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**Re-assessing Agrarian Policy and Practice in Local Environmental
Management: The Case of Beef Cattle**

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Abstract

There are policy pressures to make agriculture more environmentally sustainable and to give a more local expression to agri-environmental priorities. This paper considers these moves, with particular reference to the beef sector, and speculates on the further policy responses required to facilitate benign local agri-environmental management. The UK beef sector is characterized by its complexity and diversity but four major systems can be identified operating at varying levels of intensity. Of these, suckler herds and grass-rearing systems have long been associated with high natural value forms of agricultural land management. Many of the cherished habitats and landscapes of the UK are dependent upon grazing for their ecological and amenity value. However a combination of the BSE crisis, the strength of sterling and the recent Foot & Mouth epidemic threatens the sustainability of these high nature value grazing systems. The importance of grazing to fifty selected Sites of Special Scientific Interest is highlighted in the paper. Survey work identified a wide range of systems to be particularly vulnerable to changes in profitability in the beef sector, including: coastal grazing marsh, wet acidic grassland / marshland, upland moor and heath, calcareous grassland and neutral grassland. To maintain these systems requires agricultural policy to be more sensitive to local conditions than appears currently to be the case. There is little policy support for beef farmers in a regional context, still less giving special prominence to those farming within particular biotopes. Nor has there been sufficient policy encouragement to markets for traditional and local beef breeds. The continuing pressure for CAP reform offers further opportunity for policies to be devolved to regions and localities.

Agricultural Policy and the Local Condition

For a long period agricultural politics has been conducted at national and supra-national levels, although the impacts of CAP policies have been felt locally and generated many studies of local environmental loss (Brouwer and Lowe, 2000). Recently, however, there have been moves to make agriculture more environmentally sustainable and with that has come an increasing sense of the inadequacy of common policies and delivery mechanisms across the diverse terrain of the European Union (EU). This paper examines the moves towards a more local expression of agri-environmental priorities, with particular reference to the beef sector, and considers some of the policy responses required to facilitate benign local agri-environmental management.

With the publication of its Fifth Action Plan for the environment in 1992, the European Commission signaled its intention to develop agricultural policies that were more in tune with the concept of sustainable development. However, as Cobb *et al.* (1999) have noted, the development of policy at both the United Kingdom (UK) and EU level has been beset with problems, in part due to the lack of a commonly accepted definition of sustainable agriculture. Instead of providing such a definition, the Fifth Action Plan listed a number of broad objectives for EU agriculture based around the conservation of natural resources and biodiversity. Similarly, the UK government has emphasized the importance of resource conservation and biodiversity in its strategy for sustainable development (UK Government, 1994).

One of the major challenges that reformers of the CAP have faced, and we will argue still face, has been to make the CAP sensitive to the needs of local environments. The Agenda 2000 reforms to the Common Agricultural Policy, although involving only a modest shift in policy (Winter and Gaskell, 1998), initiated a greater degree of subsidiarity. In particular, the Rural Development

Regulation signaled a degree of national freedom in policy development and the need for regional solutions (Lowe and Ward, 1998). However, the agri-environmental schemes in England remain national schemes with only modest regional discretion allowed in targeting and the scoring of applications. At the sub-regional level, there are no policy tiers for the administration of agri-environmental policy making. For example, synergy between county Biodiversity Action Plans and national agri-environment schemes has proved particularly hard to achieve.

The impact of agriculture on the natural environment has been conceptualized during the past twenty years chiefly in negative terms, with agricultural intensification seen as a primary cause of the loss of biodiversity. The evidence for this is powerful and has been central to the approach of economists, policy analysts and environmental scientists. In the 1980s, the catalogue of destruction was chronicled by many (see for example, Shoard, 1980; Barr *et al.*, 1986; Countryside Commission, 1990; Lowe *et al.*, 1986). The precise links to agricultural price policy are rather less clear-cut but that there is a connection, albeit mediated by many other factors, is generally accepted (Winter, 2000).

However, in recent years, attention has begun to focus on the positive environmental role played by agriculture in many of the valued habitats and biotopes in Europe. Of course, some ecologists have long pointed to the need for the management of certain ecosystems along agricultural lines where such management has been threatened. However, in the main, this covered a small number of highly specific sites such as chalk or limestone grassland remnants within lowland arable areas. Indeed, there has been a considerable amount of practical ecosystem management research designed to find ways of mimicking agricultural practices in such situations (Green, 1996). What is new is the recognition that certain forms of agricultural management have a positive environmental role extending far beyond the particular issue of land abandonment

on these remnant sites (Bignal *et al.*, 1998). Most agricultural areas are not under immediate threat from abandonment but from incremental changes in agricultural management. Unfortunately, the analysis of the contribution of agricultural management to environmental condition has been characterized by two polarized approaches. First, small-scale approaches have typified the examination of the remnant site issue in lowland arable agriculture (see Adams *et al.*, 1992). Secondly, large-scale High Nature Value (HNV) analyses are evident in work that identifies the importance of certain farming systems in maintaining the quality of the 'wider countryside' across Europe (Bignal and McCracken, 1996a; Baldock, 1999). In reality, there is a continuum between these two extremes. The purpose of this paper is to consider one commodity sector - beef - and its impacts across this continuum.

