
<td>22</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>South West</td>
<td>19</td>
<td>19</td>
<td>-0.86</td>
<td>-4</td>
</tr>
<tr>
<td>Female sheep 1 Yr+ not yet breeding, put/ to be put to ram</td>
<td>408</td>
<td>349</td>
<td>-58</td>
<td>-14</td>
</tr>
<tr>
<td>North East</td>
<td>105</td>
<td>92</td>
<td>-13</td>
<td>-13</td>
</tr>
<tr>
<td>North West</td>
<td>113</td>
<td>96</td>
<td>-18</td>
<td>-16</td>
</tr>
<tr>
<td>South West</td>
<td>66</td>
<td>56</td>
<td>-10</td>
<td>-15</td>
</tr>
<tr>
<td>Rams for service 1 Yr+</td>
<td>53</td>
<td>55</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>North East</td>
<td>13</td>
<td>14</td>
<td>0.6</td>
<td>5</td>
</tr>
</tbody>
</table>

\(^{36}\) Upland category (19 JCAs in total) represents all JCAs where the number of farms in LFA is more than double those of the other categories.
### 3.6.3 JCA analysis of trends

In order to analyse and present patterns in a way which would tie in with the three-workshop approach adopted for the study, data for the **Joint Character Areas** were grouped into three different categories according to the dominance of particular farm types, using the Survey classification of farm type. The three groups were LFA farms, lowland livestock (beef, sheep and dairy) farms and arable farms (specialist or mainly cropping). Where a JCA did not have a predominance of any of these three farm types, the June survey data for this JCA was not included in the analysis. The JCA analysis thus covers 103 JCA out of a total of 157.

The tables below present the results of analysis based upon these three separate groupings of JCA.

- **The Lowland pastoral category** (53 JCAs in total) is comprised of JCAs where combined numbers of cattle & sheep and dairy farm types are more than double those of other categories.

- **Arable category** (31 JCAs in total) is comprised of JCAs where combined numbers of cereal and cropping farm types more than double those of other categories.

- **Upland category** (19 JCAs in total) represents all JCAs where the number of farms in LFA is more than double those of the other categories.

In summary, these tables show similar trends to those identified from the national statistics. However, the differences between JCA categories and locations may offer additional insights into the potential mix of factors driving change.

<table>
<thead>
<tr>
<th></th>
<th>North West</th>
<th>South West</th>
<th>Other sheep 1 Yr+</th>
<th>North East</th>
<th>North West</th>
<th>South West</th>
<th>Lambs under 1 Yr</th>
<th>North East</th>
<th>North West</th>
<th>South West</th>
<th>Total sheep and lambs</th>
<th>North East</th>
<th>North West</th>
<th>South West</th>
<th>Total sheep and lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13</td>
<td>14</td>
<td>0.9</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>25</td>
<td>17</td>
<td>101</td>
<td>8</td>
<td>15</td>
<td>8</td>
<td>101</td>
</tr>
<tr>
<td>Lambs under 1 Yr</td>
<td>2,402</td>
<td>2,538</td>
<td>135</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>611</td>
<td>641</td>
<td>31</td>
<td>5</td>
<td>413</td>
<td>416</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>North East</td>
<td>587</td>
<td>640</td>
<td>54</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>1,221</td>
<td>1,258</td>
<td>37</td>
<td>3</td>
<td>1,230</td>
<td>1,293</td>
<td>64</td>
<td>5</td>
</tr>
<tr>
<td>South West</td>
<td>868</td>
<td>851</td>
<td>-17</td>
<td>-2</td>
<td></td>
<td></td>
<td></td>
<td>1,998</td>
<td>2,008</td>
<td>10</td>
<td>1</td>
<td>868</td>
<td>851</td>
<td>-17</td>
<td>-2</td>
</tr>
</tbody>
</table>

(Source: Defra, June survey)
## Table 3.25 General statistics and trends by Joint Character Area broad types

<table>
<thead>
<tr>
<th></th>
<th>Nos 2003</th>
<th>Nos 2005</th>
<th>Change</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dairy Cows</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>879,326</td>
<td>810,324</td>
<td>-69,002</td>
<td>-8</td>
</tr>
<tr>
<td>Arable</td>
<td>76,316</td>
<td>66,238</td>
<td>-10,078</td>
<td>-13</td>
</tr>
<tr>
<td>Uplands</td>
<td>108,070</td>
<td>100,033</td>
<td>-8,037</td>
<td>-7</td>
</tr>
<tr>
<td><strong>Beef</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>247,393</td>
<td>274,327</td>
<td>26,934</td>
<td>11</td>
</tr>
<tr>
<td>Arable</td>
<td>101,453</td>
<td>106,365</td>
<td>4,912</td>
<td>5</td>
</tr>
<tr>
<td>Uplands</td>
<td>156,944</td>
<td>159,621</td>
<td>2,678</td>
<td>2</td>
</tr>
<tr>
<td><strong>Sheep</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>2,082,955</td>
<td>2,081,299</td>
<td>-1,655</td>
<td>0</td>
</tr>
<tr>
<td>Arable</td>
<td>471,825</td>
<td>460,724</td>
<td>-11,101</td>
<td>-2</td>
</tr>
<tr>
<td>Uplands</td>
<td>1,916,649</td>
<td>1,921,158</td>
<td>4,509</td>
<td>0</td>
</tr>
<tr>
<td><strong>Maize incl fodder</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>71,844</td>
<td>78,585</td>
<td>6,741</td>
<td>9</td>
</tr>
<tr>
<td>Arable</td>
<td>9,884</td>
<td>10,867</td>
<td>984</td>
<td>10</td>
</tr>
<tr>
<td>Uplands</td>
<td>759</td>
<td>982</td>
<td>223</td>
<td>29</td>
</tr>
<tr>
<td><strong>Farmers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>14,655</td>
<td>14,126</td>
<td>-529</td>
<td>-4</td>
</tr>
<tr>
<td>Arable</td>
<td>16,263</td>
<td>15,157</td>
<td>-1,106</td>
<td>-7</td>
</tr>
<tr>
<td>Uplands</td>
<td>1,452</td>
<td>1,428</td>
<td>-24</td>
<td>-2</td>
</tr>
<tr>
<td><strong>Horses not owned</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowland Pastoral</td>
<td>33,062</td>
<td>44,735</td>
<td>11,673</td>
<td>35</td>
</tr>
<tr>
<td>Arable</td>
<td>16,755</td>
<td>21,496</td>
<td>4,741</td>
<td>28</td>
</tr>
<tr>
<td>Uplands</td>
<td>4,007</td>
<td>5,121</td>
<td>1,114</td>
<td>28</td>
</tr>
</tbody>
</table>

It is perhaps when these statistics are split between the main regions of England that some more explanatory power is given to this approach to data analysis. For example, in examining changes in the LFA there is a clear distinction in patterns of observed change in cattle herds, with the North West influenced more strongly by the trend whereby small dairy farms are exiting and going into beef, whereas in the other upland areas the dominant trend is for a decrease in beef herds.

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37 This terminology is used to distinguish horses kept for other owners (i.e. as a business venture), as opposed to horses owned by the farmer which are generally kept as pets.
Table 3.26 Changes in the LFA JCAs, by region ('000 head or hectares)

<table>
<thead>
<tr>
<th></th>
<th>Nos 2003</th>
<th>Nos 2005</th>
<th>Change</th>
<th>%Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dairy Cows</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North East Region</td>
<td>6</td>
<td>6</td>
<td>-0.5</td>
<td>-8</td>
</tr>
<tr>
<td>North West Region</td>
<td>28</td>
<td>25</td>
<td>-3</td>
<td>-10</td>
</tr>
<tr>
<td>South West Region</td>
<td>15</td>
<td>14</td>
<td>-1</td>
<td>-7</td>
</tr>
<tr>
<td><strong>Beef Cows</strong></td>
<td>157</td>
<td>160</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>North East</td>
<td>44</td>
<td>44</td>
<td>-0.6</td>
<td>-1</td>
</tr>
<tr>
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<td><strong>Beef replacements 2+ yrs</strong></td>
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<td><strong>Female sheep 1 Yr+ not yet breeding, already put/ to be put to ram</strong></td>
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<td><strong>Lambs under 1 Yr</strong></td>
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<sup>a</sup> Horses or ponies not owned by occupier or occupier’s family.
Similarly, in examining different arable areas of England, we can see how a combination of natural and social factors affect the trends observed. For example, the growth in ‘horsey-culture’ is more marked in areas closer to high densities of urban population in the north than it is in the more sparsely populated arable areas of East Anglia. Also the East Midlands, with its more varied agricultural character and capability, often shows a different degree of response to trends in respect of arable crops than those apparent in the north and east.

Table 3.27 Changes in arable JCAs, by region ('000 hectares or head)

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2005</th>
<th>Change</th>
<th>% change</th>
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<td>39</td>
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</table>

(a) Includes other arable crops not mentioned on the census form, such as lupins, hops, hemp or medicinal plants, aromatics and spices

### 3.6.4 Commentary

These tables have not been analysed in great depth in this study because to attempt to do so could well be misleading, given that we are still so early in the process of farm adaptation to change in CAP supports following the 2003 reforms. However, the data already show a number of interesting points which would generally tend to
support the kinds of hypothesis about change that have been discussed in the literature and in our workshops (see next section). In particular, they appear to show evidence of early change already in key livestock sectors and situations – beef, and upland sheep, in particular – and to support the more conservative/circumspect view of the likely pace of structural change in arable farming that has emerged from our review.

At the same time, the data also demonstrate their limitations. In the literature review much has been gleaned about the kinds of change that have been occurring in arable areas in particular, as farms adopt a range of less traditional forms of shared or contract-related management in order to plan and crop land, leading to apparently significant spatial change in cropping types and patterns. The June survey is wholly unable to capture this kind of trend, because it remains based upon a holding-level collection of data which could be becoming less and less representative of the meaningful units of management planning, in relation to arable cropping.

Thus whilst we conclude that the ongoing and quite detailed tracking and analysis of June and December survey data will remain an essential element in the Defra Observatory’s work over the coming years, it is clear that additional methods to capture further elements of farm level change will also need to be considered.
4 WORKSHOP FINDINGS AND INTERVIEWS

4.1 Introduction
As explained in chapter 2 of this report, workshops with a wide range of practitioners were used as a way of triangulating the rather partial and of-necessity speculative nature of existing literature about the likely impacts of the 2003 reforms, plus the indications from emerging data. By discussing the patterns of change anticipated from these two sources with people who are working with land managers on a day-to-day basis, it is possible to assess the degree to which practitioner experience appears to support or contradict them. In addition, practitioners can add valuable interpretive depth to help in explaining why certain patterns or trends appear to be emerging or likely to emerge, from a practical farming perspective. This section provides a summary from each of the three workshops held and then records the main points of discussion in bullet point format. Please note that these bullet points summarise the views expressed by workshop attendees, which may or may not be corroborated by specific evidence. However, the format of the workshops and the mix of invitees were designed to enable any clearly incorrect views to be challenged, so the points recorded here exclude the few examples of these that arose. Details of workshop attendees, programme and presentations (summarising our findings from the literature review and data analysis) are given in annex 2 and help to provide the context for the three summaries. A further section then summarises the results of four ‘follow-up interviews’ with practitioners about specific areas of farm level change arising from CAP reform – these interviews were carried out to address apparent ‘gaps’ in the expertise of practitioners present at the workshops, as suggested by themselves. The final section in this chapter then presents the results of interviews with environmental experts, which were designed to tease out the precise environmental implications of the farm changes anticipated, in respect of the full range of Defra’s environmental priorities.

4.2 Workshop findings

4.2.1 Arable systems: Notes from the Peterborough Workshop
The following key points of opinion emerged from the workshop. It is clear that uncertainty about entitlements has meant that farmers are delaying making decisions about farm structural changes. An increase in horticultural production is not expected due to limited FVP\textsuperscript{38} authorisations, and a lack of suitable land. However, expansion in organic farming is expected, due to demand. There will be more specialisation into wheat and rape, with some simpler rotations (dropping barley and legumes) amongst the larger growers. Smaller farms might go for mixed cropping and premium prices. No return to mixed farming is predicted although beef fattening may increase, making use of vegetable waste. Land quality will influence cropping decisions. Heavier and lighter land will not be cropped, but go into temporary fallow and short term set aside instead. Farms will become zoned with cropping efforts concentrated on the more productive areas of the farm. If the wheat price remains low there will be more fallow and farmers will look to diversify. One option may be

\textsuperscript{38} Growers with land used for FVP (fruit, vegetable, potato) crops can claim SFP if they have been issued with special entitlements that have FVP authorisations.
that contractors crop only in the years when prices are good. Farmers are likely to put 5-10% of land into ELS conservation management options. Marginal land will be used for this purpose, so reducing the need to intensify cropping on the rest of the farm to maintain the same income. Continuing changes in management arrangements are anticipated, with an increase in contracting and a fall in the number of people taking day-to-day cropping decisions.

General comments: decision making and evidence of change

- Uncertainty has made most farmers adopt a wait and see strategy. Also large amounts of red tape have distracted them from making a long term strategy. The entitlement statement has muddled rather than clarified things for many farmers.

- It is not just policy that is important, decisions are being driven by economics and crop prices and SFP is just one factor. Some trends are already apparent, e.g. in the horticulture sector over the last 25-30 years the number of active businesses has fallen by 80-90%, those left are very market focused businessmen.

- In the arable sector not much change is anticipated compared to the livestock sector. In the livestock regions Defra’s farm business advisors have been inundated with requests for advice, whereas in the East of England the situation is much calmer.

Horticulture

- Vegetables and fruit under cover will not be influenced significantly by SFP, because values per ha are so high. Factors such as cost structure and market are more important in influencing farm change in this sector.

- An increase in the area of outdoor vegetables is not expected with SFP, as the value of SFP is insignificant and FVP authorisations, required to claim SFP, are limited to prevent many more producers moving into these crops. The 2005 census shows the area of outdoor vegetables is at its lowest since records began because of the difficulty of FVP authorisations.

- If uncropped arable land becomes available vegetable growers will only use it if the quality is right and the area suitable, but this is unlikely. Other sectors will not move into outdoor vegetables because it needs good skills, quality soils and good marketing contacts. Also the most suitable land is already in horticulture.

- Labour shortage is not seen as a problem because of the increase in skilled East European immigrants, particularly in horticulture, and now even into management.

- There are complex farming arrangements in the horticultural sector. For example, cut flower growers pool their land with fruit and vegetable growers to allow appropriate rotations. 70% of carrots are grown on rented land, and this figure is rising; the same is happening with potatoes.

Sugar

- The uncertainty over sugar will impact upon decisions about other crops and prevent any long term planning. On many farms sugar is the only profitable crop. With 4 years of price cuts for sugar ahead there will be uncertainty for some time.
• There are some issues for conservation if sugar disappears. Beet tops are used by pink footed geese and by skylarks and stone curlews when the land is sown.

• Crops like sugar will be grown for biofuels in the short term only (to mop up excess sugar and wheat). It will not be an attractive proposition longer term because other biofuel crops/areas are more competitive.

• Exiting sugar beet farmers might let land to others to farm.

Economics

• In the long term, product prices will be low and because of demographics many farmers will see SFP as a retirement option.

• The economics of farming is not good. For wheat, in reality farmers are losing money on a full cost basis, but other factors make them decide to keep going, like enjoying being a farmer.

To crop or not to crop?

• Land quality will influence cropping decisions. Heavier and lighter land including most ALC 4 (and some 3) land with mixed soils will not be cropped, but go into temporary fallow and short term set aside instead. If there is an option of taking on more land farmers are now looking at it more critically in terms of quality and field size/regularity. Inappropriate land will come out of cropping e.g. on Salisbury plain, large areas of wheat grown because of the subsidy regime, will not now be sustainable under SFP.

• Opinions differ about the threshold of wheat yield at which to stop cropping - some thought < 10t/ha others <5-6t/ha. However, most will continue cropping unless they can reduce their fixed costs dramatically.

• With low crop prices, landowners will decide they do not want to farm and bear the risk of cross compliance, but instead will fallow. The deciding factor will be cross compliance and GAEC penalties.

• If farmers stop farming there are tax implications (farmed land has IHT exemption). Test cases are currently running looking into the definition of what ‘farming’ actually means. The outcome will impact upon farmer decisions.

• If the wheat price remains at 65/t there will be more fallow than now and farmers will look to diversify for e.g. move into commercial shooting and put half the farm down to game cover.

• Cropping decisions are based on price at drilling time, although many farmers (and horticulturalists) are on fixed contracts. One option may be that contractors crop only in the years when prices are good. This approach will mean that contractors will not be using their machinery to capacity.

• Tenant farmers will have different equations to do compared to owners. For many, SFP pays the rent and if they do not crop they will not make any income. Short term tenants do have year to year flexibility. Fixed holding tenants are more likely to be farming full time. Owner occupiers will have a more diversified income stream, using building assets etc. and thus have slightly more flexibility.
• The outcome from these various cropping decisions will be more diversity; this is what a free market is all about.

On farm changes/responses

• There will be more specialising into wheat and rape, with some simple rotations (dropping barley and legumes) amongst the larger growers. Smaller farms might go for mixed cropping and premium prices.

• Farms will become zoned. Farmers will concentrate cropping efforts on the more productive areas of the farm, such as the middle of the field; yield mapping could be used to identify high and low yielding areas.

• It is likely that farmers will put 5-10% of their land into ELS on a per ha basis (low yielding land) and keep the rest of the land in the same intensity of cropping. Some areas will be put down to grass, but not stocked. Grass margins are a popular option as their management costs are low and they meet legislation such as LERAPs

• Block cropping is becoming popular. These farms tend to keep environmental aspects out of the cropped areas, and extra habitats may need to be created to get ELS.

• Estimates (Andersons) of the amount of land that cross compliance and ELS would take out of cropping (buffers /winter stubble) are: <1% with cross compliance and <4% with ELS. So there will be about 2% increase of habitat. There will not be a need to intensify cropping on the rest of the farm because taking these marginal areas out will not having a significant impact on gross margin.

• Expansion, and new comers to, organic farming in all sectors is expected due to demand. Also a big growth in the demand for regional/local supply is anticipated which will have a greater impact than organics, e.g. The London Food Strategy.

Different arrangements for farming the land

• There are many different management agreements, contracting is only one of them. The Census does not identify these management arrangements, although in terms of monitoring land management NFU subscription numbers are a good measure of the number of actively farming businesses.

• Contracting will increase; a third of Suffolk farmers have contracted out already. Machinery rings/pools will reduce fixed costs although farmers will lose flexibility. Fixed costs can be reduced by £60 to £100/ha with share farming.

• There is a lot of grazing land available. Negative rents are paid by some to maintain pasture for GAEC. One indicator of change in land use might be red meat processing across the region, but is this short term or long term?

• Active farm businesses will decline in 6-7 years as the move to global trading systems increases. Farms will not change hands, but will be farmed under different arrangements. The number of people taking day-to-day cropping decisions will fall; they will disengage from active management.
• The number of landowners will stay the same, but the managers will change so for conservation different people will be making decision to those who are farming.

• RPA has 120,000 claimants, 60% of these cover 10% of land and produce less than 4% of the value of output.

Movement of land

• Small blocks of land are coming onto the market and succession decisions will increase this movement.

• Estate agent data shows that areas of arable land for sale have fallen. In fact, there has been a steady decline since the war.

• 50% of buyers are non-farming, according to agents. These are Wildlife Trusts, lifestylers etc (Lifestylers will not farm themselves, they will let someone else do it).

Impact of rise in non-farm income

• Non-farm income is important. It is estimated that over 40% of farms derive some income from non-farm sources. This is greater in arable areas, the S.E. and larger farms. Buildings are used as assets for B&B, rental, livery etc. Those that are still full-time farmers are very intensive and engaged in all aspects of the food chain.

• More people working off the farm puts pressure on those left so simplified, easy care systems are needed, or more contracting/letting.

• Farming production is subsided by ELS, SFP and diversification, but how long can this continue?

Fall in inputs

• Input manufacturers data (and ADAS survey) show a decline in fertiliser use but an increase in pesticide use (area based not kg/ha). Protocols, biocontrol, regulation and economics will all drive a decline in agrochemical use.

• There is a move from prophylactic pesticide use to preventative measures (avoiding pesticides) in horticulture, but it may continue on large farms; it will be driven by cost. For broad acre crops, spraying regimes will be kept to a simple, single programme.

• Labour and machinery will continue to fall as farmers strive for more efficient production. There is scope for economies of scale with formal and informal sharing.

Water Use

• This is a big issue in the East of England, although nothing to do with CAP. Intensive cropping will have problems because summer abstraction will be reduced, exacerbated by demand from housing (East is a housing growth zone) and meeting supermarket quality grades.
Set aside

- Defra’s 2006 set aside analysis was presented and showed no westward drift of set aside, and also that the 2003 and 2005 distribution is the same. In the future, the arable East may have more set aside than its obligation whereas dairy will have the bare minimum.

- If set aside disappears the impact of releasing permanent set aside will be minimal because these are comprised of small less productive fields that will not come back into production. If set aside goes then farmers might fallow one year, and use a rotation concentrating on high value crops without cereals, although some claim this is bad for soil structure.

