8 Grazing livestock in the uplands

Context

8.1 Approximately 2.2 million hectares of land are classified as Less Favoured Area (LFA), with 1.6 million hectares classified as Severely Disadvantaged Area (SDA). Extensive sheep and beef cattle farms account for the predominance of farm types in the LFA (46%).[1] Most of the SDA land is suitable only for grazing. Currently only 7.2% of farms in the SDA are classified as dairy, accounting for 9% of English dairy cows.[2]

Current industry practice

8.2 The husbandry of grazing livestock is an integral part of English upland agriculture. Animals, plant species, landscapes and husbandry systems have adapted, or have been adapted, over hundreds of years by both economic, and natural processes.[3]

8.3 Livestock grazing in upland England is mainly for the production of meat, breeding stock, and fibre (wool). In upland regions, grazing is the major agricultural land use, largely because the more difficult terrain and poor soils are not conducive to other forms of production. The continuation of grazing systems may also be strongly influenced by family or local tradition.

8.4 Forage for livestock in the uplands comprises moorland and rough grazing, suited predominantly to beef and sheep rearing (and, in some areas, native ponies), and more modified enclosed land. Much of the enclosed land has relatively shallow soils, less suited to regular cultivation. Combined with a higher annual rainfall and a shorter growing season than in lowland areas, these factors make upland areas less suitable for intensive production.

8.5 Livestock farming in the uplands does not just have a value to be measured in terms of biodiversity and rural economy. The predominant appearance and cultural history of the uplands involves livestock - from native breeds, walls and farm buildings to place names.

8.6 In a minority of situations, livestock may be grazed with the primary purpose of maintaining upland biodiversity, managing vegetation or supporting target species in grazed ecosystems (‘conservation grazing’). Many conservation grazing projects involve maintaining cattle on hill and moorland. Because the grazing habits of cattle are less selective than sheep, and they will eat coarser vegetation, their loss from upland areas could result in detrimental changes to many semi-natural habitats.[4] These projects provide multiple benefits - traditional agricultural outputs, the maintenance of a traditional agricultural infrastructure and the maintenance or enhancement of biodiversity and landscape. An example of such a project is the Limestone Country Project in the Yorkshire Dales.[5]