Our argument is that the crisis that has afflicted the beef sector since BSE, and exacerbated recently with the Foot & Mouth crisis, should not be viewed simply in aggregate terms; in other words, at the sectoral scale in agriculture. The beef crisis clearly has ramifications for local environments, yet these are often ignored. As part of this goal of developing local sensitivity in research, we believe it is necessary to tease out the effects of sectoral policies in the local arena, considering also the way in which they interact with other policies in agriculture. To this end, we consider types of beef production, sectoral restructuring and farmers' responses to crisis on a range of HNV sites. The options open to policy makers are reviewed and ways suggested in which policy could take greater account of local conditions.

Beef production and the natural environment

The beef industry in the United Kingdom (UK) is characterized by its complexity and diversity. Before the BSE crisis hit the UK, approximately three quarters of beef production was accounted for by calves from dairy and specialist suckler herds, with the remainder being made up of culled cows from dairy and beef

breeding herds. Since then, the UK Government has banned cattle over thirty months of age from entering the human food chain on public safety grounds, known as the over thirty month (OTM) rule. Four major beef systems can be identified operating at varying levels of intensity (Winter *et al*, 1998a; Entec, 1996). Table 1 illustrates that there are two types of suckler system (lowland and upland or LFA), both based on breeding and rearing specifically for beef. Some of these farms will fatten all or a proportion of their own stock. Others will sell only store cattle to either of the remaining two systems. There are two systems of purchasing cattle and feeding to slaughter weight. Semi-intensive finishing takes calves from both dairy and suckler herds and relies on outdoor grazing for fattening. In contrast, intensive finishing takes calves predominantly from the dairy herd and requires that the animals are housed and fed carefully controlled rations.

Table 1: Major beef production systems.

Beef system	Description
1. LFA Suckler	Farms with suckler herds (breeding cows and calves) located in the Less Favoured Areas (LFAs). Permanent breeding herds produce calves for rearing and finishing. The harsh conditions mean few farms have a finishing enterprise.
2. Non-LFA Suckler	Farms outside LFAs with a suckler herd. Permanent breeding herds produce calves for rearing and finishing. Some of these farms will also finish beef.
3. Semi-intensive Finishing	Buying calves into the farm to ‘finish’ them for market. This category includes a variety of systems but their key characteristic is the reliance on outdoor grazing (e.g. store beef, 18-month beef and 24-month beef).
4. Intensive Finishing	Stock are bought in, housed indoors and intensively fed (e.g. veal, barley beef and silage beef).

Source: Based on Winter *et al*, 1998a and Entec, 1996.

Suckler herds and grass-rearing systems (categories 1 to 3 in Table 1) have long been associated with environmentally benign forms of land management with many cherished habitats and landscapes dependent upon grazing for their ecological and amenity value. As well as designated conservation sites there are many other areas of value in the wider countryside where beef grazing regimes are, or have been, an important element within traditional mixed farming. For example, on lowland mixed farms there may be small remnant sites of floristic interest confined to steep banks or low-lying wet areas. Moreover, the mixed pattern of land use on such farms means that other features of wildlife and landscape significance, such as hedgerows, are likely to have been maintained. The place of beef cattle on mixed farms in the lowlands has been crucial to the maintenance of important remnant habitats and the overall appearance of the countryside. Hence, areas of low intensity beef production form a unique farmland biotope in the British Isles (Bignal and McCracken, 1996a and 1996b). The problem, as Entec (1996, p.8) make clear, is that there 'are no readily available figures for the extent of such areas where beef cattle are a traditional and necessary part of the management system'. Instead, there is a reliance in the literature upon general observations about the specific relationship between cattle and environment. The crux of the difficulty is that few farm systems are solely reliant on beef enterprises. In lowland areas, beef herds are established as a secondary enterprise in predominantly arable and dairy systems. In upland areas, beef cattle typically exist alongside sheep. Consequently, it is hard to identify with certainty the environmental impact of cattle *per se*, even though it is generally accepted that they form an important element in nearly all low-intensity agricultural systems with a high nature conservation value in the UK (Winter et al 1998b).

The threat of unstructured restructuring: trends in the beef sector

The crisis in the UK beef industry – prior to Foot & Mouth - was caused by a combination of three factors, namely overproduction, BSE, and the strength of

sterling. Within the UK, beef production has been at or above 100 per cent of home consumption since the early 1980s and by 1995 the UK was 112 per cent self-sufficient in beef (Entec 1996). The cumulative impact of these difficulties has been to sustain a weak market price for beef since the BSE crisis began in 1996. Initially, the incomes of beef farmers were cushioned by the emergency measures and special support payments introduced by the Government. This situation changed dramatically in 1997 when both upland and lowland beef and sheep producers suffered a major reduction in net-farm income. They have not recovered since then.

