Management Guidelines for Grassland in Environmental Schemes

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1.0 Introduction

Farms entering areas of grassland into agri-environment schemes for habitat maintenance or restoration will need to adhere to management prescriptions designed, usually to optimise the botanic value of the sward, with the aim of maximising the biodiversity of the farm. Sometimes, there may be other objectives included, such as raised water levels for waders, or management of a permanent sward to protect underlying archaeological features. Whatever the environmental objective, the management of grassland for environmental benefits requires a very different approach to that required for agricultural production and, as a result, agricultural production will often be compromised.

Botanical diversity is best achieved under conditions of low fertility where the agriculturally productive grasses are less able to smother smaller, slower growing species. Under these conditions the nutritional value and quantity of grass produced will be much reduced, and the potential grazing capacity or forage production limited. This is likely to put greater pressure on other areas of the farm. Supplementation may not be permitted due to problems of nutrient enrichment, poaching and the potential to introduce seed from other areas, although with careful planning this factor could be used to achieve a desired outcome, e.g. feeding hay from a nearby species-rich hay meadow by spreading it about on a field of botanically depleted grassland may reintroduce some desirable species.

Aspects of husbandry, such as stocking rate, grazing period, season, animal species, and indeed animal breed, all need careful consideration depending upon the specific environmental outcome required, and will influence the management of the whole farm. Management of a sward for an environmental outcome may also influence the palatability, age and structure of the vegetation, as well as its composition. Sometimes, an environmentally desirable botanic composition could contain species that may prove toxic or unpalatable to some animals. As a result, animals used for environmental grazing may at times have impaired performance which may have practical and financial consequences within the whole farm system. This may exert pressure on other areas of the farm to be more productive and to be managed more intensively as a result of the agri-environment agreement.

This work aims to;

1. Review both published and grey literature relating to the management of the recognised grassland habitats, - combinations of unimproved and semi improved dry acid grassland, limestone grassland and neutral grassland; and marshy grassland.

2. Produce a report where, for each grassland habitat identified in 1, the seasonal productivity (winter, spring, summer and autumn), expected forage quality and typical sward component will be summarised and related to the nutritional requirements of cattle and sheep under a variety of grazing systems, including rotational, set stocking and block grazing, identifying expected production levels and supplementation requirements.

3. Distil the review and report into a summary of practical guidelines that meet the environmental objectives, whilst achieving optimum levels of efficient grassland and livestock production.

2.0 Literature Review

2.1 Method

The literature review concentrated on the productivity and financial consequences of environmental management. A number of processes were deployed in conducting the literature search including Elsevier's Science Direct (www.sciencedirect.com), Scirus (www.scirus.com) and Google scholar (***scholar.google****.com/advanced****_scholar_****search)*. In addition, a search of grey literature and unpublished work was undertaken to include all relevant articles over the last 10 years. Workers were surprised at the lack of published papers specifically on the subject.

2.2 Preface

Grassland is a major agricultural resource in the UK and home-grown forage is recognised as the most economic means of feeding livestock. Managed grassland is the basis of all ruminant production in this country and traditional breeds of cattle and sheep, and indeed traditional farming systems, have developed to optimise its use.

Very little 'natural' grassland exists in this country as most grasslands are not climax vegetation, but are vegetation managed to arrest the succession to woodland. Management to create and maintain semi-natural pastures has been carried out for thousands of years, but the real drive to improve grass production began during World War II, when food production became so vital. Since that time, Government policy and economic pressures have influenced the improvement of the majority of our country's grassland for intensified agricultural production. Increasing mechanisation, the availability of inorganic fertilisers and other agro-chemicals, and the breeding of new strains of grasses, particularly ryegrass (*Lolium* spp.) and white clover (*Trifolium* repens) has facilitated the creation of highly productive swards. Unimproved or semi-improved permanent grassland thus became sufficiently scarce for its environmental value to be recognised and measures taken to protect it (Critchley *et al*., 2003).