8.7 The map at figure 7 shows grazing land within the English Less Favoured Area.

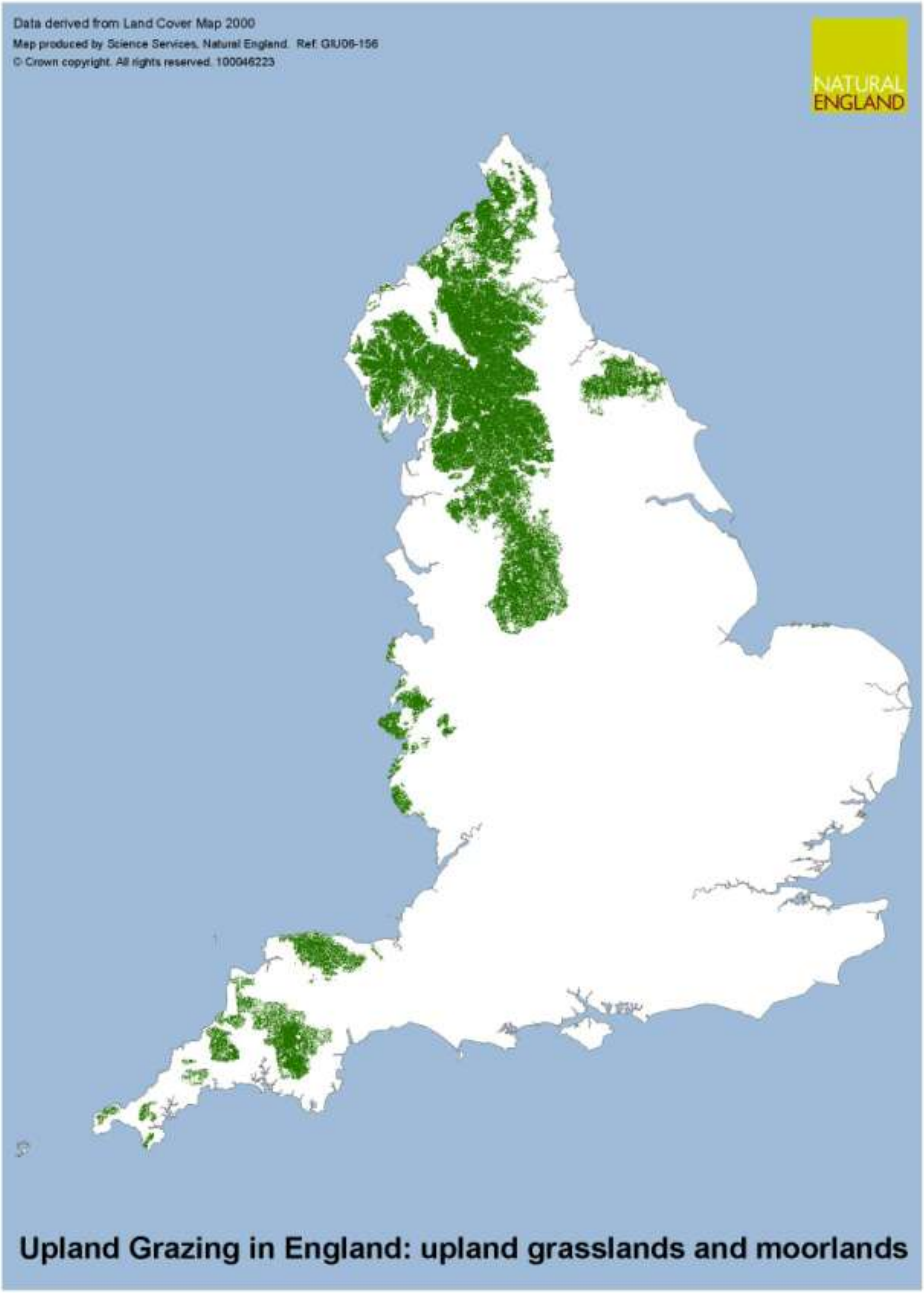

Figure 7 Area classified as grazing land within the Less Favoured Area

© Natural England

Plate 7 Cattle on a conservation grazing project

Industry trends and pressures

8.8 Some graziers, predominantly in the uplands, have rights to keep animals on common land. The land is often of low agricultural productivity, but can be comparatively high value in terms of biodiversity. Common grazing is used, with supplementary feeding, as an additional forage area, freeing the more productive 'inbye' land for periods of intensive husbandry, such as tupping, lambing, calving, fattening, and production of conserved forage. Historically, the semi-improved inbye land dictated overall stock numbers on a holding (typically it comprised about 10% of the total grazing area). After the introduction of headage payments in the 1970s, hill livestock numbers increased dramatically,[6] often disproportionately to the available inbye area. It became financially viable to outwinter hardy sheep and cattle breeds on the hill grazings, increasing problems of overgrazing and localised problems of trampling and nutrification where foddering takes place.

8.9 Since CAP reform in 2005 there have also been reductions nationally in sheep and beef cattle numbers.[7] Predictions of changing farming practice following these reforms suggest that there will be substantially less grazing activity in the uplands, with particular declines in cattle grazing. As yet there is little documented evidence to show that the changes in subsidy payment are having a direct and substantial effect on livestock numbers in the uplands. Nationally livestock numbers have declined, in many cases since before 2005,[8] Figures from the draft report by Defra's Agricultural Change and Environment Observatory Programme show a 9% reduction in upland beef cow numbers between 2004 and 2008.[9]

8.10 An economy in which livestock could not be supported in these areas would involve a major change in amenity and culture and would challenge long established perceptions of the upland landscape. Ultimately, in this scenario, natural processes would replace livestock grazing as the main influence on the landscape, leading to the development of woodland and other semi-natural habitats.