The long-term viability of beef producers is put at risk by this loss of income and mounting indebtedness, and the situation has severely worsened as a result of the Foot and Mouth epidemic. Turner and Sheppard (2001) have shown how net farm incomes for lowland and upland livestock farmers in the south-west of England were already predicted to be in the red for 2000/01. Foot & Mouth exacerbated this situation. Figures 1 and 2 show the serious decline in income in the livestock sector.

Figures 1 and 2 here

The MacSharry CAP reforms were a first tentative steps towards reform of the beef sector in 1992, but the impact was decidedly modest (Andersen *et al.*, 2000). Many believe that a viable beef industry in the UK and Europe can only be achieved through a reduction in the number of producers. The fear is that that the restructuring process will be so severe that the long-term effect will be a much-shrunken UK beef industry (House of Commons Select Committee on Agriculture, 1998). In the absence of economic viability, restructuring will run counter to the goal of promoting greater environmentally sustainability. It is to a demonstration of the consequences of fewer beef systems on the UK's local biodiversity that the discussion now turns.

Beef production and biodiversity

In order to demonstrate the importance of the beef production sector on maintaining and enhancing the biodiversity of specific localities, it is highly relevant to focus on SSSIs. SSSIs define the UK's most valued and best protected nature conservation areas and are localities where the link between agricultural management and conservation interest is well known. Each Site has been surveyed for its ecological value and is subject to a notification order which contains a series of management prescriptions (Adams, 1984). These are definite actions that the land manager must follow to maintain the interest of the Site. English Nature is the state body responsible for administering SSSIs in England.

The methodological starting point for the investigation took the form of a general request to all 21 English Nature Regional Teams for information on SSSIs in which grazing by beef cattle is known to be important. Teams were asked to provide responses structured according to SSSI characteristics, details of the beef grazing system in place (with a particular distinction to be made between direct or indirect dependence upon grazing by beef cattle for the continued conservation interest of the Site) and habitat type based on the classification of the UK Biodiversity Steering Group (1995). This national overview informed further selection of a smaller number of Team areas in which to conduct case study work. In choosing case study areas, an assessment was made of the quality of information returned, the range of habitat types covered and willingness to co-operate. Once reviewed, it was possible to generate three geographical clusters comprising nine Teams (Table 2). These represented a cross-section of beef grazing systems based on regional traditions in agricultural practice.

Table 2: EN Teams selected for study by geographical region.

<i>West</i>	<i>South-east</i>	<i>North</i>
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Dorset	Beds, Cambs & Northants	Cumbria
Somerset & Avon	Essex, Herts & London	North West
Three Counties	Sussex & Surrey	Peak District and Derbys

The nine Teams then selected SSSIs in which beef grazing was identified as an important tool to comply with the prescriptions of the notification order (see Winter *et al.*, 1998a). This amounted to a total of fifty case study SSSIs. In late 1996, a survey was undertaken of Conservation Officers (COs) with administrative responsibility for each Site and thus a knowledge of local management regimes. This took the form of a face-to-face discussion lasting up to one hour per Site, structured around the following five themes:

- the conservation interest of the Site using the notification order (listing potentially damaging operations) and map as a starting point;
- the landholding structure of the SSSI;
- the beef regime on the Site, including the specific beef system in place and its precise relationship with the nature conservation interest;
- an exploration of management practices within the SSSI, including owner-occupier participation in agri-environmental schemes;
- any directions of change within the SSSI, incorporating grazing trends, policy influences and BSE-induced changes within the context of ‘natural’ change.

These were supported by interviews with a sample of farmers managing these Sites with grazing animals.

The SSSI designation includes an extensive range of local environments in England and this was reflected in the fact that nine distinctive habitat types were classified from the fifty case studies. As some habitats were represented by just one or two case study SSSIs, the findings presented here are structured according to five example habitat types. These cover the majority of case studies investigated

and allow the importance of beef grazing to specific ecosystems to be highlighted. The five types cover: coastal grazing marshes; wet and acidic grassland / marshland; upland moor and heath; calcareous grassland and neutral grassland. They provide a basis for analysis through cross-comparison of evidence from COs and farmers who talked about individual Sites. Hence, common points emerge that are repeated across Sites of a particular habitat type, permitting the identification of key effects of beef grazing on conservation condition. Equally, attention is paid to the range of factors uniquely dependent upon locality which are essential ingredients in a full understanding of the beef-conservation relationship. It must be noted that these habitats are not the only ones in which beef cattle are important. Further, some SSSIs are located within complex mixtures of the types identified. Nevertheless, such a division assists discussion at a local level.