Encouraging a diversity of grass species in a sward is likely to benefit a range of taxa. There is no single ideal set of grassland plants suitable for increasing biodiversity, as different combinations will have different benefits. Most grasses have some insect species dependent on the flower, seed head or stem so there is a conflict between allowing the structural development of grasses through the season and the optimum management for livestock production, which involves cutting or grazing before flowers develop (Mortimer *et al.,* 2006).

Agri-environment schemes are one of the main policy initiatives for delivering biodiversity objectives and offer compensatory payments to farmers for environmentally beneficial management practices to protect, maintain or enhance environmentally valuable features, including semi-natural grasslands. It is recognised that such measures may restrict agricultural production in order to reverse the impacts of intensification or neglect.

2.3 Environmental Stewardship

Applications are no longer accepted for ESA (Environmentally Sensitive Area) or CSS (Countryside Stewardship Scheme) agreements, although some existing, ten-year agreements are still live. The main agri-environment scheme currently available in England is Environmental Stewardship. This is sub-divided into two tiers: Entry Level Stewardship (ELS) or Organic Entry Level Stewardship (OELS) and Higher Level Stewardship (HLS).

ELS and OELS work on a points based system, with a flat rate payment of £30/ha/yr for ELS and £60/ha/yr for OELS, for farms achieving a previously agreed points target. These are 5-year schemes and there are no capital grants. Grassland management options available under ELS and OELS are 'Management of archaeological features on grassland', 'Permanent grassland with low inputs', 'Permanent grassland with very low inputs' and 'Management of rush pastures'. These last three options have slightly differing management requirements, and differing points values for land within the SDA (Severely Disadvantaged Area), the LFA (Less Favoured Area), Moorland Line and for land outside these areas. ELS and OELS are generally available for most farms (see Appendix 1).

HLS (Higher Level Stewardship) agreements last for ten years. Payment rates vary according to management options selected and these can be further enhanced by supplements and capital grants. There are potentially higher payments through HLS than ELS or OELS, but this scheme is not so widely available and many farms cannot qualify. Farmers can elect to maintain, restore or create each environmental feature. Grassland options offered under HLS are for 'species-rich, semi-natural grassland', 'wet grassland for breeding waders', 'wet grassland for wintering waders and wildfowl', and 'semi-improved or rough grassland for target species'. There are supplements for hay making, raised water levels and inundation grassland (see Appendix 2).

Environmental Stewardship seeks to promote the diversity of species and sward structure through restricting fertiliser and herbicide use; encouraging extensive, mixed stocking regimes; restricting supplementary feeding; and protecting ground nesting birds through timing of management practices (Natural England, 2005 and 2008).

The number of species in herbaceous swards is related to soil pH and fertility. Raised fertility levels cause loss of species, except in cases of extreme acidity or infertility, where the reverse is true. Whilst fertiliser use is most effective in increasing production it causes the greatest loss of species diversity. Species best able to respond to increased fertility, by monopolising space and light through rapid growth, flourish at the expense of smaller plants, including most herbs. Under conditions of low fertility, these less competitive plants can happily co-exist (Holmes, 1980).

For all the major nutrients, (nitrogen (N), phosphate (P) and potash (K)), there is an optimum level at which maximum species density is maintained. All semi-natural grassland soils provide inadequate nitrogen for highly productive grass growth, and many soils hold an inadequate supply of other major nutrients. Fertiliser applications to boost agricultural output are unlikely to be compatible with the maintenance of the floristic integrity of a semi-natural grassland. Scope for compromise between achieving conservation objectives

and the use of semi-natural grasslands for modern livestock production is thus limited (Tallowin, 1997).

2.4 Acid grassland

Usually dominated by fine-leaved grasses such as sheep's fescue *(Festuca ovina)*, common bent *(Agrostis capillaries)*, wavy hair grass *(Deschampsia flexuosa)* or bristle bent *(Agrostis curtisii)*; common associates include heath bed-straw *(Galium saxatile)*, tormentil *(Potentilla erecta)* and common sorrel *(Rumex acetosella)* (Critchley *et al.,* 2003).