- A lot of grassland in the West and South of region is not being grazed. This will not be picked up by census, it all depends on how the farmer has recorded the fields in the census.

Livestock

- No return to mixed farming is predicted, livestock will be hobby only

- There is a movement of livestock out of the region and this will have to be balanced by environmental management. The milk quota is going to NI, Cheshire and Wales.

- Fattening animals in the East? SAC has forecast more beef in the lowlands. Bedfordshire and S Lincolnshire will have vegetable waste available for animal feed, will this could lead to an increase in beef, or use of methane burners in glass houses and anaerobic digesters.

Wildlife projects

- Rewilding of the coast is planned with nature reserves/RSPB/WLT e.g. Great Fens Project. Non farming buyers also have an interest in nature. Realignment plans have stalled, because of lack of replacement habitats.

- These projects need grazing and have used flying flocks. In Suffolk these have stopped because they are too costly. In some projects the trusts manage everything, all farmer needs to do is provide the livestock. There would be a market for the meat if there was a supply chain for e.g. they could use the RSPB logo, like Essex WLT, who have 1000 ewes grazing coastal marshes and sell their lamb to their members.

- Woodland planting has doubled in last 25 years for the whole region although this is mostly on highways and not always agricultural. It does not produce commercial wood, but is linked to lack of profit on marginal land.

Growth area

- For 12 miles inland of Norfolk and Suffolk cost there are 35-40 year olds working at home with small plots of land, they will want land managers and drive an increase in regional/local supply chains for local food.

- Bedford, Peterborough Thames and Haven Gateway, Stanstead etc are all housing growth areas, equal to a third of area of East of England. The Wash is becoming the new Solent, with many marinas planned.
Indicators of change for Defra

- Use Regional panels
- SPS/IACS figures
- More information on the structure of the business is needed as opposed to land ownership, i.e. identify those who are actively farming the land. This will reveal changes concealed by current data collection.
- ‘Landowner’ needs to be defined. NFU membership figures gives better indication of active managers.
- Track diversification and off-farm income over time and understand patterns.
- Need to develop a better understanding of the impact of farm structure change on environment.
- Identify patterns of separation of management of land and food production.
- Barometer farms? – difficult to get a representative sample because there is so much diversity.

4.2.2 Dairying and lowland livestock systems: Notes from the Taunton Workshop

The following key points of opinion emerged from the workshop discussion on dairying and lowland livestock systems. There is currently little evidence of farmers planning to exit the dairy industry. Those giving up are medium sized units, who have the option and the business sense to make changes. They are changing to beef (linked to supermarkets contracts and direct sales) and sheep, or responding to the high demand and good premiums for organic milk. Smaller farmers are stifled by the love of milking and the lack of time to plan changes. As pressures mount, a tipping point will be reached when farmers will exit dairying. Beef and sheep farms are changing in a more pro-active way, compared to dairy. Some single suckler beef farmers are talking of cutting back. Two trends are envisaged for beef: more intensive, commercial, mainstream beef using arable by-products; and less intensive systems meeting the demand for slow reared, quality meat. There is currently a buoyant organic beef market and direct sales. Current poor prices mean there is a disincentive to move into sheep and the loss of an abattoir in the SW has upset the market. There is a growth in smallholder or ‘other’ sectors in the SW. Newcomers are attracted into farming in SW through more flexible arrangements and for example through Fresh Start and often have off-farm income to support them. 50% of land in the SW is being sold to non-farmers and this brings many new opportunities for existing farmers. There will be a polarisation in land use. Areas of poor land to the west of the SW region will extensify or be abandoned, while production will intensify on the better land in the east. Combinable crops will stop on marginal land and revert to extensive pasture. Some feel that farmers will use their ‘easy’ grassland and abandon heathland or moorland management.

Dairy sector

- Uncertainty has made it difficult to plan ahead, once people have the cheque and know their entitlement they will be in a position to make decisions. Many dairy farmers do not realise the implications of SFP and cross compliance.

- Larger farms with 240-300 cows tend to be specialised and intensive and making the most money, but these are probably also the farms causing the most damage to soil and water, which will be most threatened by Nitrate Vulnerable Zones (NVZ), Good Agricultural and Environmental Condition (GAEC) etc;
• Many smaller dairy farms aim to keep going despite the poor prospects. They
cannot afford to invest in new waste management facilities, but know nothing else
and have limited options for change.

• There is currently little evidence of many farmers planning to exit the industry.
The love of milking stifles business decisions. Also, long working hours may
prevent them from thinking and planning changes. [NB figures from Defra
suggest that 200 dairy farmers gave up milking in the last calendar year, in the
SW region]. Often the ones giving up are medium sized units, as these have the
option and the business sense to make changes.

• A few farms are changing to a lower input and lower output situation relying on a
second, off-farm income.

• There are few milk buyers, and there are problems organising alternative sales
routes and other options. Some have tried ‘added value’ direct sales, but they are
constrained by the terms of their milk supply contracts.

• Some are responding to the high demand and good premiums for organic milk.
The processors in the region are now capable of dealing with larger quantities of
organic milk. In Jan 2006, 92 people were seeking conversion (double the
number in 2005 and the highest figure since the 1990s). OELS has been the
trigger for some conversions (figures are from the Organic Conversion
Information Service).

• Intensive dairying is a very skilled business and skilled herdsmen are in short
supply because of labour shedding. East Europeans provide some labour.

• With all the pressures at present, e.g. environmental pressure, bovine TB
(infection went up 38% to 15,000 recently), lower milk prices and cattle ear tags
and identification requirements through cross compliance (the biggest failure
areas), penalties and pressures will mount up and farmers will exit dairying.
However Fresh Start figures suggest that people are still optimistic about farming
and want to enter the industry.

• Evidence from the UE survey of farm restructuring (see Lobley et al, 2006) shows
that larger units are becoming more specialised and intensive and the smaller
units changing to beef (linked to supermarkets contracts and direct sales) and
sheep.

• In the southwest region, livestock farming is complicated by complex tenure and
holding patterns and the tradition of renting bits and pieces of land. The
interpretation of cross compliance requirements, particularly with regard to stock
movement, will be difficult.

• Farmers are realising they can pick up environmental grants, although some are
wary of becoming ‘trapped’ and constrained in future decisions such as potential
reversion of grassland to arable, if prices improve.

• Although many farms will not be profitable under SFP, many have not been
profitable for years and yet are carrying on, so this cannot be used as an
indication of farmers exiting the industry, many will just stay on and endure.

Beef
• Beef and sheep farms are changing in a more positive way compared to dairy.

• Some single suckler beef farmers talking of cutting back. They realise they do not have to keep animals to obtain the SFP. Census (2005) figures showed that beef replacements fell 35% since 2003.

• Two trends were envisaged for beef: more intensive, commercial, mainstream beef using arable by-products and less intensive systems meeting the demand for slow reared, quality meat. Sometimes these two will take place on the same holding. Trends indicate a shorter life span for cattle and developing high quality breeding stock for direct sales.

Sheep
• Poor prices mean there is a disincentive to move into sheep. There is no evidence of an increase in numbers and the Lloyd Maunders decision (to cease taking sheep at its abbatoir in SW) has upset the market.

• Any mixed farm that cannot grow 4tonnes/acre should consider changing to sheep. In the South Hams there is already evidence of arable farmers going into grass clover leys.

Organic
• There is broader interest in organics. In Gloucestershire ‘organic fallow’ is popular under OELS. In Wiltshire and Avon figures of organic holdings rose from zero to 200 recently.

• RDS confirmed they are monitoring OELS figures monthly to check whether new entrants attracted by the scheme risk creating market distortion for existing producers.

• There is a buoyant organic beef market and direct sales*.

• Decisions to change to organic are based on economics in the east, and in the west it is a case of what suits the farm. Farmers may not start out with environmental motivations, but they become organically minded after a few years

• There should be scope for collaboration in the SW with Organic Centre in Cornwall and Organics SW (Objective 1) which have demonstration farms and encourage networks.

General
• The scale of the response to CAP reform will be slow and the Government must realise this. Investment decisions happen at certain critical crunch times on family farms – changes will be patchy and sporadic

• FBAS has had a stronger demand for livestock advice in the western half of the country compared to the east. The demand is highest in the NW and SW.

• UE’s survey (Lobley et al, 2006) identified 40% of all farmers as ‘active adapters’ and 60% ‘passive absorbers’. The former are more dynamic and adaptable, the latter are resistant to change. There are tremendous variations in the levels of ability in farming; there is a need to push the industry onto the hands of the capable.
• New comers are still attracted into farming through more flexible arrangements and for example through Fresh Start. There is a growth in smallholder or ‘other’ sectors. Possibly these new incomers with off-farm income to support them may be able to make a success of farming when those currently in the industry cannot.

• There may be some return to mixed farming in those farms that have their own outlets. Mixed farm changes are dictated by the amount of grassland available on the farm. ELS may be an incentive as it provides points for mixing stocking.

• 50% of land in the SW is being sold to non-farmers and this brings many new opportunities. Many incomers do not know how to or want to farm, so will need capable farmers to look after their land.

• The category in the census of ‘other’ land use is relatively large and needs to be better understood.

• In terms of diversification farmer need to be creative - the B&B boom has passed.

Markets

• Markets and prices will affect farm change more than policy change. Lloyd Maunders lost the contract for West Country lamb to Sainsburys and this has had a big impact in the region.

• However, there is strong demand for UK produce with forward price contracting. Tesco takes up most of the red meat in the region. In the commodity market 80% of all UK farm output goes to 6 supermarkets.

• Heavy pressure from imports and supermarkets exercising power are all negative impacts so there is a need to develop an export market and need to develop consumer loyalty and create a demand for the product.

• There is growing market awareness amongst farmers. There is more engagement by the 40% active adapters and more understanding of how markets behave.

• There are supply chain (processing) constraints to the growth of niche markets, this part of the chain needs investment. Niche markets are small in volume - mainstream is more important.

• If beef production in this region falls too far, the St Merryn (Cornwall) processor would not be economic and would close down. If this happens beef and cow meat will shift to the areas of the country where there is cheap arable feed and redundant buildings available.

Geography of change

• There will be a polarisation - in general the further west the worse the land (with exceptions). These areas will extensify or be abandoned, while production will intensify on the better land in the east. This is in the short term, but when SFP stops farmers will step back in because of concerns about soil fertility. Even under individual farm management this pattern might be the same with abandonment of poor land and concentration of production on good land.
• If there are no good returns and the Water Framework Directive (WFD) kicks in with new regulations, farmers will abandon livestock farms.

• There will be unkempt landscapes and cross compliance conditions will not be sufficient to impact upon this. Experience suggests that the pressure from WFD to improve catchment management will not be sufficient to ensure good management of the landscape.

• Farmers welcome the flexibility of ELS, set aside and decoupling as they present more options than arable area payment. Combinable crops will stop on marginal land and revert to extensive pasture. Farmers will use their easy grassland and abandon heathland or moorland which will have an impact on grassland habitat.

• More energy crops would be grown in the future which would impact the landscape if done on a large scale. There is a processor on the Somerset-Dorset border which needs 350,000t wheat a year. A biomass power station proposed at Winkley, Devon would transform the landscape for a 40km radius. NFU consider that on a small scale for the community use, growing energy crops is good, but on a large scale it is unsustainable.

• Large scale landscape changes are stimulated by environmental grants such as ‘rewilding’ large areas and large scale reflooding of wetlands.

• Undergrazing will overtake overgrazing soon as the main reason that 169,000 ha of SW’s SSSIs are not meeting government targets. Less HLS, which is very targeted, will compound this.

• In SW, 35% of farmed land is in ESA (e.g. Dartmoor) and CSS schemes. Some are committed to schemes for some more years yet e.g. Dartmoor, so no dramatic changes in these landscape are expected for some time.

Possible indicators of change for Defra to monitor

• Beef numbers - numbers alone are not sufficient, we need to know what they are grazing, how long they live, and what the management systems are.

• There is a need for better census data. Land cover data alone is not sufficient – we need to know the purpose of the land cover.

• Cattle and sheep tracing schemes will provide better data.

• It may be possible to track a sample of farmers rather than just rely on stats (barometer farms).

• Catchment-landscape interactions should be monitored and changes tracked.

• Improve the FBS - redefine what constitutes a viable farm business. FBS should become the Rural Business Survey.

• Put less emphasis on the census but look at farm businesses, reduce size cut off and understand what is going on in the ‘other’ category.

• Study the adaptation strategies across the countryside.
- Use a regional panel of farmers (this has been successful with UE and Devon CC) it gives a good insight into local food chains.

- Track local food chains.

- FBS incomes and outputs should include public good gross margins (such as costs of field boundary management).

4.2.3 Upland livestock: Notes from the Penrith Workshop

In summary, views expressed were as follows. Most farmers have opted to continue as before, until they receive the SFP. Some sheep farmers are just starting to cut back on numbers, particularly old breeding ewes and some have already reduced sheep numbers on fells. There is also some evidence of sheep breeds changing and an increase in off-wintering, resulting in the loss of the hefting habit. Also, upland beef herds are disappearing. Nevertheless, there is demand for quality beef and increasing interest in traditional breeds, and ‘lifestyle’ beef producers are apparently showing some signs of success. There is a greater need for farmers to reinvest if they want to stay in beef and dairy compared to sheep, because of the more significant waste and hygiene/welfare/housing issues. It is expected that smaller dairy herds will disappear while larger farmers will expand and invest. Access to a milk processor is critical, as well as investment in modern unit facilities. Young people are leaving the hills as farming is harsh and uneconomic and there are difficult succession issues. Agricultural support alone will not be enough to attract them to stay in hill farming. Wider issues need to be addressed, such as local housing. Diversification and reliance on off-farm income is already common in the uplands. This means that increasingly, farm-based labour is being diverted elsewhere and taking farmers away from the hills, so the hill management suffers.

General comments

- CAP reform is only one driver in farm change.
- DA and SDA need to be distinguished in the discussion because they will react differently.
- Defra’s intentions are for farmers to reorientate themselves towards the market – we should ask therefore whether farmers short term adaptations are showing this shift.
- The general trend is for extensification.
- Despite dire warnings, good progress in farming has been made in Cumbria post FMD.
- Farm accounts show how important subsidies are for profitability – farmers will need some form of support to continue, it is accepted this will be linked to environmental returns.
- No significant farm changes are occurring at the moment as farmers are waiting to see the level of SFP they will receive.

Decline in sheep

- Most farmers have opted to continue as before until they get the SFP. They will not sell off stock this spring. They are still in a stratified sheep industry in Cumbria, as well as at farm level.

- Uncertainty has affected the land market. For summer grazing the market price is £120/ac and is expected to stay stable. Land prices are also firm, with no land coming onto the market, so farmers are having to take short lets. These are short-term issues because of uncertainty about entitlements and SFP.
• Some farmers are just starting to cut back on sheep. Old breeding ewes which were kept on because of rebuilding after Foot and Mouth Disease are now being sold off. Also the incentive to keep sheep to obtain sheep premia has gone. This decline in sheep numbers has brought a coincident increasing amount of cheaper lowland grazing and a dramatic rise in deer numbers.

• Farmers have been taking sheep off the fells for some time anyway in order to reduce stocking rates to prevent overgrazing under the Sheep and Wildlife Enhancement Scheme (SWES) and ESA, with 40-50% reductions. However, these farmers have not sold the sheep, but have often dispersed them, for example, many are grazing on the Solway areas. So when the census data shows a decline, in reality it is dispersal.

Change in sheep grazing system and breeds
• There is evidence of sheep breeds changing with negative and positive impacts. Fells will become a dumping ground for heavier commercial sheep, but will have no active management. However, some farmers are using traditional breeds looking for niche markets or just as a matter of pride.

• Traditional hefted sheep and their associated management will have to be supported otherwise there will be a drift towards commercial breeds. For the current grazing system to survive there is a need to act quickly to support it. Conditions of old HLCA delivered this support in the past. It defined the breed of sheep and the system of regulating flock age. Some land agents are building conditions into commons agreements.

• Off-wintering - farmers are now holding flocks down until after sheering; losing the hefting habit. When the ewes are completely off-wintered this leads to higher lambing rates (105 to 120%).

• On the commons the new rule of notification of movement makes traditional grazing very difficult when sheep move in and out of commons.

• However, there is still diversity in practice. Schemes are allowing different trends, where decisions are based on cultural and economic factors.

• If farmers are reducing numbers on fells and developing new enterprises, there will be lack of time /skills to then put the sheep back on the fells in the future and keep up with the required environmental management.

• Farmers argue ESA requirements are the only thing keeping sheep numbers stable on the hills. The farmed landscape, a traditional management system based on the Herdwick breed, is a very important asset and is now under threat.

HLS and management requirements
• SFP is thought to be disadvantaging the traditional breeds. When the ESA agreement ends many fell farms will not get onto HLS because of tight targeting (or choose not to), so their income will fall from 30/ha to zero. For ELS the payments are less than the ESA and some farmers might not even get in.

• For commons HLS you need 100% sign up and 1 person to take responsibility, so uptake is unlikely to be large.
• Farmers are concerned that although they are now being asked to keep sheep numbers down, in the future they may be asked to put the numbers up – but without extra money to compensate.

Prospects for Hill farming

• Hill farming is disappearing. Youngsters do not want to carry on; farming is harsh and uneconomic and there are difficult succession issues. Younger farmers will go for bigger units with 'kinder ground' unless there is generous support. Also they don’t have /or will lose skills. Lifestyle buyers do not have relevant skills

• There is no shortage of young farmers in the Lake District, but at present there is no economic sense for staying on farms and housing is a big issue. If prospects were good for young farmers the skills would resurrect, the potential skills base is there but radical decisions have to be made to preserve these in the next few years before they disappear.

• The changing social structure of the countryside is related to farming. Young people are leaving and older people or lifestylers are moving in. Incomers do make a contribution as rural advocates.

• In North York Moors / Yorks Dales sporting estates are large enterprises. Outsiders come in and buy all the grazing rights, spending a lot of money. The Irish and Danish are moving in because farms are cheaper and there are tax breaks.

• Diversification and off farm income is common. Trucking is a popular second income source for men, wives also go out to work. This has an impact on the farm labour because of the lack of supervision on farm.

Broader support needed

• Agricultural support alone is not enough. Wider issues need to be addressed, such as local housing, removing planning restrictions. It is important to allow for at least 2 generations of farmers living on the farm.

• Diversification, which is the main element of economic support, means that labour is diverted elsewhere and takes farmers away from the hills so hill management suffers.

• Young entrants need support. Few farms come up for sale and when they do often the house is sold separately at high cost. Young farmers could be supported through share farming, the NP apprenticeship scheme. They need advice especially for succession issues.

• Those wishing to exit the industry need support as well. For some the SFP may provide the first 10 years of their pension plan. In general, hill farmers have less thinking and planning time and are not prepared for new compliance regulations. A crunch points often comes when farm become unviable

• Loss of hill farmers has implications for the landscape and Defra needs to appreciate farming-heritage-culture-landscape links. The split in delivery to the Regional Development Agencies for social elements and Natural England for environmental/physical elements will make a joined up approach difficult.
If abandonment happened and the farmland reverts to scrub, there would have to be large-scale and expensive rescue attempt. Supporting farming is the cheapest option, rather than spending money on recovery afterwards.

**Beef**

- A recent British Veterinary Survey found a large decline in livestock in the SW, but an increase in the better areas of Cumbria and Scottish borders. In Scotland suckler numbers are falling.

- Tesco cannot get enough quality beef. There is an increase in interest in traditional breeds, and lifestyle beef producers are showing some signs of success. There are demands/markets for quality meat, but this needs certain skills to meet the specific requirements.

- Lack of reinvestment is a big barrier to cattle. There is need for farmers to reinvest if they want to stay in beef and dairy compared to sheep, because of the more significant waste and hygiene/welfare/housing issues. (Farm Connect offers 40% grant in Cumbria for these sorts of investments – sub-regional need recognised).

- There is changing legislation, pollution issues (Water Framework Directive and Nitrate Vulnerable Zones) and low prices - all are affecting the industry irrespective of CAP. Cross compliance, TB, regulation and movement requirements will prevent some farmers from reinvesting in cattle.

- The price of straw will be a big constraint to beef. If cereals decline this will become a significant issue, although arguably, with a low cereal price and farmers sowing smaller acres, they will have time to bale straw instead of chopping it.

- East of the Pennines there is a trend towards collaboration, upland rearing and lowland fattening in arable units for e.g. Barnard Castle, North York Moors, Vale of York, and Malham.

- The price of store cattle is now low, the beef price needs to rise. The expectation is that by 2010 there will be price increase but at the moment in the uplands the evidence is that herds are disappearing. Large sheep farms may keep cattle for beneficial grazing as well, but may do their sums and decide to shed these small herds of beef cattle.

**Dairy**

- Smaller herds will disappear while larger farmers will expand and invest. Smaller farmers will be reducing more rapidly and in the uplands they will change to sheep or beef. Many parishes are down to their last dairy herd. In Borrowdale 6 out of 12 cattle farms have got rid of cattle, but the bigger units could intensify with grants.

- Niche markets developed from dairies such as Swaledale and Hawes (pays 23p/l) are high profile but very small scale and involve few farmers.