i) Coastal Grazing Marsh

Coastal grazing marsh environments exemplify the importance of the relationship between beef grazing and nature conservation. In the past, many of these habitats have suffered greatly from intensification and conversion to arable production because of the scale of incentives offered to farmers through both national agricultural policy and the CAP. Indeed, the controversy over drainage of coastal grazing marsh at Halvergate in the Norfolk Broads can be seen as a landmark in the development of the concept of UK agri-environmental policy (and Environmentally Sensitive Areas or ESAs) in the late twentieth century (Colman and Lee, 1988; Baldock *et al.*, 1990). Today, only limited areas of grazing marsh survive, although the linear nature of their interest means that designated SSSI areas are relatively large. Ironically, a habitat extensively reduced by agriculture is dependent upon farming for its continued ecological value, and it is beef grazing that delivers maximum biodiversity. Cattle grazing is essential for the production of grass swards of different heights and creation of footprint hollows. These provide nesting opportunities for breeding waders such as redshank and oystercatchers and feeding grounds for wildfowl including pink-footed geese and

whooper swans. Grazing with sheep, the most common alternative to beef, cannot create this grass condition. It is true that sheep can allow pasture to survive by preventing the incursion of 'rank' vegetation. The problem is that the grassland becomes grazed too closely, producing what is best described as a 'billiard table' effect. Where pastures have been improved either by or for sheep, an element of competition for grazing with geese becomes more significant. This is also true where land has been converted into arable production. Cattle are further better-suited to grazing marsh habitats compared with sheep where there is recreational pressure for access to such areas from the general public.

The survey found that poor prices in the beef sector were persuading some farmers in coastal grazing marshes to eliminate beef cattle and specialise in other livestock enterprises (dairy or sheep). Unfortunately, the additional pressures created by the BSE crisis had 'tipped the balance' away from beef enterprises towards other livestock systems. Agri-environmental policy had, up until this point, played an effective role in dissuading owner-occupiers from radically changing their farming enterprise type. There are signs that this ability to prevent change is now slipping away and that policy-makers need to adjust their thinking to engage with practice at more detailed levels. Of course, the challenge will be to achieve specific induced outcomes without becoming overly prescriptive on farmers and landowners. An important issue to appreciate is that this type of agricultural change has more incremental effects on these local environments than the earlier threat in the 1980s of wholesale change to arable production systems. It is less likely to receive the level of publicity generated by arable conversion, yet the loss of biodiversity is the same end product. Indeed, one case study farmer with a medium-sized (77 hectare) holding running a dairy herd with a subsidiary beef enterprise had responded to a BSE-precipitated fall in income by purchasing extra milk quota. Some beef animals had been replaced by dairy followers, keeping continuity of grazing with cattle, but introducing more subtle differences in grazing habitats based on breed and age that are only just beginning to be appreciated in a nature conservation

context (Small *et al.*, 1999; see also below). Expansion of the beef herd, which would more satisfactorily meet the conservation grazing requirements of the coastal grazing marsh, was far from contemplation, especially as ‘finishing’ the beef animals for market now involved extra cost. Given that the quality of grass is not sufficient to fatten beasts within 30 months, a requirement of post-BSE beef production systems, purchased feed supplements offered the only way to achieve a saleable product within the time limit.

One response to the 1980s situation was the purchase of grazing marshes by charitable wildlife trusts as a form of environmental protection. For example, the Royal Society for the Protection of Birds purchased land on the Somerset Levels. However, this is no form of insurance against habitat change during the current crisis facing the beef sector. Many environmental bodies rely upon licensing and letting arrangements with local graziers (farmers). Such graziers are not themselves insulated from events in the beef sector so that environmental bodies are now finding it harder to secure beef graziers with a need for grassland. One consequence is that environmental organizations are forced to search further and further afield to secure the grazing animals necessary to deliver optimum conservation management. The movement of animals over longer distances runs counter to goals of sustainability within agricultural practice. This is not to mention the implications for animal welfare, relevant in terms of transport, but also in the ability to supervise animals properly in potentially hazardous environments. In the absence of beef animals, further welfare issues are of course raised by the substitution of hardy beef breeds, able to withstand the often hostile conditions of coastal grazing marsh environments, by less hardy young dairy stock and sheep. This consideration occurs regardless of type of land owner/occupier.

ii) Wet and Acidic Grassland / Marshland

This habitat type is one that has been significantly reduced in extent by postwar state-sponsored drainage schemes and improvement incentives. Areas of wet and

acid grassland in lowland situations frequently survive as islands within a sea of arable cultivation, providing refuges for aquatic flora, invertebrates and wetland birds. Water abstraction has placed an added pressure on the habitat, contributing to a 'drying out' process. In this case, nationally formulated approaches to land management are the cause, rather than alterations to grazing regimes which can be viewed as more an effect. This is because as land dries in the fulfillment of other policy goals, keeping sheep becomes a more feasible option in localities of reduced wetness. Habitat change towards flora and fauna of lower conservation interest is then exacerbated.

The survey reveals that sheep grazing can adequately maintain the environmental interest of many wet and acidic grassland SSSIs, but that mixed cattle and sheep grazing promotes optimum conditions for maximising biodiversity. As with coastal grazing marsh, this is by virtue of the mosaic of sward that beef cattle can create alongside sheep, increasing variety in floral assemblages and encouraging invertebrate species. General advantages of beef cattle over sheep are that their dung can contribute to populations of fungi / invertebrates and that cattle are better able to cope with wet sites, being less susceptible to hoof rot. Two of the eight SSSI case studies within this habitat type were discovered to be entirely unsuitable for sheep grazing for this latter reason.