8.11 For current incentives, advice and regulation for upland grazing managers, see Annex I to this chapter.

Key impacts

8.12 Through its influence on plant community composition, agricultural grazing in natural ecosystems has encouraged habitats which are predominantly comprised of grazing tolerant or resistant plant species. The history of grazing, burning and drainage on moorlands has resulted in many habitats becoming dominated by a few stress-tolerant and less palatable plant species. Thus moorland ecosystems used for grazing have become strongly anthropogenic, and often species-poor,[10] despite having a high landscape value. On the inbye land, physical conditions and traditional management methods have resulted in relatively nutrient-poor grasslands which can be particularly species rich and of high conservation value - upland hay meadows.[11] These have developed from cutting and removal of hay every year, modest applications of farmyard manure and grazing in autumn and spring.

8.13 Growing conditions in the uplands are often difficult and heavy grazing can lead to suppression or loss of a number of plant species. Where vegetation is heavily suppressed, bare patches can develop and erosion can result. Very high levels of grazing can lead to large areas being affected by erosion, though moderately high levels of grazing can mobilise the same quantity of material, though over a smaller area. Where low levels of grazing do cause erosion, it is generally only on paths, or treading (poaching) in localised areas.[12]

8.14 Heather is a key component of many extensive upland vegetation types.[13] Under excessive grazing, stands of heather tend to fragment and become dominated by coarse grasses.[14] Whilst grassy vegetation produces more biomass than heather,[15] it is poor feed value in the winter months. Extending the period of use of moorland habitats through supplementary feeding leads to potential habitat change in small areas due to nutrification through dunging and local overgrazing where stock congregate.

8.15 Low levels of grazing can enhance habitat heterogeneity, whilst maintaining or enhancing biodiversity.Determining the appropriate level of grazing for a grazing unit containing a number of different vegetation types has proved to be technically challenging, particularly when economic sustainability is considered as well.[16]

8.16 A move to less hardy, but more productive ‘upland’-type animals could result in reduced pressure on hill grazings, but increased pressure on the inbye land.

8.17 The majority (95%) of England’s blanket bog resource is uncultivated and is used primarily for sheep grazing and grouse shooting; land uses which may be accompanied by moorland drainage to produce more heather and provide better grazing. The drained peat has become degraded through oxidation[17] and the loss of peat-forming sphagnum has resulted in the degradation of a major carbon sink.[18] Restoration of water levels is effective in reducing peat degradation and enhancing biodiversity.[19] Often such a programme is carried out in conjunction with a reduction in grazing. See chapter on ‘Drainage and burning management on moorlands’.

8.18 For further factual background to this section, see Annex II to this chapter.

Summary of impacts

Biodiversity

8.19 Upland livestock production is the means by which some upland habitats, now highly valued, have been created and maintained, for example upland hay meadows. Hay production led to the development of a grassland type rich in plant species, of which some notable examples remain. These are dependent on a low soil nutrient status, and on cutting dates considerably later than intensive lowland grasslands. To a large extent, where these conditions have been maintained, it has been by traditional upland livestock management systems. Silage production has been behind much of the loss of botanically diverse upland meadows.

8.20 Much of the subsequent degradation of habitats such as heather moorland has been due to suppression, by grazing, of the heather, herbs and other dwarf shrubs, which have been replaced by more resilient grasses.

8.21 The degradation of upland heather habitats (blanket bog and dry heath), which accelerated from the late 1970s into the 1990s, has been directly linked to an increase in livestock numbers, largely stemming from CAP headage support.

8.22 Reductions in grazing in upland areas have been achieved through agri-environment schemes, the enforcement of Cross Compliance requirements, the removal of headage payments and poor returns on livestock products; these factors have contributed to some areas becoming undergrazed. Habitat recovery has been varied, depending on the degree of degradation and the alternative management introduced.

8.23 Bracken encroachment has been blamed both on overgrazing and on undergrazing in the uplands. There is little evidence to support either claim.

Resource protection

8.24 Upland soils can be fragile and relatively easily mobilised. Grazing and treading by high numbers of livestock have been implicated in the erosion of peat and other upland soils.

8.25 Moorland gripping, when combined with grazing, has had a number of serious negative impacts: the resulting destabilised soil has increased the sediment loads and colouration in water running off moorlands. It has been blamed for the increased risk of flash flooding due to diminished water retention, and the resulting desiccation of peat bogs has led to an increase in carbon emissions.

8.26 Pressure of grazing is closely related to erosion of upland soils, both in extent and volume.

Greenhouse gases

8.27 Drainage to improve grazing on peat moorland has resulted in large areas of degrading peat, turning a small carbon sink into a potentially major carbon source.