- For dairying access to a processor is critical as well as investment in modern unit facilities. Therefore, the prospects for West of Cumbria are poor – although the land is suitable.
Geography of change

- North York Moors (NYM): the Sheep and Wildlife Enhancement Scheme has been paying people to put sheep back on the hills because of under-grazing following the Foot and Mouth Disease (FMD) epidemic. However, the NYM has never been a competitive sheep area, much of the National Park is not in the LFA. NYM hill land is attractive for grouse shooting with its low altitude and dry climate. It is intensely burnt and has a monoculture of heather. Following FMD, landowners have been talking about buying in their own flying (i.e. mobile – not ‘hefted’ on one specific area of hill) flocks of sheep. Swaledale and Scottish Black Face sheep are declining and there is shift towards more commercial breeds.

- Lake District: There are big differences between grass and heather moorlands – it is important to remember these distinctions - this is an issue that comes up when talking about commons.

- East of Pennines: Grouse moors are owned by affluent landowners. It has a drier climate and is attractive to sporting activities. It is still contributing to the local economy.

- Northumberland: Northumberland has less moorland and also has rich landowners coming in for sports. The Ministry Of Defence (MOD) is also a big landowner. MOD farmers were not interested in CSS, but are now interested in HLS. Several organic farmers are coming out because of the economics and changed prescriptions. Hadrian’s Wall is diversifying into tourism related activates. The county has an integrated farming structure with part hill and part lowland farming, so there is more variation and potential scope for change. The same trends have been observed in the southern Pennines.

- The M62 corridor: This area is unusual as it’s a ‘no-mans land’ between the ESAs. There is some derelict land with urban problems.

- Lancashire: There are concerns about livestock farms in the DA and lowland areas\(^{39}\). Typical DA beef farms will get £28/ha less, they are fairly intensive already, so there is no scope for intensifying and there are limited opportunities for diversification. The scale of farming in this county is small and hectare payments are not a sufficient incentive to maintain these small enterprises.

- Peak District - White Peak: Intensive farming of SDA cereals/beef/dairy – all will be marginalised. A lot of farmers are relying on short term lets. There is concern that HLS is too prescriptive – let land will not be put into stewardship. Climate is bad. Large scale dairying may survive because of surrounding cities providing market. It is not a ‘true SDA’ compared to Cumbria.

- Welsh border: Again not a ‘true SDA’. There are good facilities for beef as farmers have invested in the past. There is no overgrazing in the Shropshire ESA. There are fewer and bigger farms with lower stocking rates. Shropshire farms are mixed upland/lowland, so they have the potential and scope for change.

- SW uplands: The percentage of cattle to sheep is higher. Loss of cattle is a concern with TB being one of the greatest problems. Dartmoor farmers intend to reduce sheep as they have traditionally farmed on the subsidy.

\(^{39}\)because in these areas, stocking rates will have traditionally been relatively high, so subsidy incomes will tend to fall with decoupling and a shift to an area payment, notwithstanding the national effect which will increase subsidy receipts to DA farms overall, as discussed in section 3.5.
Other land use

- Woodland - HLS gives generous payment for fencing off and excluding livestock from woodland to allow natural regeneration (£100/ha for each with limit of 50ha). There is an agreement not to afforest the Lake District.
- There will be interest in conservation projects and rewilding, such as Flora of the Fells, Tomorrows Vision of the Lake District and Wild Emmerdale Project, although the latter is actually an introduction of farm grazing animals and the cost is higher than supporting normal farming.
- Bio energy – not much interest because of slow growth rates in LFA and prohibitive transport costs.
- Some increased recreation/horses in areas surrounded by cities.

Predicted landscape change

- Landscape extensification will change the colour schemes. There will be more rushy pastures, fewer cattle, fewer meadows to mow, fewer walls to maintain. Easy care systems will become popular.
- Abandonment is not envisaged, just extensification. There are already abandoned pastures – brown areas, not scrub, so it is not breaking cross compliance.

Indicators to monitor

- Need a tighter focus on data in Defra census, as it does not reflect land management or tenure accurately, it needs to show who is actively farming.
- FBS should provide better data.
- Measure the number of farmers active on commons.
- Use Uplands focus group/ Stakeholder groups
- Monitor farm management change
- Commons are a first indicator of what might happen elsewhere e.g. shortage of labour.
- Use Barometer farms.
- Use an objective measure of land cover, as provided by the Countryside Survey
- Consult Auction markets and auctioneers - they are very well informed locally
- Measure nature and extent of skills in the farming community
- Farm practice survey
- Monitor new entrants
- Register potential new farmers.

4.2.4 Concluding remarks on workshops

These sets of comments from workshop participants have largely confirmed some of the trends apparent from the literature review and survey analysis, adding some new or more detailed information in a number of areas. However, their main value is clearly in providing a richer source of explanatory material which can help to link policies and impacts by describing how individuals and groups within the farming community are behaving as they adapt to the changes around them. The discussions enable us to distinguish some level of consensus about what is happening and why, and to perhaps discount a few of the potential linkages that we had envisaged as possible from the initial work. For example, in relation to the shift away from breeding ewes in uplands and towards older animals not used for breeding, as observed in section 3.6, one hypothesis could have been that the reforms were encouraging a
move towards the re-establishment of wethers as a more significant constituent of upland flocks, kept mainly as an environmental management ‘tool’ for the open moor. In the workshop, an alternative perspective that this was simply a short term consequence of longer-term adjustment towards much reduced moorland grazing in future, was presented. This therefore gives us two possible trajectories against which to test the data from future years of survey, in these areas. Clearly, the ‘wethers’ scenario might be anticipated to be much more environmentally positive for the future than the alternative ‘abandonment’ scenario for the moorland areas, so these issues will be highly significant for the work of the Observatory in future.

4.3 Follow up interviews with selected practitioners

4.3.1 Introduction

A small number of additional interviews with practitioners was identified as potentially valuable, given the gaps apparent in the spread of issues covered by literature review and workshops – notably, for pig and poultry and sugar sectors. In addition, there was a particular interest in seeking to understand more clearly the likely scale of contraction in the beef industry in England that has been predicted in the literature, resulting from the reforms. Accordingly, 4 semi-structured face to face interviews were conducted to explore these areas and issues. The information and insights gathered that are additional to those already presented under previous sections are summarised below.

4.3.2 Beef – interview with Rob Forster, National Beef Association

In his view, the most significant change recently has been the removal of the Over Thirty Month (OTM) rule on beef for slaughter that can enter the food chain. During the following 6 months cull cows have doubled in value, finding their natural place in the EU market. This rise in the market will allow immediate rejuvenation and restructuring of the cattle herd. The Eastern Europe deficit in beef represents a huge market for the UK and exports will continue to grow. Demand will be driven by accessibility, prices will move closer to EU levels and EU prices will rise. So it is anticipated that prices in the UK and the capacity for beef producers to survive will improve. Three months ago the beef herd was considered to be in terminal decline, but exports have brought new optimism and no-one is now talking about leaving.

There is now a drive for efficiency, which can be achieved in three ways:

- by finishing animals at the same weight but earlier, making savings of £30 a month;
- by improving cow herd fertility. Average fertility, in terms of calves produced from 100 cows in a 12-month period, could be raised from 85 to 92 without any increase in overheads;
- in the suckler herd, shortening the cost of winter would improve efficiency. Bagged silage is expensive and savings can be made by bringing cattle in late but in good condition, feeding them less inside, and then letting them out earlier onto land that would have otherwise have been locked up for silage.

Cost reduction and efficiency in the sector may also be helped by skilled eastern European labour. Also rents will come down, reflecting lower subsidy income.

Average herd size is only 25. To survive farms will have to become more specialized, with more cattle on fewer farms. There will particularly be an increase in more
specialized, larger units in the east on concrete, with straw, grain and industry by-products available. Also there will more enthusiasm for intensive finishing if the price of grain is low. To survive, farmers must cut costs by 20-25% and still get 250 pence / kg dead-weight back from the market. This is still a long way off and it is not possible to survive at 200 pence / kg. There will still be cattle bred in the west, but less finishing because of the high costs.

A crucial time for LFA cattle farmers will occur in 2008 when an estimated 15% of their payment will be reduced year on year (as a result of financial discipline). To survive, LFA farmers might winter their cattle off their farms in order to be able to keep more cows. Some serious thinking has to be done in SDAs in particular.

In the dairy sector there will be a rise in calf values which will persuade people to stop killing calves and engage in beef production. It could be possible for 200,000 calves to go overseas without disturbing our supply. If the supermarkets pay enough for domestic product, then more finishers in UK will be prepared to buy calves against export competition.

Supermarkets may aim to source their bulk standard beef from overseas, such as Brazil, but for their ‘better and best’ schemes they could source from UK. However, unless they pay more to maintain the beef industry here then they could jeopardise it. Brazil is the only country producing a surplus of beef today, but it could consume a higher proportion of its own beef as the economy grows. Also as the world economy grows, there will be increased competition for Brazilian beef. Meanwhile, increased diesel costs will raise the price of overseas goods.

The ‘green payment’ of Environmental Stewardship basically constricts stocking rates. More farmers will make the decision to either go green, or opt out and go completely commercial. The proportions choosing each option will depend upon the market price of animals. If the price is modest, more will pick up the ‘green pound’, if the price rises then more will operate their farm purely commercially.

The beef industry needs to be more professional, like the pig sectors. There are not many specialized farms where beef is the principal earner. In the future, the beef sector will grow and become more organized and supply a tight grade for a specific market, whether in the UK or abroad.

Impact of cross-compliance issues

There is an ‘over delivery’ of cross-compliance by farmers in England, because of fear of penalties, without any system of warning. In England, the ring feeder situation (where farms use a circular feeder placed in a field to supply cattle with supplementary feed, leading to localised poaching if the feeder is not moved frequently) is a clear example of where farmers may not comply. Proposals to shorten the winter housing period to save costs will affect cross compliance as farms will have to out-winter animals. It has been suggested that there are different regional and individual inspector interpretations of what constitutes poaching. However, ‘cows are going to have to be outside more, and Defra have to get used to that idea’. The anticipated cost of cross compliance to the average beef producer is currently unknown.

Key indicators of change in the beef sector

There is a danger of under-grazing, leading to scrubbiness or even monocultures appearing in SDAs if cattle disappear as a result of them being unprofitable but is not a concern if the market price comes right. They may be a bit bothered about
intensification, but if someone has a well run unit – lots of concrete, water directions, good drainage, there should be few environmental problems.

4.3.3 Pigs and poultry – interviews with Ciaran Gannon and Alan Brewer, Defra Rural Development Service

The broad pattern of the pig and poultry sectors prior to the introduction of SPS has been concentration and enlargement. There have been cycles of concentration associated with supply and demand, the over riding influences are the threat of imports and supermarket dominance. There has also been differentiation in some parts of the sector to meet a market niche. The cost-price squeeze and environmental pressures of indoor production has led to more outdoor units: 27% of sows are now outside. There is still a gap between the average and the best producers in terms of technical efficiency. NB Anderson seminar figures (Andersons, 2006b) showed that the pig herd has shrunk by almost two fifths in 7 years. This is attributed to low profitability, lack of technical efficiency, and disease problems.

Some intensive livestock farmers focus on production and are reliant on others for straw, feed and muck disposal. Larger indoor enterprises are characterized by reliance on concrete, not land but there are issues with manure disposal because they do not have land to spread on. The pig and poultry sectors, compared to cattle and dairy, are the main exporters of manure to other farms.

Pigs and poultry have not been supported by the CAP, so most farms will not be eligible for SPS if they are stand alone enterprises. However, where there will be an issue is where they are linked into and reliant on arable enterprises, for straw, feed and land availability for dumping waste. If the profitability of cereal production falls, there may be an increase in outdoor pig units as farmers devise a more sustainable 5 year rotation involving outdoor pigs and barley. A sustainable model that requires livestock may be more popular again.

As farmers are being told to respond to the market, in some areas this will mean intensification. For example, pig producers might intensify from 300 to 500 sows. However, the intensive producers on concrete will be challenged by the regulations and directives coming at them, IPPC, ammonia and slurry disposal.

In terms of marketing trends, there will be different responses to price and local opportunities. There is potential for box schemes with satellite producers as an alternative to supermarkets. Producers may reject supermarkets and increase direct sales through the internet. There will be less product available, so the question is whether this will strengthen the remaining suppliers or whether supermarkets will go overseas.

There may be increased opportunities to produce organic pig meat. Farmers Weekly (31 March 2006) reports claims of an acute shortage of organic pig meat with the organic sector retail sales growing 11% in 2005 to £1.2bn, buying 550 organic pigs a week, 50% of the UK total. However British Pig Executive warned that costs are 70-100% higher than conventional pig farming.

The big consumer drive for local food, animal welfare concerns and the green miles issue will drive change. The environmental costs of intensive production, manure disposal, and the other big issues including water and climate change will become important. So the intensive pig and poultry farmers will need to recognize and
respond to these drivers. If energy crops become profitable, running outdoor pigs on an arable unit may be less appealing.

There is also an energy issue for intensive pig and poultry producers, in terms of heating. Energy and water costs will rise, so there may be a trend towards extensive outdoor production with more land available. Farmers reliant on fossil fuels will have to rethink their approach. New ideas will need to be considered, such as, poultry units powered by windmills and solar panels (e.g. Leckford in Hampshire) and removing sides (or even roofs) on new dairy buildings and using the heat from the cows to help heat water (e.g. the largest self contained organic unit in the country: Goodwood estates in Chichester, does this already).

There will be more opportunities for new entrants, because production subsidies underpinned land values. If a farmer wants to take a step back, he can pay someone to run sheep over his farm 2 or 3 times a year. Outdoor pigs would be a valuable way in for new entrants to farming, now that dairying is difficult due to the capital required.

Environmental implications: Cross-compliance issues

The highest costs will be incurred where there are intensive livestock farmers who are limited by land. Farmers will need to be more extensive because of poaching risks from outdoor pigs, which are often kept on light, sloping land. Cross compliance will force through an extensive approach and will make intensive farmers reconsider their approach. An arable farmer might pay an outdoor pig farmer £5 / acre to run his pigs around his farm.

Under the Integrated Pollution Prevention and Control Directive (IPPC) the larger pig and poultry farmers will have to adopt best available techniques to avoid or minimize emissions to soil, water and air. The biggest costs will be where the larger pig and poultry farms have to update the techniques they are using, especially if it is anything to do with large items such as manure storage and buildings.

Revisions to the nitrate action programmes in the NVZ areas, which cover about 55% of England, will also have an impact. There is a clear indication that Defra will have to apply closed periods to all soil sites, not just the light, sandy soils that are currently affected. This has implications for slurry storage, as during those closed periods (autumn and early winter) farmers cannot apply high available N slurry or poultry manure. In terms of outdoor pig production, that has not been discussed within the NVZ application programme, but it might be in the future.

Suggested indicators for monitoring

- Number and scale of units should be monitored as an indication of intensity.
- Number of outdoor units, and how they utilize opportunities on land no longer grown for cereals.
- Whether farmers are in a stand alone businesses, or whether they are involved in a whole farming system should also be monitored. Many large arable farms in the east have traditionally had an intensive pig and poultry unit, and it will be interesting to see if that continues or if it is hived off as separate economic units.
- Different responses and technologies will be used to meet evolving opportunities. Uptake of improved technology in terms of reduced emissions would be an indicator.
4.3.4 Sugar – interview with Martin Lainsbury, Arable Group

Over the last 5 years sugar beet growers have been cutting back (down from 160/170, 000 ha to 150,000 hectares in last 5-10 years), due to increased yields and poor prices for beet surplus to quota. They are still meeting the national quota, but the surplus is being reduced.

This contraction has been fairly standard across all areas although with the rationalization of a number of sugar factories those growers further away from factories are more likely to leave beet growing when compensation for the transport costs ceases. Estimates are that the 7,000 current beet growers will drop to 5,000, but this will depend on the price, with £20 a tonne for quota beet many more will leave the industry than if it was £23 a tonne. £3 difference on a 70 tonne a hectare crop is £210 a hectare so quite significant. Growers are likely to concentrate on the fens and near to factories, because of the transport costs involved. In north Norfolk, the light soil means that wet summers are needed to achieve high beet yields. As farms there are far from the factory and will be challenged with water abstraction they are likely to come out of growing sugar beet. There is only one factory left in the West Midlands and many of the sugar beet growers in the west are part-timers.

Change in the beet support price means that prices for farmers will fall dramatically. The 2005 crop was worth £32 a tonne to the grower for quota beet. The new European regime reference price is just under £18 a tonne. Predictions from a model developed by Martin Lainsbury (ML) show that at £32/t with a cost of growing beet at £1038 per hectare, this gives a profit of £967 / hectare. At £18/t the grower will make £127 / hectare. This is a large drop for the same risks. Negotiations between the NFU and British Sugar are underway to agree the new quota price for the UK crop. If it is £20 a tonne many will leave the industry. The new price will be announced sometime in summer 2006. British Sugar are aware that they are going to have to maintain sugar beet as the most profitable broad acre crop if they want to sustain supplies to their factories. Cereals need a break crop and sugar beet is likely to be the most profitable break crop, providing growers are not too distant from the factory. So most growers will be keen to stay in sugar providing the price is reasonable.

Last year the national average yield was over 60 tonne / hectare, but some growers are still at 35 – 40 tonne / hectare, which means they are losing money. British Sugar have said that because the value of beet quota will fall growers must respond by reducing costs by 20% and increase yields by 20%. The recent review of pesticides resulted in the loss of the use of Temic, which was used for nematode and aphid control, and has meant that growers have to use less effective alternatives, which adds £50 a hectare on seed treatment costs. Fungicides are being reviewed so it is possible some of these may be removed which will have further financial implications.

There is still a national quota that has to be met. Previously surplus was exported as seed beet, but this now goes for ethanol. In the past, at £32 a tonne, British Sugar were keen that farmers met their quota so they could meet the national quota. Now that prices are falling, the threat of losing quota is not so great and the surplus is worth much less, so growers will not grow an insurance area to ensure they meet their quota. There are occasional periods of quota trading for those who want to

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40 At 66 tonnes a hectare dirty yield, and £11 / tonne for over quota ethanol production (with quota for 60 tonnes / hectare, with a top and dirt tear of 14%, and sugar at 18.2%). Assumptions are using standard labour and contract charges, for a typical farm with specialist equipment such as a beet drill, and typical seed, fertilizer and herbicide costs. Surplus beet (over quota) will go for ethanol production, at £11 or £12 a tonne.
increase or decrease area. This summer, those growers further away from a sugar beet factory, or on low yielding soils, may well look to sell their quota. But quota prices are getting lower.

Provided British Sugar are prepared to reduce their profit margin then sugar beet will continue to be grown in UK in the longer term. However, the area will contract and there will be more concentrated areas of specialised sugar beet growers. Anderson seminar figures (Andersons, 2006) suggest a fall from 172,000 ha (99/03) to 134,000 (2006) to 110,000 (2011).

The model developed by ML shows cost per tonne of production, typically over £15 per tonne for biofuels. Ethanol value is only £11 a tonne at the moment, and without a transport allowance of £4 a tonne, there is a net gain of £7 a tonne and a loss of £8 a tonne. Consequently ethanol values need to rise significantly to make it attractive economically to grow beet for that market.

*Environmental implications*

The environmental impact of any contraction of sugar beet is likely to be mixed. On the negative side, sugar beet is a spring planted row crop, giving birds such as lapwings an opportunity to access the soil and forage for insects and seeds so a change from beet to cereals will have a big environmental impact. On the positive side its late harvest often damages soil structure and the crop requires intensive weed control. There are also increased risks from Nitrogen leaching. The deep ploughing associated with root crops was seen to be particularly damaging to buried archaeology.

In terms of ground preparation, a typical situation is that cereals are harvested in August, the stubble is left over the autumn, a base PK fertilizer is applied on the stubble and ploughed down in November. On lighter soils there is an opportunity to plough in January or February, but on the heavier soils frost is needed to break down the soil to get a decent seedbed. Minimal tillage and direct drilling are an option on lighter soils. No ploughing results in less nitrogen leaching and higher earthworm numbers. As beet has a deep penetrating root, a good soil structure is important, with no soil pans.

Yields per ha could be increased if headlands could be put down to conservation headlands. However it would only be attractive to growers if they could turn on them occasionally which is not allowed at present. On some set-aside headlands it is possible to turn, although this is thought to vary regionally.

**4.4 Interviews with environmental experts**

In all, 14 face-to-face interviews were undertaken with environmental experts in order to obtain the most informed appraisal of the likely environmental impacts from the patterns of farm change identified by the literature review and workshops. Using a semi-structured interview format the experts were asked about the kinds of environmental impact that they would anticipate, given the possible trends outlined for different farming sectors and locations/situations, and the timescale and extent of these changes. Appropriate indicators for picking up these impacts were also discussed, and consideration was given to identifying the potential influence of other policy and non-policy variables on the change processes identified, in this context. The list of experts and the interview schedule are given at annex 2. Given the short timescale of this project, a further 3 contacts were unable to be interviewed but
provided information via email correspondence and reference to others, to assist the project. Their names are also given in the annex.