Beef cattle grazing generates a series of distinct benefits over other forms of grazing. In the initial stages of Site management, it was noted from the survey that beef cattle are capable of removing rank and scrub vegetation that other animals are unable to accomplish. Beef cattle are more able to graze tough grass species than dairy cattle, especially dairy followers of the ubiquitous Friesian/Holstein breed. As noted in coastal grazing marsh SSSIs, even within beef cattle breeds, not all animals have the same grazing capability or preferences. Traditional and rare breeds of beef cattle, such as Herefords and Longhorns, are more able to cope with

coarse vegetation found at specific localities than are softer-mouthed modern breeds (Yarwood and Evans, 1998; Small *et al.*, 1999).

The future of these increasingly remnant habitats is unclear. As discovered with coastal grazing marsh, successful management of Sites by conservation groups remains heavily dependent upon the availability of animals from interested graziers. In their absence, three options are apparent. First, graziers more distant from the Site can be located (with the attendant problems and compromises to sustainability noted under the coastal grazing marsh habitat). Second, organizations can purchase their own animals, although running a beef herd is costly and beyond the staff resources of many conservation bodies. Third, a 'flying flock' can be sought and employed, a concept that is attracting growing interest amongst conservation site managers and has recently been promoted under the Grazing Animals Project (GAP) (Grayson, 2001).

From a policy perspective, ESAs have had a limited influence on maintaining wet and acidic grasslands due to the fragmentation of sites within their geographically designated boundaries. Here again, the limitations of current prescriptions are revealed, having failed to develop significantly from their structure when first formulated, even though the initial purpose was to introduce the farming community to the notion of agri-environmental payments. Farmer 'B', operating a 90 hectare holding, had recently changed his farming system away from beef and dairy to exclusively dairy. It means that 10 hectares of a wetland SSSI has undergone a grazing change, although the farmer himself was unconcerned when questioned as cattle still graze the Site. The farmer participates in the ESA scheme and had been able to make a major adjustment to the enterprise system and thus land management without breaking the terms of his agreement. Countryside Stewardship, particularly where it operates in conjunction with EN's Wildlife Enhancement Scheme (WES) agreements, is better able to respond to a dispersed pattern of Sites by providing more site-specific prescriptions. Evidence from the

survey demonstrates limited signs of success pre-BSE. This has been achieved despite payments from CSS remaining in competition with persistently high levels of price support offered on arable crops, even if direct incentives for drainage have been removed. When considering conversion back from arable crops and restoration of wet grassland, a double blow is revealed. First, payments have never been able to match price support incentives. Second, this is combined with a BSE-enhanced removal of at least a modicum of profit from beef enterprises that, for many farmers who are culturally ingrained with a productivist ethic, would provide a tenable *raison d'être* for contemplating a switch to grass.

iii) Upland Moor and Heath

The biodiversity of upland areas of England has long been in decline as hill-farmers have struggled to make a living (Winter et al 1998b). This is despite considerable additional aid that has been spatially targeted on hill areas, particularly through the 1975 LFA Directive (268/75) of the CAP. A common response to survive in business has been to intensify livestock production systems by increasing the use of purchased inputs (such as fertilisers) and raising stocking densities, thereby maximising entitlement to state subsidies. This has been pushed by state agrarian policy to such a degree over an extended period of time that a culture of 'improving' harsh environments has become deeply entrenched in the minds of upland farmers, leaving economic explanations inadequate to account for land use change. Identity as a successful farmer in upland localities is judged by the ability to meet this challenge (Gray, 1996). Expansion of sheep enterprises was a widespread adjustment in the 1980s and early 1990s, but this led to overgrazing becoming a common problem. It is this development that agri-environmental measures aim to tackle by offering payment for reductions in livestock numbers.

The initial reaction to the fall in beef prices by many hill farmers was to sit out the downturn, caused by a lack of both an ability to switch to alternatives and a willingness to alter the farm system. Indeed, one SSSI exhibited a marked

preference amongst its landowners and occupiers to run cattle enterprises alongside sheep. This runs counter to the desire to move out of beef production altogether expressed by two case study farmers in this habitat type, so that there is a significant gap between actual behaviour and attitude. However, the length of the period of difficulties experienced in the beef sector means that pressure is building and medium term consequences are becoming apparent in the late 1990s as some farmers were persuaded to eliminate their suckler herds, a traditional sideline enterprise, in favour of keeping more sheep. It is here that agri-environmental measures and changes to the area-based Hill Farm Allowance Scheme away from headage payments have become important, helping to limit a further expansion of sheep flocks that would otherwise have taken place. Prior to the mid-1980s, this was a role filled by the SSSI system through compensatory payments to farmers not to increase the fell ewe flock.