Landscape

8.28 Upland pastoral agriculture is a major means of maintaining upland landscapes as we know them.

Annex I Current incentives, advice and regulation for upland grazing managers

There are a number of statutory controls relating to grazing. These mostly proscribe allowing undesirable change to semi-natural vegetation due to excessive grazing and are linked to farm payment and incentive schemes. Grazing on some designated sites and sites under agri-environment agreement may be carefully controlled to allow specific types of habitat to generate or regenerate:

- *Wildlife and Countryside Act*[20] *and Countryside and Rights of Way Act*[21]: provides for owner/occupiers to be notified of operations that need consent. Introduction or a change in grazing levels would require consent.
- *Cross Compliance - GAEC 9*:[22] protection of semi-natural vegetation from overgrazing and unsuitable supplementary feeding. This is a requirement of the Single Payment Scheme.
- Standards of Good Farming Practice: these apply to holdings with land under agri-environment schemes.

Management incentives

For reduction of grazing livestock numbers (principally sheep) include:

- Environmentally Sensitive Areas (ESA)
- Wildlife Enhancement Schemes (WES)
- Sheep WES
- Countryside Stewardship
- Environmental Stewardship.

For maintaining cattle:

- ES cattle supplements.
- Marketing initiatives (for example: Limestone Country project).

Annex II Impacts of upland livestock production on environmental sustainability

Table 10 Impacts of upland livestock production on environmental sustainability

Habitat quality and diversity	• Grazing has a direct effect on habitats though defoliation, trampling and deposition of dung and urine. Historically, large numbers and areas of upland SSSI have been brought into unfavourable condition through excessive levels or inappropriate timing of grazing. Currently, nearly 42,000 ha of upland SSSI habitats are in unfavourable condition due to inappropriate grazing levels.[23] • Winter foddering on upland grasslands and moorland leads to areas of nutrient enrichment, poaching and localised overgrazing.[24] • Grazing has been used in many areas as a tool for maintaining or restoring habitats.[25] This requires careful management and monitoring. • Lower stocking rates associated with ESA prescriptions for the management of semi-natural rough grazing have maintained existing heather (*Calluna vulgaris*), but have not prevented localised over-grazing and concomitant under-grazing of less desirable species.[26] • Where habitat is heavily degraded by overgrazing, reduction in grazing may result in an increase in aggressive, undesirable species.[27] Habitats which have been created (directly or indirectly) by, and are maintained due to upland livestock enterprises are: • Upland hay meadows (developed through management for hay).[28] • Upland calcareous grasslands (appropriate grazing maintains desired sward heights).[29] Upland SSSI habitats which are threatened by inappropriate livestock management: • Dwarf shrub heath - 12,069 ha overgrazing, 607 ha undergrazing.[30] • Blanket bog - 22,042 ha overgrazing, 765 ha undergrazing.[31] • Fens marsh and swamp - 174 ha overgrazing, 74 ha undergrazing.[32]

Table continued...

Species abundance and diversity	Key upland species which have benefited from grazing livestock include: • Golden plover (short vegetation within heather moorland and blanket bog, created by grazing or burning, for nesting and enclosed grazed pastures for foraging).[33] • Heather (*Calluna*) (appropriate stocking discourages scrub development, and keeps grasses in check).[34] Species which have been adversely affected include: • Salmon (soil deposition in rivers affects redding sites).[35] • Black grouse (excessive grazing of traditional feeding and nesting sites).[36]
Water level control	• Soil compaction caused by treading reduces water infiltration, and therefore may increase surface flow, increasing risk of flooding downstream.[37]
Sediment loads in water	• Where grazing exposes or destabilises soil, it becomes prone to runoff, erosion and transfer of nutrients to watercourses.[38] • A large amount of moorland drainage was carried out to 'improve' productivity for grazing. This has predisposed extensive areas to serious erosion, with associated high sediment loads.[39] • There is a high cost to the water industry of sediment and colouration removal, due to erosion. A proportion of this is due to the effects of erosion caused by livestock.[40]
Nutrient loads in water	• Nutrification of water from upland agriculture is generally low,[41] reflecting the prevalence of less intensive production systems.
Pesticide control in water	• Sheep dip is potentially a major pollutant of water. See Sheep Dip Case Study for more information.
Other pollutants	• Water quality may be affected directly through introduction of bacteria such as *Cryptosporidium* and *Giardia*, generally via the faeces of grazing livestock.[42] This is a particular issue with cattle.
Greenhouse gases	• Grazing can affect air quality through direct emissions of methane from grazing ruminants, and emissions of ammonium and nitrous oxide from dung and urine. Low densities of livestock on extensive grazings means little impact from methane per hectare, particularly where storage of slurries is avoided.[43] • The draining and drying out of peat bogs has resulted in the oxidation of organic matter, and release of stored carbon.[44]