4.4.1 The complex relationship between management change and environmental impact

A recurring theme of the interviews was that much of the commentary on the likely impact of the 2003 CAP reforms had tended to oversimplify the relationships between management change and environmental impacts. The main reasons given for this were as follows.

- A crucial factor in determining the environmental impacts of change is the existing state of the environmental component under question. An understanding of historical management practices is essential, to understand possible future trajectories. For example, while there was broad agreement that there would be an extensification of production in the uplands the impacts of this upon biodiversity would vary significantly according to the existing state of the sward.

- The reversal of an existing process, for example where extensification replaces intensification, need not necessarily result in the reversal of biological and ecological processes. In many cases experts argued that the relationships and processes are still too poorly understood to be able confidently to predict the precise environmental impacts of management change.

- It is important to evaluate the complete ‘environmental footprint’ and thus the broader consequences of management change. There should be a balanced appraisal of such impacts in terms of biodiversity, soil, air, water, landscape and heritage. Few studies have been able to do this, so far.

Nevertheless, based upon the trajectories of emerging change that were presented to them, interviewees put forward the following commentary on likely environmental implications and impacts.

4.4.2 Arable Sector impacts

In combinable crops, although it was accepted that there would be a trend toward further specialisation and simplification of farming systems with a resulting simplification of farmland mosaics, the scale of change was seen to be important. Large blocks of cereals on a farm would not necessarily be detrimental to the environment if there were also some areas of non-cropped land. Also, given the uniformity already found in the most profitable arable areas, a move in these places towards larger block cropping might not be significantly worse in terms of biodiversity. In some situations large blocks of crops would be beneficial to certain species, e.g. winchats and corncrakes. Large blocks of crops may have a negative impact on soil, particularly if they are on sloping land. Run off from top fields will continue down through lower fields if there are no boundaries in between. There may also be greater potential in the east of the country for increased wind erosion.

The loss of crop variations in the fens might have significant negative consequences for biodiversity. Here species such as the yellow wagtail occur in higher densities than elsewhere and they prefer a mix of wheat and potatoes. Mono-culture wheat would have a negative impact.

Entry Level Stewardship was felt to be a significant factor in reducing the loss of field boundaries and enlargement of fields, as points are received for hedge management. This might help to preserve these structures with benefits for biodiversity and landscape.
It was reported that legumes were coming back into rotations, mainly in the form of spring beans, due to their ease of growing. There has been a move away from second wheats in many places as a consequence of declining profitability without the attached subsidy. This was seen a beneficial to soil conservation as they are drilled into a rough surface so erosion and run off risks are low.

Where oilseed rape is grown there is an increasing use of autocasting as an alternative to drilling the crop into a prepared seedbed. The process involves seed casting at the time of harvesting. Compared to conventional techniques it saves significantly on machinery and fuel costs, but it is more likely to result in patchy germination, leaving some bare areas in the crop. Autocasting and reduced tillage will be beneficial for water, soil and bird populations. Rapeseed can also be a useful winter food source for birds. Patchy swards are good for breeding birds, both ground-nesting and those nearby, because they encourage invertebrates.

The environmental impacts of the predicted changes to arable weed distributions are largely unknown. Much depends upon the shading characteristics of chosen crops and the need for autumn versus spring germinators. If swards become more ‘gappy’ this would generally be beneficial for spring germinating weed species. The benefits of autocasting in this respect may be reduced as farmers become more skilled, which will result in less bare ground.

Considering an expansion in oilseed rape: rape is beneficial for a range of bird species – granivores, and those feeding on molluscs. Linnets and turtledoves feed on rape – it has replaced other more rare feed sources. The mass of flowers is also beneficial for bees. However the environmental benefits of rape are variety-sensitive. The double-O variety bred for stockfeed is particularly beneficial for wildlife, while this may not be true of varieties grown for biofuel. Thus the benefits of rape where used as an energy crop are likely to be greater when this is adaptive/informal so that farmers still choose dual purpose varieties, rather than when they grow specifically for fuel only.

An increase in the area of oilseed rape may be detrimental in terms of increased nitrogen leaching, because oilseed rape leaves residual Nitrogen in the soil. Also with oilseed rape there is high fungicide use, which may impact on both water quality and biodiversity.

The environmental impact of a contraction of sugar beet would be mixed. Its late harvest often damages soil structure and the crop requires intensive weed control. There are also increased risks from Nitrogen leaching. The deep ploughing associated with root crops was seen to be particularly damaging to buried archaeology. On the other hand, as a spring sown crop it has some benefits for bird species.

The environmental footprint created by the introduction of alternative crops would bring mixed benefits. In some situations short rotation coppice has been shown to enhance biodiversity, particularly in terms of birds, insects and flora. However, other crops have not yet been fully assessed for their environmental value. There are a number of threats to the historic environment from which may be caused by root damage from elephant grass; landscape damage hiding visible archaeology and affecting historic landscape patterns. Some energy crops draw high levels of water from the soils and wetting and drying cycles are particularly damaging for buried archaeology.

Any increase in set-aside on marginal areas was seen to be beneficial to biodiversity. Marginal areas are better for weeds because they are less fertile. However, the value of set-aside varies enormously and is dependent on how it is managed, for example the grass seed that is sown will affect biodiversity outcomes.
Non-rotational set-aside is increasing mainly on areas of land which are difficult to work, for example awkward shapes fields for mechanised operations and areas which are difficult to access.

Increased set-aside will be beneficial for soil conservation. Studies showing the impact of set-aside on run off have shown that rainfall amount and winter cereal are good predictors of run off but when set-aside is introduced it reduces runoff and stops flooding. When set-aside was reduced from 15 to 10 per cent, an increase in erosion was noted.

Rotational fallow is generally undertaken for weed control. Its impact on the environment depends on how it is managed. However it was also noted that in general farm managers don’t like rotational set-aside management because they worry about weed burdens in the soil benefiting from periodic set-aside. In areas which would otherwise be monoculture wheat, fallow land can substitute effectively for other crops in a traditional rotation, for a variety of plant and animal species. RSPB research on birds’ use of rotational set-aside showed how fallow areas were used for nesting or feeding by a variety of species which would traditionally have used other rotational crops (e.g. root crops) for these purposes.

There is less understanding about how much set-aside is optimal for wildlife and where it needs to be located, for maximum benefit. Some argue that it is best to spread the fallow as widely as possible, while others advise that concentrating it into particular areas or situations is of greatest potential benefit.

The implications of more mixed farming are generally very good for biodiversity and landscape interest. Also, if this is coupled with novel crop diversity, benefits are increased. Many species require a diversity of land cover types to meet their needs at varying stages of the life cycle, for example lapwings nest on arable land but feed on grass, and they may need to nest several times during the season so it is good if they can move from winter wheat onto spring cereals/crops as the season progresses. Generally granivores don’t prefer pasture, but many others do, e.g. starling and swallow prefer it for soil invertebrates/dung fauna. Starlings will feed on arable stubbles if in a mixed farming area but they don’t tend to do this now because they are mainly confined to pastoral areas. Corn buntings move between stubbles to outwintered cattle sites, to spring cropped sites, over the season. Interstitial habitats are generally very important for a wide range of species, so to the extent that mixed farming tends to have more of these will be beneficial. Any introduction of livestock into arable systems will be beneficial for biodiversity by for example introducing new insects into the system.

In terms of soil conservation a trend towards greater mixed farming would have benefits. There is evidence that mixed farming systems have less run off.

It’s important to distinguish between contaminants and pollutants: contaminants can be found in water but only when they start to harm water biology are they classed as pollutants. Reduced inputs would be a positive thing in terms of, for example, less Phosphorus being added to the soil. Changes in eroded sediments which carry attached Phosphorus will not automatically lead to changes in eutrophication. Chemical changes in inorganic P are quickly picked up when they enter water at point source but biological impacts are far more complex. Some nutrients are stored in sediments for long periods and can have a long-term effect. Pollutants often interact to cause change. For example, it may be the case that nutrient pollution is controlled but there is no change because there are herbicides and other pollutants such as arsenic still present. Removing one chemical can create a problem with another. Thinking that there will be a reversal in aquatic ecology by changing agricultural practice is far too simplistic.
An increase in organic farming may mean more air is fertilised with ammonia and ‘dumped’ by the rain on neighbouring land.

ELS is very popular with arable farmers. HLS is more likely to be taken up by farmers with shoots as they are more interested in creating habitats for improved biodiversity. An increase in biodiversity can happen over a short-time scale following changes in agricultural practices. The introduction of conservation headlands can result in increased biodiversity within 2-3 years. Farmland birds in particular are very easy to monitor and quite responsive to the change. In contrast insects are more difficult to assess as their populations fluctuate naturally. Also insects in the soil are much more robust and therefore any change in cropping does not have much effect.

4.4.3 Dairy Sector

Cropping patterns on dairy farms are likely to change. There may be an increase in the production of high quality winter feed, such as whole crop silage from undersown cereals, or use of naked oats. Clover may also be used as a substitute for fertilisers. However, there is unlikely to be a loss of biodiversity-rich grasslands to maize or other high energy feed crops, as for any grassland older than 5 years farmers will have to check whether an Environmental Impact Assessment is required if it is to be ploughed, and there is a presumption against permitting ploughing of permanent pastures now under cross-compliance. Where more maize is grown there will be increased risks to water from phosphate pollution.

The continued restructuring of the industry towards larger dairy units will also change the structure of the landscape. The amalgamation of farms will result in the reorganisation of pastures and meadows and the simplification of the landscape mosaic. There will be a concentration of animals in the pasture fields located near to the milk parlour, whilst the silage will be cut from the more distant fields.

There has been significant damage to soil structure on intensive managed grassland and the trend towards larger dairy farms will exacerbate the problem. Changes in management practices that aim to extend the grazing season will affect soil structure, through increased soil compaction and result in a loss of nutrients. The risk of nutrient loss affecting water quality is greater with late grazing due to increased periods of prolonged heavy rain.

The effect of increased manure on the land from more intensive, larger farms depends on where the farms are situated in the catchment as this determines whether the pollutants can get into the water courses. This is a question of connectivity. With a good situation and good disposal practices it need not be problematic. However most dairy farms are near water courses. It depends on the hydrology – targeted strategies could reduce the risk.

‘Grey water’ from farms is lost through run off down drains and washings and then into rivers at sewerage outlets. P from agricultural sources contributes to point sources as well as diffuse pollution. The consequence from larger more intensive farms with large areas of concrete will be extra run off and the potential for greater pollution in water courses.

The implications for methane production are uncertain. In terms of environmental impact it depends how you measure the effect of these trends. If total numbers of animals fall then methane will fall; however, if productivity per cow increases then the amount of methane/litre will increase41 – so the relationship with cow numbers is not

41 If ruminant numbers decrease, then methane emissions will decrease as long as productivity per animal remains constant. However, in dairying, if lactating cows become more productive, it is likely that
necessarily linear. Also if cows are pushed more for milking they will be less likely to calve so there will be a need to increase the number of followers, so the herd itself will increase and so produce more methane.

Changes to management practices may cause environmental problems in the form of ammonia deposition. More intensive dairying is likely to lead to an increase in Nitrogen leakage. Larger units generally mean more concrete areas so greater amounts of ammonia will be lost from urine lying around on concrete surfaces compared to soaking into soil. Ammonia loss is greater from slurry systems compared to straw based systems (with FarmYard Manure), so a change in the ratio of these will make a difference. Large units may have difficulty in recycling manures and slurries on the available land area.

The take up of Environmental Stewardship is likely to be limited among specialist dairy enterprises, as it was with previous schemes. There has been a lack of take-up of agri-environment schemes by more productive grassland farmers and it will take a long time, through education and regulatory pressures, to change this situation.

4.4.4 Livestock Sector

In general, lower stocking rates will have positive effects on biodiversity. The most direct effect will be an increase in structural diversity, leading to an increase in invertebrates which in turn should increase bird numbers, although birds are also influenced by other factors occurring at a much larger scale.

Some of the changes in increased structural heterogeneity and increased invertebrate numbers will take place in the short term. For example, following the removal of grazing pressure from moorland vegetation the initial response will be toward a more homogeneous vegetation structure (negative) in the first 2 years, which may then evolve to be more heterogeneous (positive) within 2-5 years. However if lack of grazing persists beyond that point, the vegetation again becomes more monotonous and insect and bird diversity will decline (negative). This process is still reversible if grazing is then reintroduced. If succession towards scrub and woodland is allowed to take place, the changes become much less reversible.

Extensification needs to be carefully targeted in the landscape to create contiguous blocks with connectivity.

It is important to recognise that for biodiversity and landscape interest, how grassland will respond to management change will largely depend in its current state. Areas that are currently undergrazed from an environmental viewpoint will suffer if grazing is reduced further, while formerly overgrazed land may not regenerate (e.g. to heather) if the historic vegetation has been eradicated. There is a danger that a significant decline in grazing on moorland could swing change from an overgrazed situation to an undergrazed one, in many areas. It was also felt that the long-term impacts of changes to grazing regimes and stocking density are poorly understood and are therefore difficult to predict with certainty.

Changes in breed and age structure can also have significant biodiversity impacts. Changes in sheep systems on the uplands have been shown to have significant impacts on the environment. Historically, the removal of wethers from the fells in late

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the methane produced per litre of milk will decrease. But if dairy cows are pushed to maximise production, then their conception rate drops and the number of lactations per lifetime falls. Thus a greater number of replacements are required, which don't produce milk for several years but do produce methane. So, if systems are pushed too hard, methane emissions per litre of milk could increase.
winter resulted in an increase in *Nardus stricta*, a coarse grass, because the young shoots were being eaten and controlled by the wethers. Beyond early spring, it was avoided by most stock. Large increases in this coarse grass meant that ewes were then forced onto the heather. This demonstrates the importance of understanding the ecological consequences of changes in farming systems. There may be opportunities for changes in breeds, but it is important to understand the consequences to plants of different sizes of mouth, hoof and willingness to walk.

There is likely to be a negative environmental impact if dual-purpose moors, which are currently used for both sheep and grouse production, become dominated by a grouse management regime. If heather moor management is focussed solely on grouse there is likely to be a reduction in the grass-heather mosaic, which will reduce overall biodiversity.

There was some concern that less intensive management of semi-natural grassland could result in the ‘scrubbing up’ of large areas and result in the loss of large areas of visible archaeology. There are already examples in Dartmoor where extensified grazing has resulted in the loss of visible archaeology and the loss of access to sites. Scrubbing, particularly bracken encroachment onto grassland also leads to physical damage as well as visible damage.

Intensification of upland in-bye would be detrimental to biodiversity wherever it results in a shift from semi-improved/unimproved to improved swards. Heavy sheep grazing leads to soil compaction and ground-nesting birds suffer from greater vulnerability to predators due to the shortness of the sward.

Intensive grassland is of low environmental interest so further intensification is unlikely to have much effect on biodiversity. But if the coverage of intensively managed grass expands, this will generally be negative for biodiversity because of what it is replacing – whether crops or less improved grass.

It was felt that a shift from beef and cropped land towards sheep only in uplands would have a negative impact on biodiversity. The reasoning behind this is that:

- Sheep create a more uniform and cropped sward, which is only biodiversity rich in certain situations (e.g. chalk downland). Most species prefer habitat mosaics and all-sheep systems may not provide this;
- Cattle will remove biomass at certain times of year which sheep, who are more selective grazers, will not eat;
- Sheep select at a smaller scale than cattle which could affect the invertebrate population within semi-natural grasslands;
- Mesotrophic grasslands require grazing by cattle.

The loss of crop areas from mainly pastoral landscapes is generally considered to have a negative impact on biodiversity due to the simplification of the habitat mosaic. However, a development of predominately sheep enterprises may make the farm more able to consider joining HLS for enhanced income associated with better management of remaining important areas on the farm. Sheep systems are generally more compatible with these kinds of differentiated management than beef units, particularly if the change accompanies holding enlargement.

The consequences of sheep extensification could include an increase in pernicious weeds, especially creeping thistle, but also marsh and spear thistle and ragwort, particularly where this already exists. An increase in ragwort will become a significant issue for horse owners, who will be deterred from purchasing feed and keep from areas where ragwort exists. This is already a problem in the Welsh borders and heavy clays of Buckinghamshire and Oxfordshire.
It was felt that greater attention should be given to the risks to bio-security if the traditional upland system of permanent sheep flocks breaks down and farmers introduce flying flocks primarily as a means of environmental management.

If the cost of land/grazing in the uplands does fall there will be considerable potential for large areas of the uplands to be used as summer pasture for lowland livestock enterprises. Depending on how the systems would operate there may be environmental benefits in both locations. In some areas of the uplands, biodiversity would benefit from increased grazing from cattle and sheep while in the lowlands there may be opportunities to reduce chemical inputs, with benefits to water and biodiversity, as a larger area of grassland is devoted to winter fodder production but managed less intensively than previously.

The environmental implications of changes to beef systems will largely depend upon the production systems involved. If producers concentrate their grazing on the most productive areas or formerly reseeded pastures and ignore the less productive parts of the farm, the impact may be negative. This is because without the relief of some cropland, fields managed intensively for grass production via silage or heavy stocking do not encourage biodiversity.

It is generally agreed that poorly managed horse grazing is environmentally damaging to biodiversity and landscapes due to under and overgrazing. There may be negative impacts on water quality. Horses tend to be associated with the administration of high degrees of medication, which reduces the environmental value of their manure and can have negative impacts on soil fauna. Horses tend to weaken incentives to maintain traditional stockproof boundaries because tapes or electric fences are easier and are merited by the high value of the stock, and animals might injure themselves on hedgerow vegetation. It should also be recognised, however, that well managed horse grazing can be compatible with biodiverse grazing systems.

Lower stock numbers and more extensive systems across the country should reduce the production of greenhouse gases from the sector – however a significant reduction would be needed to have a significant impact upon total GHG emissions from agriculture.

If reforms encourage more farms to enter agri-environment schemes, the historic environment is one of the key targets for ES. However, it was felt to be in danger of being marginalised and under-funded because the scheme is seen as predominantly about biodiversity, and active preservation of historic features tends to be relatively costly. The environmental impacts of agri-environmental schemes on the historic environment are direct and beneficial as the causal links between management actions and environmental outcomes are usually very clear. In contrast there is still doubt with some biological systems about how effective management prescriptions have been, even after a decade or more.

4.4.5 Monitoring: indicators of change

It was emphasised that CAP reform was only one of the drivers of agricultural restructuring and that complementary efforts must be made to monitor the environmental impacts of non-CAP drivers. This was necessary to create a more balanced evidence base to inform policy decisions. It was noted that £450m per year is spent on environmental schemes to buy public benefits, and yet only £1.3m (0.3%) is spent on monitoring to ensure these schemes are effective. From the interviews, the following additional monitoring was called for.
Farm change

There is a need to collect more detailed information on:

- Livestock type and age structure (e.g. an increase in older cattle and sheep numbers might indicate that farmers were keeping 'flying herds' - flocks mainly for environmental management purposes);
- Information on production systems, as well as land area and stock numbers, would give more useful information on likely environmental impacts of trends in farming.

Environmental change

In respect of soil, experts believe there is a need for improved monitoring of:

- Soil characteristics;
- Sediment loads;
- Soil Organic Matter;
- Background sheet erosion.

However, these issues are recognised by Defra and it is understood that suitable indicators are being developed under its emerging soil strategy programme.

At present, experts also believe there is insufficient monitoring of biological change in water. The Environment Agency monitors water for micropollutants, but biological monitoring is less frequent and apparently provides insufficient detail to accurately determine trends. Invertebrates are used as a crude indicator of change, but algae and macrophytes can also be important indicators of biological/ecological status (this is relevant to developing measures for Water Framework Directive targets). Other pollutants which should be considered for monitoring in the light of increasing knowledge about their impacts are veterinary products, maize pesticides, pathogens (and their interaction with climate change) and endocrine disrupters.

The Environment Agency water quality monitoring programme has 8,000 sites which are monitored monthly for a suite of chemical parameters, e.g. phosphates and nitrates. However this pattern of monitoring does not pick up peak, episodic rainfall-driven events which are often those delivering most nutrients from agricultural sources. This could only be done if long term data sets are redesigned to be flow-driven (i.e. able to do more monitoring in periods of higher flow). There is a new strategy under Defra’s Catchment Sensitive Farming (CSF) programme to redesign water quality monitoring to make it more able to detect these kinds of pattern, and also to include monitoring upstream and downstream from high-risk farms. Thus this gap should be addressed within the next few years.

Further research into hydrological systems dynamics is also important. In large catchments, the contributing effects and distributional characteristics of nutrients from various sources are not known, e.g. septic tanks and discharges from sewage works, as well as agriculture. It is still difficult to separate diffuse and point sources. Climatic variability is difficult to account for: in drought years, for example, the nutrient dynamics will be different from other years. The Environment Agency needs to understand what is going on, to accurately interpret the data that it gathers. There are also time-lags in the system: nitrate may appear in ground water many years after it has initially been applied to crops or released through ploughing, and therefore cannot be attributed to, or mitigated by, any current, local farming practice. There is a need to be able to separate out the complexities of cause and effect, and this is a problem especially when many research projects run for only 3 years, whereas these processes take much longer.