Lowland, dry acid grassland is an important habitat for a number of species of conservation concern, in particular stone curlew, woodlark, smooth snake, sand lizard and natterjack toad (Sanderson, 1998).

On soils of pH 4.5 to 5.5, swards are often comprised of bent grasses *(Agrostis* spp.) and Yorkshire fog *(Holcus lanatus*). These species have a lower potential yield than ryegrass, although under acidic conditions may be equally or even more productive. On soils of even lower pH, species of very low productivity such as mat grass *(Nardus stricta*) and purple moor grass *(Molinia caerulea*) predominate (Williams, 1984).

Sorrel (*Rumex acetosa*) occurs on acid soils and indeed is an indicator of lime deficiency (Williams, 1984). When young, it is digestible and a good source of protein, phosphorous and trace elements, although its nutritional value declines with maturity. However, it contains oxalic acid which, if consumed in large quantities by lactating animals, can be absorbed directly from the rumen into the blood stream where it combines with calcium to induce symptoms of milk fever (Barber, 1985).

The optimum pH for grass production is pH 6.0 on mineral soils or pH 5.3 on peaty soils. Under acid soil conditions, with a low pH, the availability of most plant nutrients is reduced causing large yield losses. Swards become dominated by those grasses most tolerant of acid conditions and clover cannot persist (Defra, 2000). Acidity also reduces bacterial and earthworm activity (Jacks, 1954). Soil pH can be corrected by the application of lime. (Defra, 2000). Skinner (1997), showed that mean herbage dry matter (DM) increased from about 6 t/ha at pH 4.5 to about 9 t/ha when pH was raised to 6.0-6.5. However, lime should only be applied in small quantities and achieving the desired soil pH may take some time. Excessive lime can lock up minerals such as cobalt, manganese, zinc and copper (Beever *et al.,* 2000).

An experiment in Wales looked at the effects of reducing nutrient inputs on previously fertilised 25 year old ryegrass/bent (*Lolium perenne L./Agrostis capillaris L*.) pasture. Reducing inputs caused a significant reduction in lamb liveweight gain, ewe stocking rate and length of grazing season. Over a 6-year period, total lamb liveweight gain was reduced by 17% where nitrogen was used, but lime, phosphate and potash withdrawn (CaPK), by 32% where lime was used but NPK withdrawn (Ca) and by 45% where all inputs were withdrawn (nil) compared with the treatment with all those nutrients (CaPKN). Ewe stocking rate was progressively reduced by withdrawing inputs and, by year 6, the nil treatment showed a 63% reduction compared with the CaPKN treatment and was still declining. There was also a reduction in the length of the grazing season of 21 days between the nil and the CaPKN treatments. The post weaning performance and condition score of the ewes suggested

that problems with the reproductive performance of the flock could occur and special care would need to be taken to manage ewes from low input systems appropriately during the autumn and winter (Fothergill *et al.,* 2001).

A Defra-funded study at ADAS Pwllpeiran, assessed the effectiveness of Cambrian Mountain ESA prescriptions in maintaining and enhancing the condition of heather in semi-natural plant communities, and the impact of these prescriptions on the physical and financial performance of grazing animals on a hill farm in the Cambrian Mountains. It was found that reducing stocking rates to either 1.5 or 1.0 ewes/ha of 40 kg Welsh Mountain sheep could lead to significant changes in dwarf-shrub and grass dominated vegetation. However, the reduction in stocking rate alone was insufficient to increase the dwarf shrubs in areas where they were sub-dominant. Initially lamb performance was greatly improved through reducing stocking rate to 1 ewe/ha, but in later years there was a downward trend in performance (Davies *et al*., 2000). This decreased performance was attributed to changes in the vegetation over the same period (Hetherington *et al.,* 2002).

2.5 Neutral grassland

A mixture of grasses such as crested dog's tail *(Cynosurus cristatus),* red fescue *(Festuca rubra)* and common bent *(Agrostis capillaries)*, with meadow fox-tail *(Alopecurus pratensis)* in damper places, is common in neutral grasslands. Associated species include bird's foot trefoil *(Lotus corniculatus)*, knapweed *(Centaurea nigra)* and great burnet *(Sanguisorba officinalis) (*Critchley *et al.,* 2003). Bird's foot trefoil is outstanding in its value to insects, including notably some rare bees (Mortimer *et al.,* 2006).