Table continued...

Soil stability (erosion)	• Grazing affects soils through physical compaction or erosion associated with trampling. This is usually associated with exposure and/or destabilisation resulting from removal of vegetation, and physical disturbance from hooves, or scraping/rubbing.[45] • Gripping to 'improve' moorland productivity through drainage has resulted in high levels of peat erosion.[46]
Soil function	• Soil can be affected chemically and biologically by deposition of organic matter and nutrients through dung and urine, and through the effect on vegetation, which can change plant litter inputs, soil microbiota and the temperature regime.[47] • Outwintering and feeding livestock can have a damaging effect on soil structure, particularly where treading has led to deep mud.[48]
Landscape character	• Landscape scale structures (walls, barns) enable the management of the grazing livestock. A large proportion of the upland areas of England owe their appearance to their use for rearing grazing livestock. This appearance may change over decades, but it is recognised as being highly characteristic of many upland National Character Areas.[49] • Reduction of grazing in the uplands has given rise to fears that historic features may become obscured or destroyed by root growth of scrub species. There is currently little evidence to support this scenario.

[1] Defra, *Agriculture in the UK 2006,* URL: **https://statistics.defra.gov.uk/esg/**. Accessed January 2009

[2] Defra (2007), *June Agricultural Survey 2007*, URL: **https://statistics.defra.gov.uk/esg/**. Accessed January 2009

[3] Smith, W.G., 'The origin and development of heather moorland', *Scottish Geographical Magazine*, 18 (1902), 587-97

[4] ADAS, Scottish Agricultural College, University of Newcastle, Centre for Ecology and Hydrology, Royal Society for Protection of Birds, Institute of Grassland and Environment Research, 'Determining environmentally sustainable and economically viable grazing systems for the restoration and maintenance of heather moorland in England and Wales'. Research Project Final Report BD1228 (Defra, 2007)

[5] Limestone Country (2008), *The Limestone Country Project,* URL: **www.limestone-country.org.uk/**. Accessed January 2009

[6] Anderson, P. and Yalden, D.W., 'Increased sheep numbers and the loss of heather moorland in the Peak District, England', *Biological Conservation,* 20 (1981), 195-213

[7] Defra (2007), *June Agricultural Survey* 2007, URL: **https://statistics.defra.gov.uk/esg/**. Accessed January 2009

[8] Defra, *Agriculture in the UK 2007*, URL: **https://statistics.defra.gov.uk/esg/**. Accessed January 2009

[9] Defra, *The Agricultural Change and Environment Observatory Programme*, URL: **https://statistics.defra.gov.uk/esg/ace/index.htm**. Accessed June 20009

[10] Sydes C., 'Recent assessment of moorland losses in Scotland', *C.S.D. Notes*, 43 (1988), Peterborough, NCC

[11] Jefferson, R.G., 'The conservation management of upland hay meadows in Britain: a review', *Grass and Forage Science*, 60 (2005), 322-31

[12] Cranfield University, 'Research on the quantification and causes of upland erosion'. Final Project Report SP0402 (MAFF, 2000)

[13] Rodwell, J.S. (ed.), *British plant communities. Volume 2: Mires and heaths* (Cambridge, Cambridge University Press, 1991)

[14] Alonso, I., Hartley, S.E. and Thurlow, M., 'Competition between heather and grasses on Scottish moorlands: Interacting effects of nutrient enrichment and grazing regime', *J. Vegetation Science*, 12:2 (2001), 249-60