According to the survey, problems with overgrazing are being exacerbated, especially amongst the heather communities of the moorland commons. Where beef cattle are grazed in such situations, they are of considerable importance for preventing the spread of bracken and coarse grasslands. Beef cattle are not always used in such localities and whilst not vital to the maintenance of heather communities would assist in their management. One implication is that it is preferable to use hardy breeds able to withstand the sometimes inhospitable conditions experienced in such localities. Instead, at present, cattle grazing is frequently confined to transitional 'allotment' areas between intensively managed inbye land and common land. Here, a habitat mosaic is created which has often provided a last refuge for birds (such as curlew) driven from the lowlands by agricultural intensification. The danger is that the elimination of beef will mean that such transitional areas will no longer be required and that an environmental dualism between undergrazing (allotment) and overgrazing (valleys and commons) will develop, both reducing biodiversity. One additional factor that has yet to be researched is the link between farm diversification and nature conservation

management (but see Winter, 1984). In one case study SSSI, it was observed amongst some family-run farms that there was declining interest in the beef enterprise because its role as a generator of supplementary income had been largely substituted by a diversification venture.

iv) Calcareous Grassland

This habitat type was represented by fifteen diverse case study SSSIs. Nevertheless, a common feature discovered is that the nature conservation interest of Sites with this habitat is only sustained very finely between tendencies to overgraze and undergraze. Many localities of this habitat type have a tradition of keeping sheep (such as downlands, for example). Maximum variety in sward height is therefore achieved by cattle grazing in conjunction with sheep, although the latter are typically more readily available.

Overgrazing has been encouraged by a trend towards keeping more sheep, greater numbers of which are likely to lead to supplementary winter feeding with associated localized nutrient enrichment and soil poaching. Improvements of herb and flower-rich meadows remain a threat, with SSSIs providing statutory limits, incentives and compensation to prevent improvement. Intensive cattle-rearing may pose a threat in itself from the need to dispose of slurry through spreading and the need to provide supplementary feed during winter to support high numbers of animals. One Site investigated is a complex mixture of grassland of varying conservation quality. Small fields survive due to a highly fragmented pattern of landownership induced by fierce competition in the local land market. Floristic interest reflects piecemeal improvement of individual fields, strongly influenced by their accessibility (the more accessible, the greater has been the effort to improve) to successions of landowners. Interestingly, it is a local custom of beef cattle rearing, together with a converse lack of familiarity with sheep-keeping and physical unsuitability to dairying, that has delivered appropriate levels of grazing over time (the SSSI designation came belatedly). The ways in which the 'on the

ground' outcomes of both policy and economic factors are geographically modified by such 'cultural resistances' continue to be a neglected aspect of the agricultural research agenda (Morris and Evans, 1999).

Having noted the pressures of overgrazing, it is in fact undergrazing that is found to be the dominant problem on the majority (eight) of the fifteen Sites of this habitat type investigated. Conservation interest is therefore compromised by scrub invasion, especially in 'allotments' on upland holdings where beef systems had been withdrawn due to a lack of profitability (see habitat iii) above). However, some beef animals, and it seems Longhorn cattle in particular, have been re-introduced as a cost and time-effective alternative to manual clearance by teams of workers. An interest in rare breeds of livestock is apparent amongst some graziers of this habitat type. When asked to explain this, one farmer was able to express succinctly an interrelated personal, environmental and economic justification: "[using rare breeds] makes life more interesting and they do a better job with the SSSI and the farm set-up" (Mr. G., 20 hectare farm). Occasionally, use of specified breeds of livestock has been supported through CSS and WES agreements, although this is the exception rather than the rule in the absence of the UK's adoption of the clause in the 'Accompanying Measures' Regulation 2078/92 which allows scope for EU member states to support 'traditional' breeds.

It should be stated that short periods of undergrazing are not necessarily negative for conservation management, as some element of scrub does offer cover for breeding birds, for example. Again, economic factors in the shape of poor financial returns were not the only reason for undergrazing. Pressure from recreational use has acted as a general deterrent against keeping stock at certain localities, as has increased road traffic and subsequent accidents on unenclosed lowland commons. A general difficulty in commonland areas has been a progressive decline in the take-up of grazing rights, particularly as properties with grazing rights attached become purchased by urban-based commuters. Some Sites that receive optimum

grazing are revealed by the survey to be nevertheless vulnerable to change. Two SSSIs selected at random in different EN team areas were found on closer investigation to depend upon the enthusiasm of a single grazier for their continued maintenance. A change in the circumstances of one individual could have major ramifications for the condition of a significant amount of valued habitat in the UK.

v) Neutral Grassland

From the nine Sites of this type in diverse settings investigated, it is clear that cattle grazing provides the optimum method of regulating sward height and encouraging maximum species interest. Sheep and ponies offer only limited substitutes. For example, sheep are unsuitable for introduction into Sites where swards have become high prior to the introduction of grazing animals. Allowing horses to graze Sites tends to produce grassland of uneven quality due to the repeated use of specific points in fields away from grazing areas as latrines by equines (for a rare study of the grazing habits of horses, see Gibson, 1996).