Most non-calcareous grassland will require periodic liming to maintain an optimum pH for grass growth (Holmes, 1980). Acidification of mesotrophic grasslands can be caused by nitrogen fertiliser and rainfall. Continuing the traditional use of lime to counter these effects may be beneficial for species diversity of the sward as well as agricultural production (Tallowin, 1997).

The inclusion of white clover in a sward can boost production and, provided that pH is maintained at 6.0 to 6.5 and P and K indexes above 2, the sward can be managed with low nitrogen inputs. White clover can fix up to 280 kgN/ha/yr (Cowling, 1982) although more typically 200 kgN/ha in lowland swards (Davies and Hopkins, 1996) and 150kg N/ha in upland swards (Munro and Davies, 1974). Of interest, in the latter paper, higher responses were obtained from poorer stagnogley soils (181 kgN/ha) than from the more fertile brown earths (129 kgN/ha), a response that was believed to be due to soil mineralised N availability. Clover persists well under conditions of low nitrogen, but on high N soils it is out competed by the grass (Holmes, 1980). Up to 100 kgN/ha applied early in the year can be tolerated and will increase early and late grazing when soils are too cold to allow rhizobia activity.

It has been demonstrated that sheep actually prefer clover to grass (Rook *et al.,* 2002). The foliage of clover is also important in the diet of farmland birds and the flowers are valuable for insects, in particular red clover is noted for its value to long tongued bumble bees, some of which are very scarce. (Mortimer *et al.* 2006).

The inclusion of clover in a grass sward increases ruminant DM intake, although excessive amounts can cause bloat. (Holmes, 1980). For every 10%

increase in white clover content, there will be a 1% increase in the protein content of forage (Eblex, 2008). Curll *et al.* (1985) found that with no N use, sheep liveweight gain and wool production closely reflected herbage growth and clover content of the sward. This was greatest where N had not been used the previous year, and least where it had, and thus the clover content was suppressed.

Sibbald *et al.* (2002) demonstrated that average white clover content in a sward is negatively correlated with level of nitrogen fertiliser. It was concluded that nitrogen fertiliser can be reduced or removed from upland sheep pastures without compromising individual animal performance, provided that white clover content and sward height are maintained. For a satisfactory level of sheep performance, sward height needs to be maintained at 3.5 to 5.5 cm between turnout and weaning. From weaning, swards need to be above 5 cm for ewes and at least 6 cm for lambs. To maintain these sward heights may require a reduction in stocking rates or provision of supplementary feeds.

Griffith and Tallowin (2007) found that daily liveweight gains of cattle grazing neutral species-rich grassland were comparable with expected average performance levels under commercial grazing systems, demonstrating that there were no nutritional constraints on the individual performance of productive livestock. However, stocking rates varied considerably, meaning that overall agronomic output from species-rich and semi-improved pastures was 45% and 60% respectively of that achieved on fertilised, improved grass.

Dry matter yields from a sample of lowland semi-natural grasslands ranged from 40 to 80% of those that might be expected from intensively managed, agriculturally improved grass. The metabolizable energy value of some hays from species-rich, semi-natural lowland grasslands were between 10 to 40% lower than the energy contents of forages cut from intensively managed grasslands. Limited evidence suggests that digestibility of mid-summer cut hay may be as much as 20% lower than that cut from intensively managed grassland (Tallowin, 1997).

A general characteristic of unfertilized, and particularly the more species-rich semi-natural grasslands, is that they have a considerably lower growth rate in the spring and early summer compared with agriculturally improved and /or fertilized grasslands. This means that peak yield and maturity are reached later in the year than in improved grasslands with implications for forage quality. Digestibility of July cut species-rich meadow hay would be above that of hay cut at a similar time composed of agronomically important grasses such as cocksfoot *(Dactylis glomerata*) and early flowering perennial ryegrass (*L. perenne*) (Tallowin, 1997).