[15] Milne, J.A., Pakeman, R.J., Kirkham, F.W., Jones, I.P. and Hossell, J.E., 'Biomass production of upland vegetation types in England and Wales', *Grass and Forage Science,* 57 (2002), 373 and 388

[16] ADAS, *op.cit.*

[17] Dawson, J. and Smith, P., 'Carbon losses from soil and its consequences for land management', *Science of the Total Environment*, 382 (2007), 165-90

[18] Joosten, H., Augustin, J., Schafer, A. and Sirin, A., *Peatland restoration and climate: of gases guesses, gains and guts*. Greifsward [Germany], Institute of Botany and Landscape Ecology, 2006

[19] Natural England, *Carbon management by land and marine managers.* Report 026 (Natural England, 2008)

[20] Ministry of Justice (1981), *UK Statute Law database*, 'Wildlife and Countryside Act 1981 (c. 69)', URL: **www.statutelaw.gov.uk/**. Accessed January 2009

[21] Ministry of Justice (2000), *UK Statute Law database*, 'Countryside and Rights of Way Act 2000 (C.37)', URL: **www.statutelaw.gov.uk/**. Accessed January 2009

[22] Defra (2007), *The guide to cross compliance in England 2008,* URL: **www.rpa.gov.uk/**. Accessed January 2009

[23] Natural England (2008), *Site of Special Scientific Interest database,* URL: **www.english-nature.gov.uk/special/sssi/**. Accessed January 2009

[24] UK Biodiversity Action Plan (2005), *Habitat action plan: Upland hay meadows*, URL: **www.ukbap.org.uk/**. Accessed January 2009

[25] Bakker, J.P., *Nature management by grazing and cutting* (Dordrecht [The Netherlands], Kluwer, 1989)

[26] ADAS, *Effect of stocking rates and vegetation management practices on the regeneration of Calluna and dwarf shrub heath communities*. Report to MAFF Countryside Management Division (Unpublished, 1998)

[27] Adamson, H.F., Ross, S.Y. and Gardner, S.M, 'The response of upland wet heath to ESA stocking rates: A heft scale approach' *in* Proceedings of Biodiversity, Plant Structure and Vegetation Heterogeneity: Interactions with the Grazing Herbivore. *Workshop held at SAC Hill Mountain Research Centre, Crianlarich, Perthshire, 9-10 October 2001*

[28] Jefferson, R.G., 'The conservation management of upland hay meadows in Britain: a review', *Grass and Forage Science*, 60 (2005), 322-31

[29] Rodwell, J.S. (ed.), *British plant communities. Volume 3: grasslands and montane communities* (Cambridge, Cambridge University Press, 1992)

[30] Natural England, *Site of Special Scientific Interest database, op.cit.*

[31] Natural England, *Site of Special Scientific Interest database, op.cit.*

[32] Natural England, *Site of Special Scientific Interest database, op.cit.*

[33] Backshall, J., Manley, J. and Rebane, M., *Upland management handbook* (English Nature, 2001)

[34] Backshall, *op.cit.*

[35] Greig, S.M., Sear, D.A. and Carling, P.A., 'The impact of fine sediment accumulation on the survival of incubating salmon progeny: implications for sediment management', *Science of the Total Environment*, 344:1-3 (2005), 241-58

[36] Baines, D., 'Seasonal variation in lek attendance and lekking behaviour by male Black Grouse *Tetrao tetrix'*. Ibis, 138: (1996), 177-80

[37] Palmer, R.C., *Soil structural conditions in the Camel catchment (including the De Lank and Allen tributary catchments) during February 2005* (Cranfield, NSRI, 2005)

[38] Evans, R., 'Soil erosion in the UK initiated by grazing animals: a need for a national survey', *Applied Geography,* 17 (1997), 127-41.