Many of the case study Sites of this type are small in size, often surviving as individual unimproved fields amongst other improved pastures. More remarkable is that three of the neutral grassland Sites have also been entered into CSS, demonstrating that protection through the SSSI system alone may be insufficient to safeguard conservation interest. Insufficient levels of payment had dissuaded entry into CSS by farmers on three Sites. Where adopted, it is apparent that the Scheme has acted to coordinate and thus accelerate positive Site management. Additional agreements through compensatory arrangements, WES and the Reserve Enhancement Scheme ensure that the majority (five Sites in total) are grazed to desirable levels. Elsewhere, as with calcareous grassland, undergrazing is again the dominant problem (three Sites), with just one Site overgrazed. Further investigation revealed that undergrazing on all these Sites had been a long-term problem, exacerbated rather than caused by the BSE crisis. For example,

undergrazing had occurred for many years on a Site in the rural-urban fringe of a large city because of difficult management in the face of persistent vandalism.

A distinctive feature amongst farmers of these Sites was that the most stable and assured beef systems were found on businesses where income was earned through farm diversification activities, again demonstrating a link with nature conservation. Most enthusiasm for a continuation of beef herds came from those farmers who had engaged in direct selling or niche marketing of their meat.

vi) Summary: the importance of locality

The five case study habitats presented demonstrate the importance of locality as it aids an assessment of the way in which farmers are responding to the beef crisis. Influential factors include the production system farmers operate, the economic importance of the enterprise, participation in agri-environmental schemes, farm location and local culture, tradition and identity in farming. On many farms, beef herds are small and the 1997 Agricultural Census showed that over a third of beef farms have less than 10 cows and nearly three-quarters have less than 30. In the lowlands, beef enterprises are usually subsidiary to crop and dairy enterprises but they are often ecologically vital as they graze and maintain high value grasslands that, for a variety of reasons, have escaped intensification. This situation is now under threat. Although all sectors of agriculture have been affected by the downturn in profitability, the beef sector has been worst hit (although sheep enterprises have also fared badly since 2000). In the face of negative margins, some farmers have decided to replace beef production with other enterprises to the potential detriment of these sites. Indeed, as shown on wet and acidic grasslands, there is evidence of an expansion of arable cropping into grassland areas, including the loss of important permanent pastures such as grazing marshes as a direct result of the problems facing the beef sector combined with the current attractions of arable cropping (Winter *et al.*, 1998c). An alternative threat is that of land abandonment where the cattle are not replaced with another productive system.

Culturally ingrained narrow interpretations of the meanings of 'farmer' and 'farming', strongly influenced by unidimensional postwar agrarian policy, have left many farmers struggling to make the conceptual leap to regarding fields as product rather than as productive. Upland localities illustrate that the problems farmers face here are severe and, in the absence of realistic levels of environmental support, there is now a real danger of business failure and the extensification of production to such a degree that many highly valued habitats will be lost through lack of management. For those able to survive, there is a continued threat from enterprise restructuring where farmers reduce or eliminate their beef enterprises while at the same time acquiring more sheep or even milk quota.

The Policy Challenge: Local Problems and Local Solutions?

Agri-environmental schemes, most notably ESAs and the CSS covered a substantial number of the sites investigated. The impact of these schemes varied considerably between farms and HNV areas. Before the BSE and Foot and Mouth crises, ESAs and CSS acted as 'holding mechanisms' for beef enterprises in coastal grazing marshes. Specific aid for beef grazing as an integral part of these schemes now seems necessary to relieve the pressures created by BSE and Foot and Mouth. On wet and acidic grasslands, agri-environmental policies appear to have had minor and *ad hoc* 'on the ground' impacts by persuading farmers to continue with cattle or assisting conversion from arable to grass-based enterprises. Unfortunately, just when the impacts of agri-environmental initiatives were finally being observed, the BSE crisis reduced the attractiveness of the farming systems they support. In the uplands, the operation of agri-environmental measures is important as they facilitate limits on the expansion of sheep enterprises, which might otherwise be a logical way for farmers to compensate for the falling value of beef cattle. Participation therefore slows the rate of intensification and prompts

modifications of stocking management. This is also true of calcareous and neutral grasslands habitats, assisting in their survival in intensive lowland settings.

Agri-environmental policy has therefore been rather 'hit and miss' in conserving the biodiversity of habitats dependent on beef grazing. On the one hand, such schemes have provided farmers with some income that has helped to offset falling revenues from beef cattle, reducing the need for a change in farm enterprises. On the other, the UK Government has decided not to adopt a provision to promote rare livestock breeds in the 'accompanying measures' package designed to 'green' the CAP.

DEFRA's official line is that no habitat is directly dependent upon grazing by a specific breed for the continued maintenance of its conservation value. The role of the Rare Breeds Survival Trust (RBST) may well be significant here. This charitable body, which supports rare breeds using its own resources, could be viewed as promoting principles that would merely be replicated by DEFRA in statutory form (see Evans and Yarwood, 2000).