Some species of unimproved semi-natural vegetation have a high feed value and the voluntary intake of some wild flower species is higher than that for perennial ryegrass (*L. perenne*).

2.6 Calcareous grassland

Usually dominated by fine-leaved grasses such as sheep's fescue *(Festuca ovina)* and crested hair grass *(Koeleria macrantha)*, or by more robust species such as upright brome *(Bromus erecta)*, chalk false brome *(Brachypodium pinnatum)*, hairy oat grass *(Helictotrichon pubescens)* or blue moor grass *(Sesleria caerulea);* common associates include salad burnet *(Sanguisorba*

mino) wild thyme *(Thymus polytrichus)* and common rockrose *(Helianthemum nummularium)* (Critchley *et al*., 2003).

The small areas of sheep grazed swards on the southern chalklands of England are dominated by red fescue and introducing other species can be difficult. Chalk false brome *(Brachypodium pinnatum)* is an undesirable species because it can dominate large areas of dry calcareous grassland and is not grazed by stock except when nothing else is available (Dibb, 1985).

On grasslands where the amount or quality of forage is marginal, the type of livestock that can be grazed is limited. On the chalk grasslands of Aston Rowant, where scrub control was a primary objective, animal performance was compromised. Dry ewes or wethers with a live weight of at least 50 kg were most suitable for tolerating the nutritional stresses imposed, particularly in winter. Lamb production from such grasslands would be untenable without supplementary feeding. However, the botanical composition of the chalk grasslands changed little, at least in the short term, in response to a wide range of grazing managements (Wells, 1976).

Several trace mineral deficiencies including cobalt, manganese, zinc and copper are aggravated on calcareous soils. (Gill *et al.,* 1980; Beever *et al*., 2000). Deleterious effects on the performance of livestock fed on hay from calcareous soil may arise due to a relatively high calcium to phosphorus ratio of the forage. The magnesium content of hays from some semi-natural grasslands was below the safe level for productive livestock (Tallowin, 1997).

Copper deficiency is most likely to occur where herbage molybdenum levels are high, even where copper content of the pasture is quite high, because molybdenum inhibits copper absorption. Molybdenum uptake by herbage increases as soil pH increases, and is at its highest on calcareous soils, predisposing livestock grazing on such land to copper deficiency. Copper deficiency can impair livestock performance in a number of ways. It retards growth, causes infertility, low milk yield, scour and an increased susceptibility to infection. It causes swayback and increased mortality rates in lambs (Cooke, 1983)

Haymaking on chalk grassland at Knocking Hoe over some 30 to 40 years was calculated to cause a limitation of potassium availability as well as a reduction in dry matter yield. Severe nutrient depletion may also cause a decline in species composition (Tallowin, 1997).

2.7 Marshy grassland

Wet acid grasslands are likely to contain an abundance of species such as purple moor grass *(Molinia caerulea)*, brown bent *(Agrostis canina)* and sharp-flowered rush *(Juncus acutiflorus),* as well as the presence of species such as lousewort *(Pedicularis sylvatica)*, greater bird's foot trefoil *(Lotus pedunculatus)*, carnation sedge *(Carex panacea)*, yellow sedge *(Carex viridula oedocarpa)*, common sedge *(Carex nigra)* and star sedge *(Carex echinata)* (Sanderson, 1998). In addition, marshy grasslands provide a habitat for invertebrate species such as the endangered marsh fritillary butterfly *(Eurodryas aurinia)*. Such pastures are ecologically valuable but their limited agricultural potential makes them vulnerable to change either through neglect or through agricultural improvement. Either leads to a loss of biodiversity (Moy *et al.,* 2002). In low lying areas of wet grassland, periodic inputs of nutrients

by flooding is an important means of maintaining fertility and floristic diversity (Tallowin, 1997).