[39] Defra, *Controlling soil erosion: an advisory booklet for the management of agricultural land*. Publication PB3280 (Defra, 2005)

[40] Moors for the Future Partnership (2007), *Soil and Water Conservation*. Research Note 15, URL: **www.env.leeds.ac.uk/sustainableuplands/15%20-%20Soil%20&%20Water%20Conservation.pdf**. Accessed January 2009

[41] Defra, *e-digest statistics about: Inland water quality and use*, URL: **www.defra.gov.uk/environment/statistics/inlwater/iwnutrient.htm**. Accessed January 2009

[42] Keeley, A. and Faulkner, B.R., Influence of land use and watershed characteristics on protozoa contamination in a potential drinking water resources reservoir, *Water Research,* 42:10-11 (2008), 2803-13

[43] Mistry, P. and Misselbrook, T. (2005), *Assessment of methane management and recovery options for livestock manures and slurries*. Report for Sustainable Agriculture Strategy Division, Defra, URL: **http://randd.defra.gov.uk/Document.aspx?Document=AC0402_3589_FRP.pdf**. Accessed January 2009

[44] Oglethorpe, D.R., 'Livestock production post CAP reform: implications for the environment', *Animal Science*, 81 (2005), 189-92

[45] Palmer, *op.cit.*

[46] Worrall, F., Presentation to Natural England workshop - Peatlands. (Unpublished 2006)

[47] ADAS, *The environmental impact of livestock production*. Report for FFG (Defra, 2007)

[48] Palmer, *op.cit.*

[49] Countryside Agency (2006), *Landscape: beyond the view*, (parts 1-3), URL: **www.countryside.gov.uk/Images/Beyond_The_View_part1_tcm2-31061.pdf**. Accessed January 2009

Case study: Sheep dip

Sheep are prone to parasitism from a number of ectoparasites, several of which are capable of carrying potentially lethal diseases, or are a direct cause of serious welfare problems.

Failure to treat sheep against scab mites, ticks, lice and biting flies can encourage disease such as louping ill (which also affects grouse), loss of condition and death. Most sheep owners treat stock prophylactically. On some holdings where ticks are a major problem (particularly moorlands), dipping may take place four or more times during the summer and autumn. In recent years there has been no statutory obligation to dip sheep against scab mites, but flock managers have recognised the welfare benefits to their stock, and the majority of flock owners still dip their flocks.

Historically, there have been a number of ways of dealing with sheep ectoparasites, such as washing, tarring, spraying, injections, and dipping. The simplest effective method of controlling the majority of skin parasites is dipping, largely because the dip penetrates the natural water-repellent barrier created by wool, and has a relatively long period of residual activity. Treatment by dipping is also the most effective treatment against all major ectoparasites. Systemic treatments such as injection or pour-ons, whilst having the benefit of reduced risk to water quality, are not effective across such a broad spectrum.

In the past, use of sheep dip has had a direct effect on watercourse quality, not only in areas where sheep are produced, but also in areas where wool is processed, where dip residues on the wool fibres could be washed out and released into watercourses.[1]

Release of sheep dip into watercourses, either via dipped sheep, or poor disposal of spent dip has caused substantial environmental harm, due to its high level of toxicity, which can affect considerable lengths of watercourse, and sometimes substantial parts of a catchment.[2] In 2005, there were nine Category 1 (the most severe) pollution incidents involving sheep dip.

Problems caused by sheep parasiticide treatments can be categorised into three broad areas:

- Those which harm humans who are involved in the dipping/treatment process, or who come into close contact.
- Those causing environmental damage to aquatic invertebrates caused by dip products entering watercourses.
- Those causing mortality in soil-dwelling invertebrates which process or use sheep dung which has been affected by systemic products or through direct disposal of spent sheep-dip to land.

In 2006, the National Farmers Union launched its Stop every Drop[3] campaign to raise awareness of the potential pollution dangers associated with sheep dipping, and to promote best practice. This was supported by the Environment Agency and the Veterinary Medicines Directorate. Also in 2006, licenses permitting the sale of cypermethrin-based dips were suspended. In that year there was only one Category 1 incident involving sheep dip.

---

[1] Best, J., (pers. comm.)

[2] Virtue, W.A. and Clayton, J.W., 'Sheep dip chemicals and water pollution', *Science of the Total Environment,* 194 (1997), 207-17

[3] Environment Agency (2007), *Sheep dip pollution reduction programme* (Updated August 2007), URL: **www.environment-agency.gov.uk/static/documents/Business/sheepdip_prp_0807_1410874.pdf**. Accessed January 2009