For biodiversity monitoring, there is a need to collect more detailed information on:
• arable farmland biodiversity;
• changes between spring and winter-sown crops distinguished on ecological criteria and by how long the stubbles remain standing. Generally, the longer delayed the cultivations are and the less extensive they are, the better it is for birds. Conservation tillage is good for a range of species, soils and diffuse pollution reduction, overall.

There is potential to use some of the monitoring studies undertaken by agencies looking at SSSIs to identify some key grassland changes. Relevant indicators should include the:
• proportion of grass to heather in uplands;
• proportion of tall grass to short grass;
• proportion of pernicious weed species in grassland e.g. docks, creeping thistle.

Satellite imagery at key times of the year could provide a good indication of landscape change and habitat status in pastoral areas, showing areas of cut grassland, different intensities of grazing and moisture content.

There is very little systematic monitoring of the historic environment. This means that we know very little about current rates of change. There is definitely a need for monitoring a set of key indicators. Cost effective indicators could be created under the monitoring programmes currently being developed by English Heritage for Scheduled Ancient Monuments and historic farm buildings.

4.4.6 Other important influences on environmental change

Interviewees identified a number of other important influences upon the environmental impacts of agricultural change in England, over the next few years. These are summarised briefly below. They need to be taken into account when seeking to track the impacts of CAP reform because in some cases they may obscure, contradict, override or exaggerate these particular policy impacts.

Climate change

There will be significant environmental implications from climate change that will have impacts upon upland farming systems, in particular. Climate change scenarios for the west of the country predict that within 25 years there will be a significant increase in rainfall. This will force upland livestock enterprises to invest in alternative housing systems and give more attention to issues like poaching and waterlogged soils.

Climate change will also affect plant communities. Ultimately, the National Vegetation Classification system may need to be revised to take account of the changes. One driver will be an increase in near-ground levels of ozone. This damages cells and may already be having an impact on plant communities. Too much atmospheric nitrogen is having a big impact on acidic grasslands and reducing biodiversity. Also, in some eastern and southern areas, periods of prolonged water stress are likely, which will reduce the range of some species.

Globalisation of markets, increased international trade and the impacts of a Doha WTO agreement

Developments in South America mean that beef prices are likely to be forced down as global supply increases.

There is evidence that milk companies have been demanding milk with a low butterfat content, which is giving rise to an increase in use of Holsteins. These much
larger cattle, by comparison with former breeds, are exacerbating soil structure problems. This in turn leads to nutrient losses, which has an impact on biodiversity and reduces the number of grassland birds.

The market and purchasing power of the large supermarkets will continue to be important. Supply contracts with farmers can create soil problems, for example harvesting carrots in spring to guarantee year-round supply. There is also a possibility of avoiding some of the GAEC conditions if farmers have a supermarket contract for a specific harvest time – this can override the conditions, which is not ideal from an environmental perspective. On the other hand, supermarkets also have the potential to improve farm environmental practice and a number of initiatives in this area can be anticipated for the future. CCRU and ADAS recently completed a study for the Environment Agency (EA) examining the potential for supermarket protocols and purchasing arrangements to influence the environmental impacts of key production sectors (e.g. horticulture), whose findings are being taken forward by the EA in discussion with retail and farm assurance organisations.

Water Framework Directive (WFD)

It was noted that the levels set for some ecological factors under this Directive are so low that it is likely that whole sectors of arable farming will be unable to comply without making significant changes. Thus the WFD could be a major driver for changes in practice. However, it is uncertain that the biology of rivers will change if the required chemical and biological levels are met: the timescale and targets set for the WFD are not wholly evidence-based. There is an assumption that agricultural change will lead to biological change in rivers, based upon current understanding of hydrology. However, by changing agricultural practices there is no reason to expect there will be a reversal of past processes. The invertebrates in many water bodies have been lost, so their ecology has been changed permanently.

Social and cultural change in rural areas

Concern was also expressed about the difficulties of reversing the environmental impacts resulting from rural socio-economic change. The depletion of skills, both within the farming community and among rural crafts, was identified as a major factor. For example, in upland areas the maintenance of many semi-natural habitats depends on farmers with specific grazing and livestock management skills. If these are lost it could be difficult to reverse the environmental changes that would ensue. A particular area of concern is the loss of skills in beef cattle management in the uplands. It was also argued that the industry-wide trend towards a greater use of farm contractors was detrimental for the environment. Economic pressures to complete tasks, often in poor weather conditions, resulted in environmental damage. Contractors were also thought to be less environmentally skilled than on-farm labour, although there is no evidence to support this claim, at present.

Concern was highlighted in respect of the decline in the skills base for maintenance of the historic environment. There is evidence to suggest that the age profile of many skilled trades is skewed towards the elderly. There is a danger that there will not be enough skilled labour to do the work generated by ELS and HLS. On the other hand, evidence from past agri-environment schemes suggests that the schemes themselves can help to stimulate interest and the transfer of these skills to new entrepreneurs, as long as the basic knowledge can be retained and passed on successfully.
Forestry policy

Woodland policy is relevant as in environmental terms, the farmland-woodland interface is very important. However, in England it is unlikely that forestry policy alone could stimulate major changes in rural land use, given its generally low profile and modest funding, to date. What is more likely is that the policy could have important local impacts, as opportunities for woodland planting and added-value woodland management are stimulated by the decline in the relative profitability of agricultural production that is anticipated, following the CAP reforms. In this context, regional forestry strategies will be critical, as well as funding under the next England Rural Development Programme and England Woodland Grant Scheme.

The planning system

In terms of the built environment, most historic farm buildings are functionally redundant within contemporary farming systems. Here, broader drivers of change will affect the management of these buildings, in particular the statutory land-use planning system and the demand for homes and workshops caused by the continuing process of counter-urbanisation. Planning conditions and attitudes towards the likely impacts of diversification (e.g. vehicle access to new businesses on farms, terms of use for changes of use) are frequently cited as critical influences upon the pace and extent of such changes.

Energy policy

Not much mentioned by interviewees, but frequently a subject of speculation and anticipation in workshops and discussion with practitioners, it is evident that the future development of energy policy within England will be an important influence upon farming and land management change across the country, within the next decade. If current price rises for fossil fuels are sustained and continue, it is very likely that more private investment will flow into alternative energy generation in a variety of forms. Government policy will have a critical influence upon the relative attraction of the various renewable options, whether using urban or agricultural waste, biofuel crops (from wheat and rape to miscanthus and woodfuel chips), wind or wave energy or solar power. Carbon trading policy and terms of access to, and organisation of, the national grid will all be significant in this respect.
5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This report provides an overview of the available published and unpublished evidence of actual and anticipated farm change as a result of CAP reforms in 2003, and its environmental implications. Chapter 3 presents the findings from a review of available literature on the emerging and/or predicted impacts of CAP reform upon farm level changes in England and an analysis of relevant survey data. These are given for the farming sector as a whole and for the arable, dairy and livestock sectors. Chapter 4 then summarises the key points from workshops and interviews with practitioners and experts about emerging trends and their environmental implications. In this final chapter we draw upon all this material to discuss briefly the main conclusions from the study, and then focus in particular on two aspects:

- The implications of the changes for Defra's environmental priorities
- Consideration of gaps in the data, and recommendations for ongoing monitoring strategies.

5.2 Overview of change and key patterns emerging

It is clear that farms and farming structures and practices are constantly evolving in response to a wide range of factors. Some of these are predictable and involve planned adjustment, while many are less easily predictable and must therefore be dealt with as they arise. Of these changes, only some relate directly or indirectly to CAP policies and still fewer relate directly to the specific changes of the 2003 reforms to the policy, but it seems clear that these reforms are likely to have noticeable impacts over the coming 5 to 7 years.

It is also apparent that the reforms have generated a significant climate of anticipation and discussion as regards change within the sector, and that this in turn has probably led to a particular focus on the needs and the options for change, among different farming sectors and communities across England. In addition, the long delay in the process of implementing the Single Payment Scheme successfully has given farmers more cause for concern about current and future business survival than they might otherwise have had. This has probably stimulated further planning for change, in the light of the policy reforms.

From the wealth of material gathered in this report we can only begin to identify the impacts of the reforms, both for farming and for the environment. Much of the literature that we have covered bases its predictions upon simplified analysis and professional judgement. From the workshops and interviews we have gathered practitioner experience and understanding of current adjustments, rationales and adjustment strategies across the country. We believe that the combination of this variety of material and sources gives us a valuable insight into what is already and what is anticipated to be, the main impact of the reforms on farm businesses across England. By drawing upon the systematic review of the impacts of agriculture upon the environment as presented in the OBS 03 project, in combination with focused and face–to–face interviews with selected environmental experts in this field, we can identify the key environmental implications of these trajectories of change.
5.2.1 Early evidence of change

In the short term we identify a contrast between arable, dairy, and sheep and beef sectors, in the nature and rate of adjustments. The predominant response to the reforms in the arable sector, for the time being, appears to have been ‘wait and see’, with few farms making radical changes and a resumption of cropping patterns similar to those seen in 2003, before the reforms were agreed (2004 was an unusual year, much more preoccupied with entitlement and uncertainty). This has meant a continuing, significant use of ‘fallow’ (uncropped – now GAEC 12) or formally ‘set-aside’ land within the rotation (comprising roughly 15% of the total arable area) and marginal declines in the areas sown to a variety of cereal crops (e.g. barley, oats), continuing a trend that has been apparent since 2000. Business impacts as yet appear marginal and there is no evidence yet of decreased intensity of management on the land which remains actively cropped.

By contrast, the predominant response to the reforms in the beef and sheep sectors seems to have been to see them as a trigger for change and already begin to make system changes, in response to the expected change in support between now and 2012. Broadly speaking, early changes appear to involve reduced recruitment into beef suckler herds among existing grass-based beef producers and changes in management strategies for common land and rough grazings in the uplands among sheep producers, which would be consistent with planned extensification and/or simplification of management systems and reduced labour input. In addition, there is some evidence of increased keeping of sheep in lowland areas, particularly among beef producers seeking to cut costs and raise income.

In the dairy sector, although significant changes are occurring and a concentration of production into fewer and larger farms is evident, this is a continuing trend predating the 2003 reforms. It is clearly influenced by a host of factors – including both policy and market changes – among which the specific impacts of CAP reforms may be relatively minor. As a by-product of this change, a proportion of those marginal dairy farms that are deciding to quit milk production are moving into beef enterprises in the short term (in the longer term, further adjustments are likely due to anticipated low returns from beef). In south-west and central England in particular, conversion to organic production among more mixed, mainly dairy farms is also a marked trend. It is also possible to say, even at this early stage, that these emerging patterns of change are being experienced in different ways and at different rates in different parts of the country, such that the implications for the environment will also vary according to local geography, culture and history. This was most clearly shown in the workshops, where emerging responses were differentiated by land quality (e.g. SDA/DA where DA farms face more immediate needs to adapt, but have more options), infrastructure (transport links and slaughter/processing concentration influencing development of intensive stock production), and cultural outlook (larger farms / younger generation / non-dairy holdings swifter to identify new opportunities and adapt). Change is generally more evident in the north and west than in the south-east and east, at present, but within regions, these other economic and cultural factors are also seen as important. In particular, the relative influence of ‘non-traditional’ sectors and enterprises (e.g. leisure, horses, hobby and lifestyle farming), which has been increasing generally in the past decade, varies significantly between regions and Joint Character Areas, and is already seen as an important determinant of future options in some localities. National survey data indicate significant increases in horses and non-commercial holdings since 2003, which may be related to CAP reform but could also be a statistical effect caused by new SPS registrations.
5.2.2 Patterns of future anticipated change

In overview, our findings suggest that for the foreseeable future, most farmers would be likely to continue to claim and receive support under the SPS because to choose to opt out of the system would continue to have significant negative financial implications for the vast majority of farm businesses. The comments in this section should therefore be seen in this broader context.

Our expectations for the sheep sector are broadly in line with previous predictions of modest change in stock numbers and a slight decline in production, but this study has added to our understanding of the key factors in decision making, in this sector, and elaborated the likely changes in more detail. There will be significant regional variation as well as marked within-farm variation in trends across the country, and the further weakening of traditional upland-lowland linkages also seems likely. Over the next 3 to 10 years, sheep are likely to become more common in lowland pastoral and arable areas, and less common on the open moorland (not the in-bye) of uplands - particularly if, as suggested by practitioners, hill farmers decide that it is more cost-effective to concentrate their production on better and more accessible land and thus progressively abandon moorland management.

Beef cattle are likely to become less numerous across England as a whole. Again, the trend is consistent with previous findings, but this study has identified regional and subregional trends which enable more careful environmental appraisal of their implications and potential policy responses. The implications are for marked declines in the uplands, increases at least temporarily in traditional dairying areas (as less efficient dairy businesses use beef as an exit route), and extensification – modest decline in numbers - in the more marginal parts of current mixed and arable farming areas. Cattle may also disappear from the least productive parts of existing lowland semi-natural grazed habitats such as heathlands and marshlands, unless they – and the infrastructure and skills that their management requires - can be sustained here on purely environmental management (as opposed to viable production) rationales. This appears most likely if they are able to enter the higher tier Environmental Stewardship scheme and that, in turn, will depend upon scheme resources and targeting over this critical period. Successful niche and organic marketing may also play a role, here, where these management approaches develop.

Dairy farms are likely to continue on their current trend of becoming less numerous, larger scale businesses, distributed less evenly across the country. They are likely to decline in upland and arable areas and concentrate in lowland situations where grass growth and an increased area of maize forage production will be favoured climatically and culturally over all-arable systems. However, these trends appear only weakly affected by the CAP reforms. It is still too early to establish the degree to which cross compliance and GAEC conditions, in conjunction with implementation of the EU Water Framework Directive in the UK, will affect this basic pattern due to their potential (in theory, at least) to counter or alter the incentives towards spatial concentration and intensive land and stock management. Increased conversion to organic production is also likely to continue, irrespective of this question. In the uplands and the east where dairying is anticipated to see the greatest declines, high-value niche marketing will sustain a minority of producers.

In more productive arable areas, it seems likely that larger scale, block cropping of wheat and rape and simplified rotational systems - in which fallsow play a significant role replacing second wheats, barley and other cereals - will become more dominant. Sugar beet production will contract, while the extent of horticulture may remain stable overall, although crop choices in this sector will vary according to EU and global market fluctuations as well as energy price trends, irrespective of CAP reform.
impacts. Where land leaves regular cropping, grazing by horses, amenity tree planting and non-farming use are likely.

In less productive arable areas (as defined at a sub-regional or JCA level), simplified block-cropping systems would tend to be a less attractive prospect for large scale operators, due to lower returns. Likely parallel or alternative trends in these areas appear as follows.

- Persistent fallow land is likely to be an important short to medium term phenomenon as small patches of less accessible/productive land fall into relative disuse (managed minimally to claim SPS).

- Some land is likely to go to built development – particularly where new housing on greenfield sites is already favoured, under other government policies (e.g. south and east England). Although the total impact is small - probably less than one per cent of the arable area in 5 years – impacts would be highly concentrated and thus locally significant;

- A potentially significant area of crop land will be diverted into renewable energy production, mainly using annual crops. Rape is particularly favoured as a widespread option, but wheat could also feature, while short rotation coppice and sugar seem likely to be more localised and dependent upon processor-led initiatives. This trend could also affect productive arable land, if relative prices improve significantly, where it could be expected to reduce the proportion of fallow and set-aside in these areas.

- Some arable farms may become more mixed enterprises, particularly if associated with farm diversification into leisure, adding value/direct sales, and/or organic farming, where livestock production offers the potential to enhance the value or scope of the diversified activity, despite its significantly lower returns as a commodity option.

- Other areas may see minor shifts into different outputs including novel and niche crops (herbs, pharmaceuticals, fibres), wine, and fruit and vegetables in the coming 5 to 7 years. The latter depends critically upon the future status of the FVP authorisation procedures, and the scope for opportunistic entrants into a market which is currently heavily controlled by the major multiple retailers. In localised areas where currently there is a mix of livestock (often dairying) and cropping, one possibility will be for maize or cereals to replace temporary grass as the main source for silage production, and for this to be supplemented by production of high-protein fodder, to support increases in relatively intensive livestock enterprises (beef finishing, outdoor pigs).

Where land remains cropped, there are divergent views about trends in input use. Many published studies predict declines in both rates and areas of pesticide application while practitioners tend to be sceptical of this. However, both the literature and the practitioners anticipate a trend of declining use of chemical fertilisers, as more farmland is affected by NVZs and the adoption of precision farming techniques while the persistence of fallowed land within rotations will also reduce frequency of application.

In all areas, the influence of non-commercial and/or non-agricultural farmland management will strengthen as a result of the reforms (e.g. lifestyle farming, or environmentally-motivated landownership and management), as will the scale of land used for horses and recreational pastimes. This continues an existing trend but the implications of the reform are for a relative acceleration of the trend as farming revenue declines with decoupling, in the short to medium term (3-5 years). Where land leaves commercial agriculture for leisure or lifestyle use, the related impact upon
land values and the structure of holdings is often such that the reversal of this process becomes highly unlikely.

There is also the potential for significant areas of land to be taken out of production and managed in accordance with the rules of the Single Payment Scheme (GAEC 12), on a ‘minimal-cost’ basis. In arable areas this may well occur as a continuing practice on the smallest and least productive sites but elsewhere there is likely to be a variable annual pattern, with different land leaving and entering production each year. In effect, this would mean a continuation of the recent phenomenon of significant areas of fallow land (15% of cropped area) in arable areas, but the total extent of this area should increase slowly over the next 5 years or so. In livestock areas, ‘GAEC12’ land is perhaps more likely to be long-term and involve the most awkward and least productive areas of land – e.g. rushy pastures, overgrown heather where there is no grouse interest, gorse and bracken stands. This kind of land could amount to an increasingly significant proportion of farmland in some parts of the country, including upland and lowland heath areas, and common land. However, both its spatial pattern and extent will depend upon individual landownership and tenure. It will be influenced by the relative quality and scale of landholdings as well as by other factors such as the family labour force and/or succession plans, and will therefore present a very varied pattern of development, across the country.

One final point worth consideration is the impact of CAP reform on explicit environmental management through the effects of firstly, cross compliance and GAEC rules, and secondly, from its likely effects upon the uptake of the new agri-environment schemes and movement from existing schemes to the new scheme. Generally it would be expected that the introduction of the new cross compliance and GAEC rules should bring about a gradual improvement in basic environmental management standards on farms, regardless of how they are changing. However, this will depend upon how clearly standards are defined and how well they are enforced, as well as how compatible they are with other trends in farming practice and thus the extent to which farmers choose to continue to claim SPS if these payments decline in future. Good information and advice are likely to be an important element in securing benefits from these developments, and it is likely to be some years before such benefits can be demonstrated. Similar points apply to ELS uptake as it spreads across more productive areas of lowland England.

In respect of agri-environment schemes in marginal areas, we suspect farms will increasingly diverge between those who choose an explicit environmental route for future management, in which case they will apply for HLS and perhaps also OHLS and achieve more benefits than currently (whether or not they are already in ESA or CSS schemes), and those who decide instead to focus on enhanced profitability through conventional production, in which case the only scheme they might join is ELS and their farming may be concentrated upon their better land while the rest is managed under GAEC 12. Thus compared to the current situation where many of these areas have significant ESA and CSS uptake, environmental impacts could diverge significantly between and within farms, and across local areas, depending upon the choices made and available resources. If farmers decide to opt for ELS when their ESA or CSS agreements end, rather than HLS, capital work on farms (wall and hedgerow restoration) would probably decline and there is potential for localised intensification of grassland sward management on in-bye land and undergrazing on moor and heath.

5.2.3 Environmental Implications

The implications of these changes for the environment are not always clear, as much depends upon precise local conditions and the current state of particular
environmental characteristics that will be affected by the trends identified above. The influence of other government policies and initiatives, including explicitly environmental policy as well as related issues such as energy policy, will also be important. However, the changes stimulated by the 2003 reforms will include both positive and negative impacts, for a range of environmental assets. This is consistent with the conclusions of previous studies. Taking this further, we attempt to provide more detail in relation to the specific trends, in Table 5.1 below.