Wet soils encourage certain weeds such as buttercups *(Ranunculus repens* and *acris*) which are poisonous if eaten in large amounts when fresh (safe in hay); marsh horsetail *(Equisetum palustre*) and marsh ragwort *(Senecio aquaticus*), both of which are highly poisonous, especially in hay; and rushes (*Juncus* spp.), which are unpalatable and can cause poisoning and partial blindness in cattle (Williams, 1984). Bog asphodel *(Narthecium ossifragum)* can cause photosensitisation in sheep, whilst St John's wort (*Hypericum perforatum)* will produce photosentitivity in lightly pigmented skins in cattle (Cooper and Johnson, 1984).

In waterlogged soils, soil structure is usually poor, root development may be weak and plants are more susceptible to disease. More important than the restriction on grass growth is the restriction upon its utilisation, and the length of the grazing season. If swards are grazed when the soil is too wet to bear the weight of livestock, poaching will occur and the resultant damage can damage the sward and reduce grass production. It may result in the ingress of low yielding species, such as annual meadow grass *(Poa annua*) and unpalatable rushes *(Juncus* spp.). The grazing value of almost all wet soils can be improved by drainage (Williams, 1984) and because of this, many marshy grassland habitats, particularly in lowland areas, have been lost.

Marshy grassland dominated by purple moor grass *(Molinia caerulea)* and rushes *(Juncus spp.)* has very limited agricultural value. Such grasslands are usually inaccessible to stock in winter or in wet weather at any time of year and where stock are present, severe poaching and structural damage can occur. However, they provide useful grazing in a dry summer, especially for cattle, and many were traditionally used to make hay. Their real value is in a summer drought, when grazing elsewhere may be short. However, production is very limited. Average weight of livestock carried and output have been found to average 25% of that achievable from improved pastures. Growth rates of cattle are particularly poor from mid-summer onwards and average growth rate was found to be 0.52 kg/day, in contrast to over 0.75 kg/day expected from improved pastures. The nutritional value and mineral content of the forages are sub-optimal for productive livestock. In particular, potassium deficiency increased during late summer and autumn and there is a high calcium to phosphate ratio which can cause fertility problems for breeding stock (Tallowin *et al.,* 2002). Such pastures are unsuitable for modern breeds of sheep, particularly lactating ewes, because of the low sodium and calcium content of the forage. However, cattle can be maintained in good condition with respectable weight gains if grazing on this grassland is alternated with access to better pasture (English Nature, 2004). Cattle are useful for grazing coarse vegetation and will consume all parts of the plant, including senescent material, leaves, stems and seed heads. They use their tongues to tear herbage and rely on a sward height above 4cm. Cattle will tolerate lower quality forages than sheep (like *Molinia*) because they have a longer retention time in the rumen and a higher intake relative to their metabolic rate, allowing them to compensate for low forage nutrient values by consuming more (Davies, 2009).

Galloway steers grazing the coarse grasses of mixed rush pasture and fen vegetation, at a stocking rate of 2 steers per hectare, on Woodwalton Fen

exhibited a liveweight gain of 0.85 kg/day during summer. Over the winter however, these animals showed little change in live weight, indicating that the vegetation was adequate for maintenance requirements only (Williams *et al.,* 1974).

Tallowin & Smith (1996) demonstrated that grazing store cattle (200-300 kg live weight) on lowland wet heaths and fen meadows, at high stocking rates for just one or two months in summer, achieved the conservation objective of enhancing botanical richness through controlling successional change and preventing dominance by *Molinia caerulea,* whilst limiting the time that productive livestock were subjected to mineral deficiencies. This also allowed the release of intensively managed grassland for production of higher quality silage. Indeed the improved UME of the silage compensated for the reduced output by the livestock whilst on the semi-natural grassland.

Upland wet heath can become dominated by *M. caerulea* under conditions of heavy grazing by sheep. A 4-year study examined the impacts of grazing with sheep only or sheep and cattle together. *M. caerulea* was found to increase under grazing by sheep alone and to decrease substantially under grazing by cattle and sheep together. At a stocking rate of 0.75 cows per ha for 10 weeks in summer, cow daily liveweight gains were adequate to regain body condition prior to calving, but these and ewe mating weights and lamb weaning weights were lower in paddocks with 1.5 than 0.66 ewes per ha. Ewe and lamb performance were similar in mixed and sheep-only paddocks at each ewe stocking rate. It was concluded that cows can be grazed with sheep to remove *M. caerulea* biomass without detriment to livestock performance (Critchley *et al.,* 2008).