These developments suggest that agri-environment policy has to enter a new phase in which local conditions and local solutions become more central to the political economy of agriculture. Hitherto, agri-environmental policy has functioned almost entirely following macro-level principles, primarily on the basis that it has to compete with a profitable agriculture. Most of the schemes have been devised to compensate farmers for loss of profits if they retain particular less intensive agricultural systems. It was assumed by those who devised schemes that traditional forms of agriculture would continue to yield some profit and, if topped up by scheme payments, remain a viable form of production. It is now clear in the specific case of beef that the compensatory principle is likely to be inadequate as a basis for the future maintenance of beef systems. This is especially the case when, as Potter and Goodwin (1998) have shown, the prospect of liberalization of agriculture in the EU raises concerns about the existence of all economically fragile commodity sectors and systems. A further problem that affects many British

farmers who operate low intensity fattening systems, whether it be in the uplands or lowlands, has been the introduction of the OTM rule. As demonstrated in wet and acidic grassland localities, traditional breeds of beef cattle are advantageous in the delivery of conservation grazing. The OTM rule effectively discriminates against traditional beef breeds as they typically take longer than 30 months to mature. Although not the sole reason that farmers keep rare breeds (Yarwood and Evans, 1999), the lack of a market for traditional beef produce is yet another factor undermining the economic viability of keeping these cattle, with adverse consequences on local nature conservation. However there is anecdotal evidence that this is changing as a result of the The Foot & Mouth crisis which served to focus fresh attention on breeds, in part because of possible variations in levels of susceptibility to the disease but also because of increased interest in local foods as response to the crisis.

There are two potential solutions which immediately present themselves for the maintenance of ecologically important sites dependent on cattle grazing at the local level. The first is to dispense with a productive agricultural system altogether. Techniques have been developed to mimic grazing activities on remnant sites within arable areas involving mowing and the removal of vegetation (Green, 1996). However, these techniques are labour intensive and not suitable for the management of large numbers of small sites or bigger tracts of countryside. More importantly, they collide head-on with culturally-conditioned meanings of what it is to be a farmer. Secondly, animals can be grazed that are not destined for the food chain. Some environmental bodies have deployed animals directly for this purpose, but even non-productive animals require husbandry. With no end product, this may be a costly approach which increases with scale. Maintaining herds of non-productive cattle may be viable on a small number of key sites, but it is likely to be financially prohibitive to extend this approach so that it becomes a common form of local environmental management. In any case, it seems axiomatic that longer-term solutions to local problems will have to be sought within the framework of

agricultural policy and markets, and this seems appropriate given the emphasis now given to multifunctionality within the European agricultural model (Buller 2001).

Conclusions: CAP reform, beef and local environments

There is considerable evidence that the restructuring of beef production in the UK is having a detrimental effect on biodiversity and that current sector policies are not sufficiently sensitive to local conditions. Future outcomes largely depend on the future of beef markets in the UK and Europe. The market measures put in place under the CAP in response to BSE and Agenda 2000 have had an effect. Thus, although the European Commission in 1998 predicted a rise in surpluses in the five years from 2000, the Commission's annual report on markets in 2002 revealed consumption roughly in line with production. Not surprisingly, therefore, the Commission's mid term review of CAP published in July 2002 envisages no significant change in the beef support regime beyond the introduction of a single aid payment to simplify support. This would serve to remove incentives for intensive beef production. The proposed measures are unlikely to do anything substantially to ease the situation facing vulnerable beef producers in Britain.

The reform package overall with its emphasis on rural development and environmental protection, including cross-compliance measures, is consistent with the need to de-couple support from production and should have environmental benefits. Potentially it builds on measures already taken in Britain under the greater subsidiarity allowed under Agenda 2000. The first is modulation with member states allowed to use a share of the money available for compensation payments to farmers (up to 20%) to make payments to specific sectors, depending on the type of beef production prevalent in their country, through so-called 'national

envelopes'. Known variously as 'modulation' or 'recycling', in the UK this has been implemented initially as a flat rate 2.5% (rising to 4.5% by 2005) clawback from all farmers receiving compensation payments fully match-funded by Government (Ward and Falconer, 1999; MAFF, 1999). Second, there is scope to pay these national aids on either a per head or area basis. MAFF/DEFRA, after consultation with farming organizations, decided to use national envelope money to top up Suckler Cow Premium in the first instance and to review the possibility of providing area-based payments in the future. The LFA payments (HLCAs) have been repackaged as a Hill Farm Allowance Scheme introduced in 2001 payable on an area rather than a headage basis.

The novelty of the reform means that calculating the likely environmental consequences is fraught with difficulty. It is clear that there is considerable potential for the national envelopes and the revamped LFA payments, alongside the continuing agri-environmental measures, to be used to facilitate the maintenance of environmentally sensitive grazing regimes in HNV areas. However, this requires policy to be more sensitive to local conditions and local requirements than appears to be the case currently. DEFRA has a regional structure and it is at this scale that DEFRA, through its regional rural development consultation groups, is in touch with local developments and agri-environmental issues. But the groups do not meet frequently, and policies have been slow to develop which support beef farmers in a regional context, giving special prominence to those farming within particular biotopes. Still less has there been a sustained encouragement to markets for traditional and local beef breeds. The continuing pressure for CAP reform offers further opportunity for policies to be devolved to regions and for policies to be worked out in the context not only of the agriculture departments' own policy agenda, but also with regard to local Biodiversity Action Plans.

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