Table 5.1 Summary of expected change and environmental impacts

<table>
<thead>
<tr>
<th>Expected change</th>
<th>Implications for environmental priorities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Arable areas</strong></td>
<td>1. Soils, water and air: Could lead to reduced erosion from increased crop cover over winter - depends upon soil management and vigour of crop growth in the autumn (- poor emergence could still leave soils vulnerable to erosion). More maize would tend to increase erosion/soil sediments in water. Crop shifts imply more nutrient loading in water and potentially higher pesticide (fungicide) use, but not necessarily increased levels in water. Neutral for air and climate. Simplified rotation impacts depend critically upon management techniques – whether low-cost but prophylactic (negative), or precision inputs (positive). Biodiversity, landscape and historic environment: generally negative for biodiversity and landscape interest due to more uniform crop types and lack of winter stubbles. However, could be mitigated by change 2. Little impact on historic features (already threatened in these areas).</td>
</tr>
<tr>
<td>2. Because less land is cropped for food and feed, the area of fallowed (GAEC12) land increases in less profitable areas. Alternatively, more of this land is cropped for biofuels (this depends upon energy policy).</td>
<td>2. Soils, water and air: Benefits from fallow, subject to good compliance with GAEC conditions: i.e. to establish good cover and exercise restraint in applying inputs or wastes. Neutral or negative impacts from biofuels because of a reduced area of fallow, compared to the current situation. Use of glyphosate on fallows or rape (pre-harvest/ploughing) negative for air and water. Biofuels offer climate benefits if they replace oil/coal/gas. Biodiversity, landscape and historic environment: important benefits from fallow for biodiversity and historic assets – ideally would want a mix of rotational/fixed where fixed is targeted at protecting important features/extending habitat. More Biofuels in place of fallow would negate the benefits.</td>
</tr>
<tr>
<td>3. Some grassland and other biodiverse areas maintained by extensive grazing in environmental schemes and projects</td>
<td>3. Generally beneficial for all environmental priorities but highly dependent upon available resources from agri-environment and other sources (e.g. LIFE, Heritage Lottery, EU convergence and competitiveness funding, etc.).</td>
</tr>
<tr>
<td>4. Some intensive livestock enterprises expand (beef finishing, outdoor pigs), along main transport links, onto land vacated by arable (probably still in rotation)</td>
<td>4. Soils, water and air: Impacts on soils and water (disposal of manures, localised poaching) would tend to be negative, notwithstanding GAEC, but localised. Negative impacts on air (ammonia, more methane production) Biodiversity, landscapes and historic environment: negative for knock-on damage via soils and water but some potential benefits if these units maintain local land use diversity and field boundary infrastructure is enhanced.</td>
</tr>
<tr>
<td>5. Slow / modest increase in novel crops, wine, and</td>
<td>5. Soils, water and air: Permanent crops can be positive or negative for soil and water, subject to management techniques. Benefits for air (reduced losses of soil N). Horticulture and vines</td>
</tr>
</tbody>
</table>
If FVP restrictions are eased, horticulture.

Pastoral areas
1. Productive areas – continuing concentration of dairying into larger and more intensive units
2. Slow expansion of the organically farmed area in middle England and the South West
3. Marginal areas - dairy farms shift into beef and sheep. Beef farms decline in favour of sheep.

Uplands
1. Extensification on out-bye and open moor
2. Stocking increases on in-bye land, and balance of stock shifts in favour of more sheep and fewer cattle.
3. Farms enlarge and simplify management regimes
Both lowland and upland areas across the country:
1. More land (perhaps 5%, by 2013) shifts into equine use
2. More land (perhaps may increase water demand but as controlled, may have minor impact. Horticulture as currently practised can be negative for soils and water (higher nutrients, pesticides, compaction issues at harvest).

Biodiversity, landscape and historic environment: polytunnels negative for landscape, but otherwise, many of these crops can introduce diversity into otherwise monotonous habitat so potentially also beneficial for landscapes and biodiversity. Negative for historic environment.

1. Soils, water and air: Negative, with more poaching and erosion along tracks and by gates, more N&P losses from compacted soils, some losses from increased maize areas, increased methane and ammonia. GAEC Soil plans may reduce damage.

Biodiversity, landscape and historic environment: negative for biodiversity and historic features in these locations, although landscape interest likely to remain.

2. Benefits for biodiversity, landscapes, soils and water through reduced nutrient loading and improved soil management. Reduced livestock emissions to air. Neutral for historic elements (a balance of positive effects on field boundaries but possible negatives from more ploughing and root crops)


Biodiversity, landscapes and historic environment: general benefits from extensification but if cattle disappear, some biodiversity/landscape loss – significant if on currently valuable sites for these attributes.

1. Soils, water and air: benefits short term - reduced erosion on currently overgrazed areas, reduced water pollution and enhanced peat protection (carbon sequestration benefit). Potential negatives longer term (5+ years) -- increased fire risk from over-mature vegetation which could lead to greater peat erosion.

Biodiversity, landscapes and historic environment: on overgrazed sites, benefits for all 3; on undergrazed sites, rapid declines in wildlife and slower landscape quality decline, risk of damage to historic features from scrub growth.

2. Soils, water and air: some positive - reduced poaching from cattle, but potential riverbank/margin damage from sheep will persist or increase. Reduced emissions to air from fewer cows.

Biodiversity, landscapes and historic environment: mainly negative due to less varied grazing, less need for buildings and landscape infrastructure maintenance.

3. Potentially negative impacts on soils and water, landscapes and historic features (also possibly biodiversity), from reduced active maintenance and restoration of field boundaries and buildings.

1. Soils, water and air: Risk of damage to soils from overgrazing and localised poaching and compaction.

Biodiversity landscapes and historic environment: negative for grassland diversity and landscape feature maintenance (also more electric fences), increased damage to historic features. May promote traditional hay making on adjacent farms which would be beneficial for biodiversity and landscapes.

2. Soils, water and air: most options would tend to bring benefits
5%) shifts into amenity / leisure or lifestyle uses.

3. More land (probably less than 2%, nationally) is lost to development

4. Cross compliance conditions encourage better environmental management

5. More land enters the ELS scheme, particularly in lowland and arable areas

6. Notably in uplands (where former scheme uptake is most significant at a landscape scale), sharply varied impact of agri-environment scheme choices (ESA/CSS to ES) from reduced inputs, livestock and soil disturbance but some uses could increase compaction and erosion (e.g. motocross).

Biodiversity, landscapes and historic features: depends on past and new management – could be positive (active, interested or allow more diversity to develop) or mildly negative (neglect leads to decline of existing features and increased homogeneity).

3. Negative for soils, water and air - ceased ecosystem functions.

Negative impacts on biodiversity, landscapes and historic environment can sometimes be mitigated by good design and increased variety of local niches/features (e.g. gardens, trees, etc).

4. Should be beneficial for all aspects by ensuring and/or raising standards on all farms, but critically depends upon how many comply (effective enforcement), how well they comply (good advice and information), and whether farms choose to remain in SPS when payments begin to decline (2008-) we assume most will claim, at least up to 2013).

5. Little short term impact but may have medium to long term general benefits from continued feature maintenance, better input management.

6. For all attributes, implies losses where environmental management declines as old agreements are not replaced by ES ones (but still subject to GAEC), but gains where HLS agreements, in particular, are taken up. Could imply higher standards of basic management, overall but may result in lower level of feature restoration if HLS uptake is not widespread. These comments apply equally to agreements across the rest of England but the impact, as most of these are for individual, more isolated sites, will be less marked outside the uplands.

Considering local factors and processes

In the east of the country, the impacts of simplified cropping and more fallow depend upon the scale of block cropping, with larger blocks generally tending to reduce biodiversity and potentially posing a greater risk of soil damage through compaction by heavier machinery. In addition the extent to which rape and fallow, together with other more variable break crops such as field beans, provide sufficient diversity of wildlife habitat and landscape to compensate for anticipated declines in the area sown to barley (including spring barley), other broad-acre crops and sugar beet, will be important. [Note: we assume that wheat, and winter wheat in particular, remains the dominant feature of these relatively productive arable landscapes].

Lower use of some inputs – machinery and fertilisers, in particular - is possible where simplified block cropping is practised, for example as a cost-cutting exercise (eg broadcasting rape seed to save fuel), or a considered strategy (frequent fallows are used to rebuild fertility so lower applications of chemical fertilisers are made). Where these areas are now designated as NVZs, fertiliser applications should be reduced as farmers must practise nutrient management planning. These changes should have benefits for certain aspects of biodiversity and water quality.

To the extent that environmental schemes and NGO projects are able to support this, an increase in extensive livestock grazing is possible in some parts of Eastern England and would clearly be beneficial. The broader spread of sheep into some lower-grade arable areas might have benefits, whereas shifts into outdoor pigs – an alternative strategy for poorer grade land which leaves arable production - might bring both gains and losses to environmental assets, with potentially negative
implications for water quality, in particular. If agriculture in some areas becomes sufficiently economically unattractive, the loss of farmland to housing and other forms of built development, stimulated by a combination of lower agricultural interest in acquiring or managing the land and increased interest from developers in response to continued urban out-migration demand, would generally be negative. The anticipated growing transfer of land into ‘horsey-culture’ and leisure use would tend to be negative or neutral\textsuperscript{42}, unless effort is devoted to improving the environmental management culture in these sectors. By contrast, however, these circumstances would also be likely to stimulate increased purchase and/or management of land by CARTs (Conservation, Amenity and Recreation Trusts), whose practices tend to be relatively environmentally beneficial.

Some sources have suggested localised increases in more intensive, larger scale and earlier beef finishing in some accessible eastern areas. If this prediction proves well-founded, environmental pressures on water, soils and air in these locations would increase. In other areas, beef farming offers a more extensive system of cattle management where it is expected to replace less profitable dairying, and this should bring benefits.

In the west and in the hills, the anticipated loss of beef cattle from some landscapes would be a significant concern for biodiversity – particularly in respect of those SSSIs for which favourable condition depends upon grazing by cattle. Again, the higher tier Stewardship scheme should be targeting such areas but uptake will be dependent upon available resources and the extent to which the scheme can act quickly enough to retain existing cattle herds. If these disappear, there will be a loss of infrastructure and the management skill for keeping cattle on the relevant holdings, which will make it more difficult and costly to reintroduce them, later. However, there will be positive impacts on air and possibly on water quality from declining beef numbers across England as a whole.

The continuing concentration of dairying, both spatially and in relation to the land management systems applied by surviving dairy businesses, will tend to decrease the risk of “pollution incidents” but probably increase the severity of incidents when they do occur. In addition, concentration into larger herds would tend to increase the intensity of land management on these holdings (e.g. more maize, higher stocking rates on the new land onto which they expand, with generally negative environmental implications). At the same time it might produce larger businesses where the principal manager would not be milking every day, and might therefore devote more time to soil protection and nutrient planning than is currently achieved on some smaller units. However, it is unclear to what extent any particular aspects of policy reform are influencing, or could influence, these management issues.

In the hills, there is the prospect of significant changes in grazing patterns and practices on farms. One critical issue to track carefully will be whether the reforms, in combination with ongoing changes to the nature and distribution of LFA aids, lead to a dwindling of interest in the management of stock on open moor areas. The environmental implications of this depend upon whether the land is currently grass moor or heather moor, the current intensity of grazing management and whether or not it is actively managed for game. Participants at our Penrith workshop were worried about hill farms ceasing to manage hefted flocks on common grazing land and instead concentrating all farming activity on in-bye and in-take land, which they thought would lead to severe degradation of upland landscapes and reduced

\textsuperscript{42} the considered view of experts interviewed was that a change to horse grazing would be negative for biodiversity, landscape and water quality because such land is often overgrazed and the stock receive high levels of hazardous veterinary chemicals which are transmitted to soils via dung, although some contradictory opinions were raised by agency consultees. We believe this is an area of potential concern which would merit further investigation.
biodiversity as bracken, coarse grasses and over-mature heather take over the sward. Environmental experts tended to agree that for many upland areas, undergrazing would lead to medium to long term declines in biodiversity, although where suppressed heather swards are currently overgrazed (e.g. Lake District, Long Mynd, some Pennine areas), a few years of dramatically reduced management could be beneficial. It is too early to assess whether large scale common land abandonment in the uplands is a real risk, or whether a combination of tradition, interest in game management and support for environmental management and income diversification via agri-environment schemes and other rural development projects, will prevent it. In sum, biodiversity losses would result from the loss of grass and heather mosaics in the short to medium term (2-7 years), and the longer term implications (10 years plus) would be for significant habitat change in these landscapes with more scrub, coarse grasses and bracken and gradually, more trees in less exposed sites.

These descriptions are necessarily rather general at this early stage, but they highlight the importance of the Observatory Programme checking and refining its understanding of trends and implications in the months and years beyond the completion of this particular project.

5.3 The implications of the changes for Defra’s environmental priorities

5.3.1 Introduction

The Government’s priorities for delivering a sustainable farming and food sector are set out in the Sustainable Farming and Food Strategy: Forward Look. This was published on 18 July 2006 and builds on the Sustainable Farming and Food Strategy published in December 2002. The Forward Look states that the strategic outcomes identified in the Strategy, given their long-term nature, remain valid. Table 5.2 relates the key SFFS strategic goals for the environment to particular sub-issues in policy and relevant indicators.

Table 5.2 SFFS priorities in relation to the environment

<table>
<thead>
<tr>
<th>SFFS strategic outcomes</th>
<th>Environmental policy focus (reflected in headline and core SFFS indicators)</th>
<th>SFFS headline indicators</th>
</tr>
</thead>
</table>
| 1) reduced environmental cost of the food chain | Climate change emissions (CO₂, CH₄, NO) and impacts (flooding); soil, water, air pollution (agrochemicals, nutrients, waste). | a) reduced greenhouse gas emissions from food and farming  
b) Improved river water quality (N and P levels from agriculture) |
| 2) Better use of natural resources | Preservation and sustainable use of natural resources (soil, water resources, non-food crops, waste minimisation). | c) organic matter content of agricultural topsoils |
| 3) Improved landscape and biodiversity | Biodiversity (crop and farmland); rare habitats and species; landscape protection. | d) favourable condition of nationally important wildlife sites on farmland  
e) reverse decline in farmland birds |

Source: Defra, 2004
The Forward Look sets out the Government’s current thinking about action underway or planned. It is structured around five priority themes:

1. Succeeding in the market
2. Improving the environmental performance of farming
3. Sustainable consumption & production
4. Climate change & agriculture

For improving the environmental performance of farming, it highlights in particular landscape, wildlife and biodiversity, the quality of our soils, air and water. In discussion with Defra, we have therefore identified seven particular priorities for consideration in this section, as listed below. Some particular issues (in brackets) represent Defra’s view of the principal ‘gaps’ where significant change is needed.

1. soil protection (reduced soil erosion);
2. water quality (reduced diffuse pollution);
3. air quality (reduced ammonia emissions);
4. pesticides (reduced diffuse water pollution);
5. biodiversity (increased farmland birds numbers, improved SSSI condition and meeting the UK Biodiversity Action Plan targets for farmland Priority Habitats and Species);
6. landscape (enhanced landscape quality);
7. climate change (reduced GreenHouse Gas emissions and enhanced bioenergy production from agriculture, also increased carbon sequestration).

Each of these Defra priorities is presented in turn, briefly summarising policy targets and measures and then highlighting the agricultural practices which, in Defra’s view, require further action in order to meet these priorities. The report then summarises how likely CAP reform impacts would be anticipated to affect these practices.

**5.3.2 Soils**

Defra has developed a comprehensive action plan for protecting soils from further degradation. For agriculture, this action focuses upon achieving better soil conserving management by farmers:

- within the CAP, through the twin tracks of cross compliance soil management planning and positive measures under Environmental Stewardship, particularly through soil plans under ELS;
- through better regulation, and in particular the roll-out of the whole farm approach to facilitate compliance, as well as through advisory initiatives associated with this and CAP cross-compliance.

Agricultural practices which require further action, from Defra’s perspective, are: preventing erosion from lack of cover; run-off from crusted autumn-sown soil; cultivation of over-wet soil; over-grazing; run-off from eroding soil caused by stock grazing over winter; and encouraging practices that promote improved soil organic matter.
In arable areas, predicted declines in the area sown to spring barley, in favour of winter wheat or rape (for either food or biofuels), could lead to reduced erosion due to increased crop cover over winter. However, much will depend upon soil management strategies and the vigour of crop growth in the autumn (- poor emergence could still leave soils vulnerable to erosion). A continuation of the recent increase in maize area would tend to be negative for soil erosion. If the area of set-aside and fallow land increases in less profitable areas, this might bring benefits (subject to appropriate management of this land: i.e. to establish a good cover, avoid compaction and exercise restraint in the application of inputs or wastes, as required under GAEC). Alternatively, if more land is cropped due to improving prospects for biofuels, for example if fuel prices rise further and carbon trading developments increase demand from energy generators, then the general implications for soil management would be neutral or negative because of a static or reduced area of fallow compared to the current situation.

If grassland areas are maintained in arable landscapes by extensive livestock grazing, this will generally be beneficial for soils. Where livestock enterprises become more intensive – such as where larger scale beef finishing units may be expanded along main transport links – the impacts on soils (largely from disposal of manures and localised poaching) would tend to be negative, notwithstanding GAEC requirements. The possible expansion of outdoor pigs onto land vacated by arable (probably still within continuing arable rotations) could cause localised damage to soils in these areas.

In pastoral areas, the continuation of the trend towards concentration of dairying among larger and more intensive units is likely to be negative for soils in these situations, with more poaching and erosion along tracks and by gates, and more losses from compacted soils. However, in those places where dairy farms shift into more extensive beef and sheep units, one would anticipate improved soil conditions from lower stocking rates.

In the uplands, the risk of damage to soils from overgrazing should be much reduced particularly on moorland and rough grazings, as farms extensify management of these areas. However there could be risks of degradation if stocking increases on inbye land, via localised poaching and intensive management of temporary grassland. Similar negative impacts could be anticipated where land shifts into equine use – a trend likely in both lowland and upland areas across the country.

However, the as-yet unknown impact of cross compliance GAEC on these changes could be significant. By 2007 all farms in receipt of the single farm payment will have a soil plan, and by 2009 there will be requirements for farmers to adhere to certain elements within these plans. They could therefore become useful tools to enhance soil management and soil protection on farms. Much depends upon the extent to which this initiative is able to achieve improved standards, against a background of continuing structural change which clearly has both negative and positive implications.

5.3.3 Water

The reduction of diffuse water pollution from agriculture is a key target which arises from the UK’s commitments under the EU Water Framework Directive (WFD) to achieve good ecological status for all waters by 2015. Defra’s Catchment Sensitive Farming (CSF) programme aims to develop measures to tackle diffuse water pollution from agriculture (DWPA) to meet WFD requirements. It is working to develop an effective package of policy measures to reduce diffuse pollution and is
examining a number of options, including a supportive approach under which Defra launched the England Catchment Sensitive Farming Delivery Initiative (ECSFDI) in April 2006. In addition, the extension of Nitrate Vulnerable Zones under the EU Nitrate Directive to cover 55% of England’s farmland, in 2002, means that many farmers now have to undertake regular nutrient planning and budgeting in order to comply with requirements in these Zones.

ECSFDI is engaging with farmers through workshops, seminars, farm demonstrations, self-help groups and in particular a substantial programme of one-to-one farm visits. The aim is to raise awareness of DWPA and encourage farmers and land managers to take early voluntary action to tackle it. In addition the initiative will be working in tandem with cross compliance conditions, the ES scheme and the Whole Farm Approach, to help achieve improved management practices.

Agricultural practices that are relevant to these concerns, for dairy farms in particular, are: improved manure/slurry storage and application; also more targeted fertilizer and pesticide application; and better soil management (reduced erosion), stocking and grazing.

Conserving the quantity of water resources in England is also likely to become more important in future. Although agriculture is a relatively modest user across England as a whole, at present (representing less than 2% of the total volume of licensed abstraction in 2004), irrigation, drainage and storage reservoirs on farms will all affect water resources. In the east and southeast of England where resources are likely to be more scarce in future, these influences may well represent a significant negative impact on scarce supplies, over the next 5 to 10 years.

CAP reform implications

The impacts of likely reform trajectories on water are largely an indirect result of changes in cropping and enterprise shifts in different areas, which will mean that the pattern of water pollution from agriculture could also shift. It is likely to become worse in areas where dairying concentrates but to improve where livestock rearing extensiﬁes and where beef cattle numbers, in particular, reduce. In arable landscapes much will depend upon the balance between cropped and uncropped land which is likely to ﬂuctuate more than in the past due to a greater sensitivity to changes in world market prices as EU protection is reduced. Lower cost, larger scale cropping operations could be either beneﬁcial or negative for water quality: this depends entirely upon the management strategies employed by larger operators (i.e. whether ‘precision’, or simpliﬁed/low cost but including an important element of ‘insurance’ treatments). If food cropping becomes replaced in a signiﬁcant way by cropping for biofuels, nutrient loading on water seems unlikely to decrease signiﬁcantly. On the other hand if fallow becomes a signiﬁcant and more stable feature in cropping rotations, this would generally be beneﬁcial in reducing nutrient loading. Shifts of land into amenity uses would generally tend to reduce diffuse pollution, with the possible exception of horses, where high stocking rates could exacerbate poaching, compaction and thus phosphate losses to water, in particular. While the growth of amenity land and that used for horses has so far been fairly localised, the study ﬁndings suggest that this is likely to become more widespread across the country in the medium term (5-10 years). In some areas where horses are already locally signiﬁcant, they could become a dominant landscape feature within this timespan.

Reduced upland overgrazing should be beneﬁcial for water quality, although much depends upon the balance of land types in upper catchments between open moor, allotments and in-bye: where catchments have wider and more productive valley ﬂoors, nutrient loads could remain higher due to intensive inbye use. The relative
significance of extensification stimulated or maintained by agri-environment schemes in these landscapes will also be a critical factor.