Hay from the species-rich meadows of the peat soils on the Somerset Levels and some fens are at risk of sub-optimum potassium content if cutting is delayed until August or September. Dietary potassium is particularly important for young growing or lactating stock, so it would be wise to avoid feeding such hay to those animals (Tallowin, 1997).

3. Livestock production from Grasslands of Environmental Value

3.1 Grasslands as a Broad Habitat Group

An assortment of environmental conditions and management practices has resulted in a variety of grasslands throughout the UK. These can generally be categorised on the basis of their soil status and degree of management. Under agri-environmental schemes, a number of management prescriptions for grassland are recognised. These range from prescriptions that aim to maintain existing sward interest, to others that seek to return swards that have undergone some degree of 'improvement', to their previous semi-natural or unimproved condition. Grassland types considered here are unimproved acid grassland, unimproved limestone grassland, unimproved neutral grassland, semi-improved grassland and marshy grassland.

Unimproved grasslands are increasingly under threat from grassland improvement and many are now found in only small areas. They are characterised by having received relatively low inputs in terms of nutrient enrichment and therefore they retain a high number of species suited to low nutrient conditions. They may be of great age, and are frequently species-rich. The diversity of plant life that is frequently found in unimproved grasslands can be important for many species of invertebrates. For example, butterflies often feed on one species of nectar-bearing plant, but will require another species on which to lay eggs. Sward structure is equally important. Tall swards provide shelter for small mammals, such as mice and voles that are in turn, preyed upon by larger mammals and birds of prey. A number of declining species of bird, such as lapwing (*Vanellus vanellus),* snipe (*Gallinago gallinago)* and grey partridge (*Perdix perdix),* also breed in these types of grassland. Structure diversity is also important for many spider species.

Management of unimproved swards thus requires a sensitive management approach with species, stocking rate, stock type (adult, lactating, growing, etc.) and season all being important factors for consideration. Management prescriptions need to be site specific based on the species present and the specific environmental objective for the site. Because of this, there is very little in the literature on animal performance from unimproved swards. Stock usually only graze these sites for short periods at very low stocking rates.

Semi-improved grasslands are far more common. As the name implies they have received a relatively greater degree of improvement. This may be in the form of direct input of lime and/or inorganic and/or organic nutrients, increased grazing or mowing, drainage or previous reseeding with agricultural cultivars. Grasses tend to respond to high nutrient availability with more vigour than other plants, so the results of 'improvement' tend to be a shift in sward structure to a lower number of species of competitive, nutritious, agricultural grasses, which out compete other species. Under environmental schemes, Semi-improved grasslands are often managed to allow them to revert to unimproved grasslands. Often to accelerate the reversion requires a depletion of nutrients and this is best achieved by incorporating a cutting regime in the annual management cycle.

3.2 Unimproved Acid Grassland

Acid grasslands are the most widespread grassland type in the UK and make up part of the UK Habitat Action Plan (HAP) for 'Lowland unimproved acid grassland'. They tend to be nutrient poor, of low pH status, and form the bulk of rough grazing in more upland areas where they are inclined to exhibit relatively low species diversity. However, other acid grasslands, around the upland fringes and in more lowland areas, are species-rich. Acid grasslands often form complex botanical mosaics with other habitats, such as heath land, which in the absence of grazing, they may develop into.