However, as with the situation for soils, much still depends upon the management practices employed on farms. Cross compliance conditions such as those to prevent localised overgrazing and requiring soil plans should help to enhance management, as well as the relative popularity of uptake of the nutrient planning and more extensive land management options within ELS. However, these practices are potentially influenced as much by other non-CAP developments as they are by CAP-induced changes. For instance, the extension of NVZs across much of England means that more farmers are now obliged to undertake some kind of nutrient planning and there are widespread limits on total N-applications to land. In these zones, therefore, CAP reform impacts are likely to be less evident than the impacts of designation because the latter will restrict the restructuring options available to farmers which might otherwise have affected management practices. Phosphate leaching will not be tackled by the NVZ constraints, but it is a major focus of Catchment Sensitive Farming. Past experiments with similar approaches suggest they can offer significant potential to improve management to reduce diffuse pollution from a range of farming situations which could be more significant than the anticipated scale of many CAP-induced impacts.

As regards water quantity, a potential gradual increase of horticulture in eastern England – subject to relaxation of the FVP (Fruit, Vegetables and Potatoes) authorisation rules as the area element of the Single Farm Payment grows – could imply more demand for water for agriculture in these areas. However, under current licensing provisions there are limits on farmers abstractions from surface waters, so the construction of more on-farm reservoirs seems highly likely to be the medium term trend. This is likely to be fueled also by recurrent summer drought due to climate change, such that the CAP reform effect will be relatively minor. In the longer term, new storage reservoirs could have negative implications for groundwater recharge, although other changes (e.g. use of other land for wetland restoration, and an increase of built development, as land leaves agriculture) seem likely to have more significant impacts upon the resource.

5.3.4 Air

Emissions of ammonia can lead to both acidification and eutrophication of sensitive terrestrial and freshwater habitats. The main drivers for action are the EU National Emissions Ceilings Directive (NECD), the UNECE Convention on Long-range Transboundary Air Pollution, the Water Framework Directive and Defra’s SSSI Public Service Agreement target. The UK is currently on target to meet its agreed emission ceilings for 2010. The European Commission has, however, started preparatory work for a legislative proposal to revise the NECD. The new proposal will probably include a set of tighter emission ceilings to be achieved by 2020.

However, under the WFD, a number of freshwaters have been identified as at risk of failing to meet the WFD objectives because of acidification. Ammonia is a contributor to this acidification. In addition, high levels of ammonia from agriculture are also contributing to the classification as ‘in unfavourable condition’ of a number of SSSIs. Current national targets for ammonia emissions may not offer adequate protection to sensitive habitats. Work is on-going to identify the likely further action required to reduce emissions of ammonia to meet the UK’s domestic and international commitments.

Ammonia emissions are associated with the production of nitrogen rich products (manures, fertilisers). Changes to the handling and spreading of these products may
involve additional costs for farmers but should help reduce emissions to air. However, focusing on air pollution in isolation risks diverting nitrogen into other pollutant forms that cause other environmental impacts (climate change from nitrous oxide, nitrogen leaching to water). Defra is therefore seeking the development of integrated nutrient management strategies that reduce total inputs to the system (e.g. feeds, fertilisers) as well as reducing outputs (e.g. manure, slurry and soil management).

**CAP reform impacts**

At the macro-scale, a relative downturn in farming profitability as a result of UK decoupling and increased market access in the EU, should reduce the scale of livestock production across the country as a whole, with benefits for air quality. Such a trend will generally be in line with previous predictions of CAP reform response. However there will continue to be ammonia emission concerns wherever intensive livestock units remain viable (fewer, larger holdings more concentrated in particular locations: SW dairy, E beef and the continuing influence of pig and poultry units). Cross compliance and GAEC conditions should enhance standards of manure and slurry storage and management over time, and the expansion of ELS could also make a positive contribution as long as waste management planning and those other ELS options which will reduce waste generation remain relatively popular choices.

### 5.3.5 Pesticides

It is Government policy to promote uses of pesticides that achieve high standards in environmental protection whilst maintaining the economic viability of crop protection. In March 2006 the Government published the UK Strategy for the Sustainable Use of Plant Protection Products which outlined this policy and established a number of stakeholder groups to develop the necessary packages of measures. These measures will include helping to co-ordinate the actions of a number of industry and Government policies and initiatives which influence, or are influenced by, the use of pesticides. Key amongst these will be the work of the Voluntary Initiative and measures to implement the Water Framework Directive, as well as the development of appropriate indicators. Broad Policy and the Strategy's package of measures will evolve to take account of the developing EC Pesticides Thematic Strategy (which includes an expected Directive on the Sustainable Use of Pesticides).

Careful handling, application and disposal of pesticides, the use of alternative methods of pest control; and enhanced general husbandry and crop management to minimise pest levels, are all actions that would help promote Defra's priorities in this area.

**CAP reform impacts**

This is perhaps one of the most difficult areas in which to determine a clear pattern of impact from CAP reform. The formal modelling work tends to suggest reduced use of all inputs, including pesticides, as a result of decoupling because of the reduced profitability of cropping. However, we are not convinced as yet that this will indeed be the dominant pattern. All indications are that the relationships between pesticide use and different management and restructuring strategies are much more complex than these models will tend to assume. The biggest users of pesticides (including those used in veterinary applications) on farmland would tend to be horticulture, broad-acre crops and equine enterprises, but the most widespread of these users is, and will undoubtedly remain, broad-acre crops. Thus to predict trends in usage from anticipated CAP reform impacts on this sector, we have to know the likely balance of
crop types (including fallow, and maize) and their relative requirements for pesticides under different management options. We can generally assume that fallow land will receive much lower pesticide applications than cropped land – although widespread management with glyphosate seems likely to persist as a feature. Shifts between cereal crop types depend upon the balance of winter to spring cropping – more winter cropping generally means more fungicides. However, shifts between cereals and other crop types are also relevant since, for example, legumes tend to imply greater pesticide use than cereals or brassicas, all else being equal. Increases in the area of maize would seem likely to increase pesticide usage. One environmental expert interviewee suggested that non-CAP influences may be more significant in this area than CAP reform, particularly in respect of reducing the environmental impacts of pesticides. These include the Voluntary Initiative and the increasingly restrictive attitudes of processors and retailers towards pesticide use. In addition the next few years will see the phasing out of a number of pesticides which were not supported in the EC Review process or which failed to meet the required environmental or human health safety standards established under these procedures.

Nevertheless, in the years 1998-2004 there appears to have been an increase in the area of land in England that is treated with pesticides and a significant increase in the complexity of pesticide mixes commonly applied in different cropping systems, rising from an average of 7 per crop to 11. Over the same period, however, levels of contamination in water appear to have declined. We have not been able to isolate the precise causes of these trends and therefore to assess whether the CAP reforms are likely to significantly affect them. In the practitioner interviews there was a broad agreement that the reforms were unlikely to affect detailed crop management issues such as these. It was felt that farmers were already seeking systems that would reduce their costs and that the reforms would simply increase their incentives to continue so doing. In that context, therefore, we cannot be confident that pesticide use will fall as a result of the CAP reforms.

5.3.6 Biodiversity

Defra’s PSA targets plus the more precise targets within the England Biodiversity Action Plans for 10 priority habitats and 78 priority species, provide a good breadth of indicators for biodiversity in the farmed landscape. In many instances, similar pressures from agriculture apply, including over and undergrazing, loss or deterioration of traditional field boundaries, widespread use of pesticides and heavy machinery, nutrient enrichment from manures and inorganic fertilisers.

The farming practices that are of most concern to Defra and its biodiversity goals are, in order of their relative significance: overgrazing (currently affecting 31.34% of SSSIs by area); moor burning; land drainage; inappropriate scrub control and woodland management; undergrazing (currently affecting 6.1% of SSSIs by area); air pollution.

CAP reform implications

The findings of this study tend to confirm many of the conclusions of earlier predictive work on the likely impacts of the reforms on biodiversity: that is, that there will be a

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43 One is to ensure that all Sites of Special Scientific Interest (SSSI) in England, which cover 7 per cent of the agricultural land area, are in ‘favourable condition’ as defined under the EU Habitats Directive; the other is to reverse the decline in the populations of a specified list of farmland bird species that has been observed since the 1970s.

mix of positive and negative effects depending upon local geographic, agronomic and socio-cultural situations. In the arable areas, the general view of experts would tend to be relatively optimistic for most of the future scenarios, including more block cropping and increased fallow area (by comparison with the current situation and recent past). One possible exception would be for the scenario of a significant expansion of energy cropping which would be likely to occur at the expense of the current area of fallow and set-aside land, in these landscapes. In all other scenarios, a significant proportion of fallow land would be likely to remain and this and its management would be key to many of the anticipated biodiversity benefits. Bird populations should have more opportunities to benefit from fallow and also very low cost crop management strategies, as well as precision farming techniques, where these persist. The diversity of land cover types will alter but not necessarily reduce, in that fallow and novel crops and non-farming uses may displace what is currently a greater variety of broadacre crops, over time. A combination of legislation, GAEC conditions and increasing ELS uptake would seem likely to maintain the presence and quality of interstitial and linear habitats on farms in these areas (with the possible exception of ditches, which can be an important and still declining environmental feature in some lowland landscapes such as the fens\textsuperscript{45}). Also, the prospect of more land moving into extensive management for wildlife, under HLS or perhaps more significantly other EU and UK funding initiatives (Lottery, EU regional funds and LIFE++) is positive. This would be implied because of the lower opportunity costs of extensive management, as the relative returns from cropping decrease but eligibility for the SPS remains. If in response to the same economic signals, more land in marginal arable areas starts to be used for sheep grazing, this would generally be beneficial for the landscape mosaic and thus for many farmland species (with the exception of rare arable flora), whereas movement of land into equine and non-farming uses would bring a mix of positive and negative biodiversity impacts in localised areas.

In pastoral areas, the main concern in lowland landscapes must be the potential loss of active management on marginal semi-natural habitat that is dependent upon continued extensive grazing by cattle and/or sheep. In addition, further concentration of intensive dairy units into specific subregions would tend to increase biodiversity decline in these areas. Counter to these trends would be the generally positive impacts on areas of currently intensively managed grassland, of reduced stocking and simplified management regimes, as would be implied by restructuring from dairy to beef and sheep and from intensive beef to more extensive beef and/or sheep plus perhaps an expansion of organic farming, in these landscapes. In the uplands, overgrazing seems likely to decline in significance as an issue for biodiversity while undergrazing becomes a much more important concern in some places. In both situations, the relative attractiveness and availability of HLS agreements could be a critical determinant of future change, even in situations where land is currently tied up in ESA agreements for the next five years and thus the critical point is perhaps 2008 or 9, rather than 2006-7.

5.3.7 Landscape enhancement

The Countryside Agency (CA) has been developing indicators of countryside quality (Countryside Quality Counts – CQC), and preliminary results show significant changes in quality over time. There are, as yet, no hard measures for determining

\textsuperscript{45} These are a field boundary feature not currently protected by legislation and yet potentially valuable for wildlife, particularly in otherwise flat arable areas where drainage systems and ditches (drains, rhynes and dykes) have been longstanding features of productive arable landscapes. Recent evidence from the Countryside Agency's Agricultural Landscapes study series (Westmacott and Worthington, 2006) suggests that these boundaries are still being removed in some areas, with clearly negative implications for wildlife habitat and local biodiversity.
success in maintaining or enhancing landscape character. One key area has been the degradation and removal of traditional, characteristic features of particular landscapes (buildings, boundaries and wetland areas). Clearly, significant changes in land cover will also change landscape character over time, so overgrazing and undergrazing, leading to moor and heathland degradation in sensitive upland and lowland landscapes, and the loss of grassland to scrub in some lowland areas, are a notable concern in this respect.

Agricultural practices of some concern include the removal or degradation of traditional features (buildings, boundaries), over and under grazing and other practices that damage farmland biodiversity and cultural features.

**CAP reform implications**

The publication by the CA in July 2006 (Westmacott and Worthington, 2006) of the fourth in the New Agricultural Landscapes (NAL) series of research reports, examining agricultural change and its visual impacts upon lowland landscapes, gives a timely reminder of the often very long-term nature of changes in character and their determinants. The authors stress the extent to which in recent decades, a combination of CAP reform alongside enhanced awareness of and interest in landscape protection have reduced the scale of negative impacts from farm change upon landscapes, in different lowland settings around the country. The findings of our qualitative study would tend to be consistent with this view – i.e. a slower pace of landscape change currently and in the future (by comparison with change in past decades), due to more emphasis upon preserving key features through GAEC, cross compliance, legislation and Environmental Stewardship, as well as peer pressure and the influence of non-farming occupiers of rural land. Nevertheless, there are situations where potential changes due to the reforms could give rise to significant concern and/or significant opportunities for new and positive developments. These include the uplands, where the future form and rationale for management of the open moor appears quite likely to have to change in the coming 5-10 years, and lowland landscapes which currently depend for their high diversity on a mix of farming systems. This mix seems likely to decline due to reform (e.g. some areas specialising in dairy, many losing dairy and beef and going over wholly to sheep). In arable areas, this study has highlighted our relatively poor grasp of how changes in cropping styles and systems across the landscape might affect its character (in terms of both aesthetics and functionality). Yet there are clear indications of a considerable potential for change in cover types over relatively short timescales, depending upon agricultural market and non-food production developments. On the other hand, the more durable landscape infrastructure seems likely to persist and the significance of non-farming elements in the landscape will continue to increase.

5.3.8 **Climate change**

Agricultural management is one important influence upon the UK’s climate change goals. In addition to the points relating to nutrient enrichment and pollution described already, which are important also for reducing GreenHouse Gases (GHG), agricultural activity contributes significantly to GHG generation. 7 per cent of total greenhouse gas emissions; 43% of methane emissions and 68% of nitrous oxide emissions emanate from agriculture in England. Agriculture can also contribute to tackling climate change via the production of energy crops and in acting as a carbon sink via its soils, and the creation and management of farm woodland and other permanent vegetation.
Agricultural practices which can help to tackle climate change include reduced stocking levels and keeping fewer livestock altogether. Using GHG abatement techniques in crop and animal husbandry (e.g. animal feeds which generate reduced methane), achieving improved resource efficiency (especially in respect of nutrients), growing energy crops, and expanding areas of semi-natural, permanent vegetation, may also help.

CAP reform implications

This is an area of concern where our study would tend to support previous predictions of largely positive impacts, in that a general reduction in livestock numbers across the country seems likely, which will lead to reductions in agriculture’s contribution to GHG emissions. Also, we predict that energy cropping will become more significant, partly as a result of CAP reforms but much more as a result of non-agricultural market developments, which should be positive for Defra’s climate change concerns. However a balance clearly needs to be struck here between the potential benefits of growing more biofuels to replace fossil fuel energy sources and the potential for negative impacts on other environmental assets such as biodiversity, water quality, soils and landscapes. One area of potential interest for the future will be to explore the extent to which CAP reform provides opportunities for enhanced management of other farmland resources (e.g. upland peat soils or extensive, permanent semi-natural habitats) primarily to sequester carbon. These and other future prospects for reducing agriculture's carbon balance depend upon further research and development into optimal land use and management strategies, as well as policy and market trends wholly unrelated to CAP reform.

5.3.9 Waste management

Much of the waste and by-product arising on farms consists of organic matter such as manure, slurry, silage effluent and crop residues. The next most significant farm wastes are packaging and plastic film, and sheep dips. Defra aims to minimise waste production, to promote waste recycling and reuse over disposal, and to ensure that wastes are managed and disposed of safely. The Agricultural Waste Regulations which are now in place require farmers to dispose of waste at licensed sites.

The agricultural practices of most concern in relation to waste include over-application of slurry and manure to land (for disposal purposes), as well as systems which influence the initial generation of farm waste and the need to encourage and facilitate waste recycling (e.g. plastic films from vegetable production and silage making).

CAP reform implications

In overview, the implications of CAP reform upon the generation and disposal of waste from agriculture are most significant in the following areas:

- reduced numbers of cattle in upland and lowland areas will reduce the incidence of slurry and manure in many landscapes but concentration of dairying will increase it in some particular locations. Where sheep replace cattle, this will significantly reduce waste problems because of much lower levels of manure generation, and where beef enterprises replace dairy farms, stocking levels will usually be lower and thus waste generation should reduce. The only expected shifts in livestock enterprise types which would not bring these kinds of benefit are moves into intensive beef or outdoor pig production, which are likely to be highly localised;
the sections on water and soils have considered implications which include the
effects of changes in waste generation on livestock holdings;

- the combined effect of GAEC, farms entering ELS and other, non-CAP,
  measures including the Whole Farm Approach and the Catchment Sensitive
  Farming initiative should be beneficial in improving waste management standards
  on farms;

- new concerns and a need for awareness-raising and higher management
  standards may arise in sectors and among land-users that have not traditionally
  been considered as significant elements, but whose impact upon the land is
  increasing: notably, equine and leisure based businesses.

5.4 Gap analysis

5.4.1 Introduction

This section draws together feedback from the workshops and interviews as well as
our own conclusions from the literature review. It considers needs for additional
research and monitoring activity to enable a fuller appreciation of the environmental
implications of farm change as a result of the 2003 CAP reforms, in England. Our
intention here is not to repeat the gap analysis and discussion of the value of
qualitative indicators and methods of data collection that we set out in the OBS01
study. Here, we concentrate in more detail upon the gaps suggested to us while
carrying out this particular investigation of farm-level change in response to policy
and its environmental impacts.

The main issues are as follows.

5.4.2. Farming businesses and their behaviour

Several comments were made on the need for more information on the structure
of the farm business, as opposed to actual land ownership. It was felt that current
data does not reflect land management arrangements, such as contracting or tenure,
accurately or record those who are actively farming. This makes it very difficult to use
data such as the June survey to predict how land management will respond to policy
drivers, because past evidence indicates the importance of the scale and motivations
of management units (which are manifestly not the same as ‘farm holdings’ anymore)
in determining management strategies. For example, in eastern England it might be
valuable to know how much land was being managed by a few very large contracting
businesses – some commentators believe these are now by far the most influential
actors in land management in these areas. If this were confirmed by such an
investigation, Defra might be able to predict change by studying the motivations and
management styles of these particular actors, over time. It was also suggested that
there should also be some measure of active farmers on commons. In the uplands,
changes on commons were cited as a useful first indicator of what might happen
elsewhere – there may be opportunities to track this through active commoners
groups.

As diversification activities become an important source of farm income there is a
greater need to better track diversification and off-farm income over time and
understand patterns because these factors can be key influences upon farm
management motivations and styles, with related environmental impacts.
It was suggested that livestock numbers or crop areas alone are insufficient as an indicator of farm change. The farm management systems under which livestock or cropping businesses are operating are also important. For example, are stock being housed throughout the year or are they grazed outside over winter? Are cereals cropped as part of a rotation or in continuous cropping systems? - etc. Also, there is a lack of data as to the breeds that are being used for grazing which can be important in determining environmental impacts: for example, a significant move to the larger Holstein dairy breed could have implications for soil structure on dairy farms. Similarly, land cover data alone was not considered sufficient as a method for predicting vegetational quality and the impacts of management. There is a need to know the purpose of the land cover from the farmers’ perspective, and the land management system in operation on that cover.

Understanding ‘other’ farm types: With the recent increases in the number of “other” farm type category identified by the June survey, it was felt that more information was required about this farm type in order to understand the reasons for the increases. This category is a residual, so is likely to have a mix of more and much less conventional types and styles of farming enterprise within it. As such, one cannot either assume that it is mainly hobby/non-farm income-driven farmers nor that it is mainly commercial farms with a complex mix of outputs and this makes it very difficult to predict how it might behave in response to different stimuli. One particular action that we recommend is to gather some more robust data on the environmental impacts of land use change from sheep and/or cattle grazing to grazing by ponies and horses for leisure use, in different situations around the country (e.g. to understand if the purpose of keeping horses affects the management regimes used, and how impacts depend upon soil type, topography, existing sward quality, etc.).

5.4.3 Field level practices

There is a lack of information regarding changes in grassland management practices. Satellite or aerial photograph imagery at key times of the year could provide a good indication of landscape change, tracking year-to-year trends in areas of cut grassland, different intensities of grazing and apparent moisture content. It was also suggested that much grassland in the East of England region is not being grazed and this will not necessarily be picked up in the June survey.

It was suggested that there was a lack of data that distinguished between spring and winter sown crops (especially wheat) and the management of these crops, for example how long the stubbles are left to stand. Also, interest in knowing the proportion of set-aside land that is being used to grow industrial crops, including energy cropping, was highlighted and we would concur that this could be valuable, in respect of anticipated trends following the 2003 reforms.

5.4.4 Key Environmental data

In relation to environmental data, a lack of information relating to the historical management practices of farmland in order to determine the environmental impact of change was highlighted. For example, the impact of livestock extensification on grassland biodiversity will vary significantly according to existing sward structure and past management.

It was suggested that there is insufficient monitoring of many agriculturally-relevant features/aspects of water, in England. These aspects include the following.
• biological change in water. Although invertebrates are generally used as a crude indicator, there is a need to measure algae and macrophytes as well. Whilst the Environment Agency monitors for micropollutants, biological monitoring is less frequent and provides insufficient detail to accurately determine trends.

• It was suggested that other pollutants which should be monitored are veterinary products, maize pesticides, pathogens and their interaction with climate change and endocrine disrupters.

• the Environment Agency water quality monitoring programme does not pick up peak, episodic rainfall driven events which deliver nutrients from agricultural sources.

• better monitoring is needed of upper catchments where diffuse pollution from agriculture is known to be a problem. The Catchment Sensitive Farming programme will set up new monitoring to address this need, but this is only planned to be a limited-life project at present and these considerations are needed also for the longer term.

• in large catchments the distribution effects from various sources, such as sceptic tanks and discharges from sewage works are not known. Long term dataset sets are required in order to obtain this information.

There are very few national schemes for monitoring biodiversity on arable farmland with the level of frequency that would be necessary to track CAP reform impacts (i.e. annually or biennially). The Breeding Bird Survey is the main one, but is confined to birds and some mammals. The Butterfly Conservation survey, has very few transects on arable farmland. The Game Conservancy Trust has a long-term study on farmland on the South Downs in Sussex, but this only covers 100 cereal fields. Other insects, mammals and other invertebrates could also be very usefully monitored: the assumption that we can accurately check biodiversity by using bird species as indicators was recognised even by Bird experts as a rather crude one (albeit necessary, given the current paucity of other data). While a greater diversity of plant and animal species has been monitored under Countryside Survey, the relative infrequency of these exercises (four surveys since 1980) means that they cannot detect the impacts of short to medium term influences such as policy changes. For reasons of cost, it would seem advisable to seek stakeholder agreement on the extension of any annual species monitoring to one or two other important indicator species, before such a step could be considered.

The lack of systematic monitoring of the historic environment was highlighted in both the literature review and expert interviews as a particular concern, although because policy for this area is formally led by the Department of Culture, Media and Sport (DCMS), rather than Defra, it has not been discussed in detail in section 5.2. This lack of monitoring means that we know very little about current rates of change in relation to a host of historic features in the landscape – from buried artefacts and archaeology to surviving field boundaries, to farm buildings. English Heritage is beginning to build up a system for monitoring condition in farm buildings at present but there is no long-term or consistent monitoring of this kind yet in place. Notwithstanding the DCMS responsibility, the established importance of historic elements in shaping landscape character and influencing biodiversity (e.g. through provision of longstanding habitat for a variety of species) would suggest that Defra should also be seeking to address this gap, in partnership with DCMS and/or its agencies.

The lack of comprehensive and robust JCA-resolvable data on landscape change other than basic land cover types – e.g. for basic features such as field boundaries
and the size and location of small woods – is a problem, particularly in light of the signature by the UK of the European Landscapes Convention (ELC), in February 2006. The ELC requires signatories to take steps to monitor landscape change in respect of character and quality. Although CQC is an important development in this regard and is making best use of the data that is available, the infrequency and spatial insensitivity of the surveys upon which certain of its elements depended in phase 1 (notably, field boundaries and vegetation condition), is a problem. However, we understand that plans are being made to address some of these issues using adapted additional datasets (e.g. Defra IACS and Rural Land Registry information on boundaries, new Land Cover remote sensing approaches), in the second phase of CQC. It would therefore seem most sensible to work collaboratively with the CQC process in identifying the best ways to address these issues in the context of the Observatory’s ongoing work.

5.4.5 Qualitative evidence of change and its impacts

This study has particularly highlighted the importance of developing and enhancing qualitative, as well as quantitative, tracking and reporting systems over the next few years, as patterns of change emerge more clearly. In our view it is essential that the Observatory should continue to check and evaluate both the formal and the grey literature (including agency, NGO and practitioner reports and journals, as well as farming press) and discuss emerging patterns with practitioners and environmental experts at regular intervals, to assess the trends and impacts and consider appropriate intervention strategies. Reliance only on quantitative and regularly collected datasets will not be sufficient to provide Defra with evidence of change as it occurs and to enable action to be taken sufficiently rapidly to address impacts.

5.4.6 Conclusions

This brief summary of gaps in the data illustrates the way in which changing priorities have outpaced monitoring strategies in this area. On the farm business side, some of these issues might be investigated in future through a different kind of Farm Business Survey – with more farms involved, collecting less economic detail but attempting to capture essential business characteristics in a way which could be spatially explicit at the field level. On the other hand, it might instead be possible to gather some of this information from an amended approach to the June Survey; asking respondents to define any functional relationships between the multiple holdings that are recorded or adding some questions about farming systems. The Farm Practices survey might be usefully amended to capture more information about farming styles and systems as well as to examine field-level management. In all these cases, the ability to relate responses to GIS databases at field level would be particularly valuable and should at least in theory be possible for as long as SPS applies.

On the environmental side, this study has confirmed findings of other elements of our Observatory monitoring studies, in OBS 01 and OBS 03. It is clear that some aspects of the environment are much less fully monitored than others and that in relation to predicting the impacts of agricultural change, some of these gaps are particularly serious. Water would be perhaps the most pressing one at present, given the targets and obligations of the EU Water Framework Directive, but biodiversity other than birds and special sites, historic features and other cultural landscape elements (monitored at the landscape scale) and implications for climate change would all seem likely to be important for the future.

Our final comment (5.4.5) about the continuing importance and value of qualitative evidence-gathering remains valid, notwithstanding new efforts to address the gaps
identified here. In our view, this process should continue into the foreseeable future.
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ANNEX 1    WORKSHOP ATTENDEES AND PROGRAMME

Monday Feb 20th Taunton

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>David Crabb</td>
<td>Defra RDS (SW – dairy and beef)</td>
</tr>
<tr>
<td>Matthew Heaton</td>
<td>Defra RDS (SW - Organics)</td>
</tr>
<tr>
<td>Ciaran Gannon</td>
<td>Defra RDS (HQ)</td>
</tr>
<tr>
<td>Anthony Gibson</td>
<td>NFU regional representative</td>
</tr>
<tr>
<td>Matt Lobley</td>
<td>University of Exeter</td>
</tr>
<tr>
<td>Julian Hosking</td>
<td>English Nature</td>
</tr>
<tr>
<td>Julia Proctor</td>
<td>National Trust SW Farm and Countryside</td>
</tr>
<tr>
<td>Clare James</td>
<td>Clinton Devon Estates Assistant land agent</td>
</tr>
<tr>
<td>Richard Hosking</td>
<td>Land Agent, RICS</td>
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From CCRU: Janet Dwyer, Julie Ingram, Jane Mills

Wed 1st March Hackthorpe, near Penrith

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Mervyn Edwards</td>
<td>Defra RDS (NW)</td>
</tr>
<tr>
<td>Ian Condliffe</td>
<td>Defra RDS (Y&amp;H)</td>
</tr>
<tr>
<td>Adrian Shepherd</td>
<td>Yorks Dales National Park and ANPA</td>
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<tr>
<td>William Houstoun</td>
<td>Rural Regeneration Cumbria</td>
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<tr>
<td>Geoff Brown</td>
<td>Fells and Dales LEADER +</td>
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<tr>
<td>Veronica Waller</td>
<td>Fells and Dales LEADER +</td>
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<tr>
<td>Julia Aglionby</td>
<td>Chartered Surveyor &amp; Agricultural Valuer</td>
</tr>
<tr>
<td>Alex Lowe</td>
<td>Defra RDS NW</td>
</tr>
<tr>
<td>Will Cockbain</td>
<td>NFU regional representative</td>
</tr>
<tr>
<td>Lindsey Clothier</td>
<td>Defra: Observatory Programme</td>
</tr>
<tr>
<td>Ian Soane</td>
<td>The Upland Centre</td>
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<tr>
<td>Helen Shaw</td>
<td>The Upland Centre</td>
</tr>
<tr>
<td>Diane Spence</td>
<td>Defra RDS (HQ)</td>
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<tr>
<td>Debbie Peach</td>
<td>Defra: Observatory Programme</td>
</tr>
<tr>
<td>Daniel Hird</td>
<td>Scottish Enterprise Dumfries and Galloway</td>
</tr>
<tr>
<td>Martin Staveley</td>
<td>Rural Regeneration Cumbria</td>
</tr>
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</table>

From CCRU: Janet Dwyer, Julie Ingram, Pete Gaskell
Friday 3rd March Peterborough

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin Collinson</td>
<td>EEDA, consultant and farmer (horticulture and arable)</td>
</tr>
<tr>
<td>Sarah Escott</td>
<td>Defra RDS (HQ)</td>
</tr>
<tr>
<td>Chris Stoate</td>
<td>Game Conservancy Trust</td>
</tr>
<tr>
<td>Liz Bridges</td>
<td>English Nature Land Agent</td>
</tr>
<tr>
<td>Robert Gooch</td>
<td>The Farmed Environment Company</td>
</tr>
<tr>
<td>Nigel Boatman</td>
<td>CSL, York</td>
</tr>
<tr>
<td>Peter Taylor</td>
<td>Association of Independent Crop Consultants, freelance agronomist</td>
</tr>
<tr>
<td>Helen Dunn</td>
<td>Defra: Observatory programme</td>
</tr>
<tr>
<td>Steve Langton</td>
<td>Defra: Observatory programme</td>
</tr>
<tr>
<td>Nigel MacDonald</td>
<td>ADAS horticulture consultant/adviser</td>
</tr>
<tr>
<td>Graham Redman</td>
<td>The Anderson's Centre</td>
</tr>
<tr>
<td>Pamela Forbes</td>
<td>NFU regional representative</td>
</tr>
<tr>
<td>Chris Moke</td>
<td>Farmer (arable and pigs)</td>
</tr>
</tbody>
</table>

From CCRU: Janet Dwyer, Julie Ingram

WORKSHOP PROGRAMME

10.30  Arrival and coffee

11.00  Round table introductions and welcome from CCRU

11.10  Introduction to the workshop – aims and purpose (JD)

11.15  Summary of literature review and data analysis findings for these kinds of farm, followed by facilitated discussion to examine participants’ views about the validity of the findings and other issues that may have been missed, focusing upon key changes by sector.

12.30  Lunch

1.30   Unpacking the geography of change – what is happening where, and what other influences may affect future land uses in each area? Facilitated discussion using maps.

2.30   Finish, tea and depart
ANNEX 2: INTERVIEWEES AND INTERVIEW GUIDE

Table 1 List of additional practitioners interviewed

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rob Forster</td>
<td>National Beef Association</td>
</tr>
<tr>
<td>Ciaran Gannon</td>
<td>Defra RDS technical advice unit (for pigs and poultry)</td>
</tr>
<tr>
<td>Alan Brewer</td>
<td>Defra RDS (for pigs and poultry)</td>
</tr>
<tr>
<td>Martin Lainsbury</td>
<td>The arable group (for sugar)</td>
</tr>
</tbody>
</table>

Interview guide for follow up interviews with practitioners

Questions were redesigned for each interview, broadly following similar themes. An example for pigs and poultry is given here, for brevity.

Topics of conversation for discussion with Pig and Poultry representatives.

How would you describe the broad pattern and situation of pig and poultry enterprises in England prior to the introduction of the SPS? What were the key trends in the sectors between, say, 2000 – 2005?

How do you anticipate decoupling and the SPS will influence intensive pig and poultry production systems and moves into or out of these sectors? Are there any particularly relevant cross compliance issues?

What other policies are likely to influence change in the pig and poultry sectors in the next few years? (NVZ legislation, animal welfare, WTO Doha, etc)

What would you expect to be the extent and timing of the policy driven trends you have described?

What patterns / trends do you feel will vary regionally? (E.g. most outdoor units are currently in East Anglia on light free draining soils, do you anticipate the outdoor pig sector becoming more commonplace elsewhere in the country?)

What are the other main influences on pig and poultry production systems, apart from CAP reform and other policy changes?

What impact, if any, will the ELS and HLS schemes have on pig and poultry production systems, or vice versa (are the schemes attractive or relevant to these sectors, and will this change with decoupling)?

Assuming cereal prices continue to fluctuate around the £70 a tonne level, what influence do you anticipate this will have on intensive and extensive (indoor / outdoor) pig production systems? Battery / free range poultry?

What other currently unquantifiable influences do you feel might affect the pig and poultry industries 2006 – 2013?

What marketing trends do you anticipate over the next 7 years in the pig and poultry sectors? (E.g. what % rise in direct marketing?)

What influence do you anticipate the supermarkets will have on the two sectors over the next 7 years?
Defra is concerned to track any farming changes with environmental implications. With that in mind, what key indicators of change in the pig and poultry sectors do you feel should/could be monitored, 2006-2013?

Table 2 List of environmental experts interviewed

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Name</th>
<th>Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADAS</td>
<td>Owen Davies</td>
<td>Landscape and ecology</td>
</tr>
<tr>
<td>Anglia Ruskin University</td>
<td>Bob Evans</td>
<td>Soils</td>
</tr>
<tr>
<td>Centre for Ecology and Hydrology</td>
<td>Helen Jarvie</td>
<td>Water and aquatic biodiversity</td>
</tr>
<tr>
<td>Centre for Ecology and Hydrology</td>
<td>Colin Neal</td>
<td>Water and aquatic biodiversity</td>
</tr>
<tr>
<td>Centre for Ecology and Hydrology</td>
<td>Richard Pywell</td>
<td>Biodiversity (systems/invertebrates)</td>
</tr>
<tr>
<td>English Heritage</td>
<td>Steve Trow</td>
<td>Historic</td>
</tr>
<tr>
<td>English Nature</td>
<td>Phil Grice</td>
<td>Biodiversity (birds/general)</td>
</tr>
<tr>
<td>Environment Agency</td>
<td>Rachel Dils</td>
<td>Water</td>
</tr>
<tr>
<td>Game Conservancy Trust</td>
<td>John Holland</td>
<td>Biodiversity (birds and invertebrates)</td>
</tr>
<tr>
<td>IGER</td>
<td>David Chadwick</td>
<td>Air</td>
</tr>
<tr>
<td>IGER</td>
<td>Jerry Tallowin</td>
<td>Landscape and ecology</td>
</tr>
<tr>
<td>Oxford University ECI</td>
<td>John Boardman</td>
<td>Soils</td>
</tr>
<tr>
<td>RSPB</td>
<td>Richard Bradbury</td>
<td>Biodiversity (birds)</td>
</tr>
<tr>
<td>Scottish Agricultural College</td>
<td>Davy McCracken</td>
<td>Landscape and ecology</td>
</tr>
</tbody>
</table>

Additional less formal correspondence/assistance was given by:
Andrew Baker, Countryside Agency
Vince Holyoake, English Heritage
Jeremy Lake, English Heritage
Tony Burton and colleagues, National Trust
Gerry Lawson, NERC

OBS 02 – Question list for interviews with environmental specialists

1. Explain the purpose of the research: to investigate the emerging and likely environmental impacts of the 2003 CAP reforms in England, and outline what we have done so far. Now that we have a good picture of how farm sectors and areas seem to be adapting to the change, we need to clarify how these changes will probably affect different aspects of the environment. That’s where the interviews come in.

2. Ask them to describe what areas of the environment they know most about, eg:
   - biodiversity (species and/or habitats, and which ones)
   - landscape
   - historic environment
   - water (ecology, hydrology, pollution)
   - soils
   - air and/or climate change
   - other: please note
   - or just particular aspects of these: eg grazing impacts upon sward diversity, etc.
From this, decide which of the three area/farm type categories is most relevant to their knowledge: arable, LFA or lowland livestock, or any two, or all three.

3. Briefly talk through the key trends that we have identified in the workshops and lit reviews that relate to their areas of expertise. You can use the powerpoint diagrams as a guide for this, if you like and the technology allows it!

4. Ask what these changes are likely to mean for their environmental areas of expertise: which things are likely to be affected (attributes or systems), and in what ways? What might be beneficial for the environment, and what might be detrimental, in their view?

5. How might the changes develop over time? – can they say what is likely to change when, and how patterns of change might develop – i.e. from short-term (2-3 years) to medium term (5-10 years)?

6. How might we anticipate picking up these changes? What sort of indicators might be useful for detecting changes and assessing how serious they might be? Is the appropriate information already gathered in any systematic way, or would new monitoring be needed?

7. What other factors might complicate any interpretation of these changes – are there other influences that could have a bigger effect than the sorts of changes we have picked up in relation to CAP reform?

8. Is there any other key literature summarising or detailing some of the issues we have discussed here in a particularly relevant way, that we should look at? If so, please provide references. (It may be useful for you to have a copy of the OBS3 interim report with you, to check whether we've already covered this material in the systematic review of impacts).
Annex 3: slides from workshops
Farmer responses to CAP reform, 2005: lowland livestock, including dairy

- a few ideas of possible trends
Possible system changes

Dairy → Beef

Various kinds of cropping: wheat, vegetables

Larger, more specialised

Less efficient/other motivations

Beef and sheep

Sheep

or

Land leaves farming
Possible stock number changes

**Dairy** – same number of cows, but in fewer, larger herds

**Beef** – lower numbers (everywhere?), but remainder split between extensifiers and intensifiers

**Sheep** – lower numbers in some places, higher in others?
Basic strategies

• **Wait and see** – *but for how many, and how long?*

• **Get rid of the loss makers** – *will beef go quickly? Where will the biggest shake-outs be?*

• **Who will be gaining and building up businesses?**

• **Any unusual developments to anticipate?**
Other factors to consider and discuss

• Response to cross compliance and GAEC – *how will this affect farming styles/options and practices?*

• Response to ES scheme – *how widespread and what does it imply for farming practices?*

• Other constraints on change – *access to capital/planning time/family situation* …
Focus for morning discussion

- What do we know is happening, now – to sectors/areas/types of farm?
- What do we think is likely and when? (scale and timing of changes)
- What else will be influencing change, apart from policy?
- What would be the key indicators, to keep track of, 2006-13?
Thinking about the geography of change

• Big picture – regional patterns

• Local area changes

• On-farm scale: land use patterns
Farmer responses to CAP reform, 2005: arable and horticulture farms

- a few ideas of possible trends
Possible system changes

**Combinable crops** - wheat, barley, rape, legume rotations

- Larger, more specialised: wheat OR rape

**Novel crops** – bio-energy, pharmaceuticals, ornamentals

-or-

**Grazing stock** – Sheep, beef?

- Organic / Return to mixed farming?

**Outdoor veg**: potatoes, carrots, green veg and salads

**Veg under cover** (polytunnels, glass)

**Land leaves farming**

- Woodland
- Leisure – theme parks / trails
- Nature parks
- Housing

**Livery/equine**

- Poorer land
- Better land

**Set aside / fallow**
Possible cropping changes

More wheat
More rape
Less legume
Less barley/oats/rye
Less sugar
More fallow/temporary grass
More unusual crops
More or less irrigation?
Basic business strategies

• **Wait and see** – *but for how many, and how long?*

• **Get rid of the loss makers** – *who/what will go quickly? Where will the biggest shake-outs be?*

• **Who will be gaining and building up businesses?**

• **Any unusual developments to anticipate?**
Other factors to consider and discuss

• Response to cross compliance and GAEC – how will this affect farming styles/options and practices?

• Response to ES scheme – how widespread and what does it imply for farming practices?

• Other constraints on change – access to capital/ planning time/ family situation

• Other rural changes – new markets and opportunities …
Focus for morning discussion

• What do we know is happening, now – to sectors/areas/types of farm?

• What do we think is likely, and when? (scale and timing of changes)

• What else will be influencing change, apart from policy?

• What would be the key indicators, to keep track of, 2006-13?
Thinking about the geography of change

• Big picture – regional patterns; landscape scales

• Local area changes – within each locality

• On-farm scale: land use patterns and practices
Figures refer to ha per km² of land area (i.e., percent of total since 100ha = 1km²). Grey areas indicate no data or data suppressed to preserve confidentiality.

Figure 4.2 Distribution of set-aside and bare fallow estimated from the June Census/Survey, shown by Joint Character Area.
Farmer responses to CAP reform, 2005: *Hill and Upland Farming*

- a few ideas of possible trends
Possible system changes

Hill Sheep (breeding)

More or less Tacking?

System integration?

Upland sheep (breeding and finishing)

Beef

Horses (livery) or Land leaves farming / virtually unmanaged

Upland Dairy

Larger, more extensive, more wethers

Beef and sheep

More or less Tacking?
Possible stocking changes

**Sheep** – lower numbers in some places, higher in others? Shifts in systems, simplification or merger, changing use of different types of land

**Dairy** – will decline or disappear except where serving niche/specific market (Hawes, Swaledale, etc)

**Beef** – much lower numbers, but remainder split between extensifiers and intensifiers (DA/best locations)

**Other stock** - more horses, more goats (milk and fibre), more novelties
Basic strategies

• **Wait and see** – *but for how many, and how long?*

• **Get rid of the loss makers** – *will beef go quickly? Where will the biggest shake-outs be?*

• **Who will be gaining and building up businesses?**

• **Any unusual developments to anticipate?**
Other factors to consider and discuss

• Response to cross compliance and GAEC – *how will this affect farming styles/options and practices?*
• Response to ES scheme – *how widespread - ELS and HTS - and what does it imply for farming practices?*
• Other constraints on change – *access to capital/ planning time/ family situation …*
Focus for morning discussion

• What do we know is happening, now – to sectors/areas/types of farm?

• What do we think is likely and when? (scale and timing of changes)

• What else will be influencing change, apart from policy?

• What would be the key indicators, to keep track of, 2006-13?
Thinking about the geography of change

• Big picture – regional patterns

• Significant areas already in ESA / CSS
  (37% LFA incl. common land, 48% excluding it) – how will this affect changes?

• Local area changes within massifs / valleys

• On-farm scale: land use patterns, management practices