Although some acid grasslands tend to be relatively floristically poor in terms of numbers and diversity of species, they do provide a habitat for a number of uncommon plants such as wood bitter-vetch (*Vicia orobus)* and mountain pansy (*Viola lutea)*. A number of invertebrate UK BAP priority species such as the butterflies, high brown fritillary (*Argynnis adipe)* and pearl-bordered fritillary (*Boloria euphrosyne),* also find a habitat on acid grassland/bracken mosaics. Bird species associated with acid grasslands include a characteristic group of birds such as whinchat (*Saxicola rubetra),* wheatear (*Oenanthe oenanthe)* and tree pipit (*Anthus trivialis)*, and a priority UK BAP species, skylark (*Alauda arvensis)*.

The specific environmental objectives for unimproved acid grassland are to maintain a lightly grazed sward in which species that are indicative of low nutrient, low pH status are favoured. Small-scale features including ant-hills, occasional scrub and small patches of bare ground are all valued as these are of benefit to a wide range of wildlife, especially insects and other invertebrates. Plants such as heath bedstraw, tormentil, sheep's sorrel and lousewort are encouraged. Species such perennial ryegrass, white clover and creeping thistle (*Cirsium arvense)* that are indicative of nutrient enrichment, are in turn discouraged. In addition, transition within the sward to less palatable grasses such as mat grass and bracken (*Pteridium aquilinum)* are to be avoided.

In order to achieve these objectives, grazing management needs to be at a level which avoids both over-grazing, which would lead to a loss of structural diversity and species, and under-grazing which could favour the spread of invasive grasses such as mat grass, or more competitive grasses such as fine leaved fescues and perennial ryegrass.

Grazing regimes should be site specific but would normally be based on low levels of sheep production at a maximum of 3 to 4 ewes per ha for up to 10 months of the year. These pastures would not support winter grazing, and provision of supplements should be avoided as they would lead to nutrient enhancement. During spring and early summer, these pastures would be suitable for grazing single-bearing ewes only, as sward composition would tend to be low in nutrient content and grasses would be prone to florescent growth. When matching stocking levels to herbage availability, the performance of single lambs to weaning can be perfectly acceptable without adverse weight loss in the ewe. However lamb finishing would need to be carried out on improved pastures and dry ewes would need to be given sufficient pasture to enable them to regain their previous tupping weight. Where unimproved acid grasslands are used for cattle, this is usually restricted to summer grazings to utilise an accumulated herbage mass. This

can be particularly useful where dry suckler cows are used to control mat grass or purple moorgrass, which has become unpalatable to sheep.

For sheep, continuous grazing is normally adopted but for cattle grazing, improved animal performance can be expected from block grazing, allowing animals to rotate around pastures ensuring sufficient sward height is maintained.

3.3 Unimproved Neutral Grassland

Neutral grasslands are characterised by species with a preference for loam soils of neutral pH. They are frequently species-rich and are also characterised by a high number of broadleaved herbs. As the soils on which neutral grasslands occur are inherently relatively fertile, most have been reseeded and lost.

The management prescription of 'unimproved neutral grassland' also often includes grasslands that are managed as hay-meadows. These are left ungrazed from spring, before being cut in mid- to late-summer. The practice of taking a hay cut encourages a characteristically diverse flora. This includes such species as, common knapweed, bird's foot trefoil, hawkbit (*Leontodon hispidus)* and meadow vetchling (*Lathyrus pratensis)*, and flowering hay-meadows are regarded by many as symbolising 'traditional countryside management'.

Although a number of vertebrate species that are subject to priority UK BAP's utilise neutral grassland, none are restricted to it. Similarly, priority UK BAP bird species that is associated with neutral grassland, such as skylark and linnet (*Carduelis cannabina)* are also found in other habitat types. However, several priority UK BAP invertebrate species are associated with neutral grasslands in England.

The environmental objectives for unimproved neutral grassland are to maintain a lightly grazed sward in which species that are indicative of low nutrient, moderate pH status are favoured. Small-scale features, including ant-hills, occasional scrub and small patches of bare ground are all valued as these are of benefit to a wide range of wildlife, especially insects and other invertebrates. Plants characteristic of unimproved neutral swards are encouraged whilst species that are indicative of nutrient enrichment such as perennial ryegrass, white clover and creeping thistle are discouraged. Management practices should also prevent encroachment within the sward of bracken and coarse grasses favoured by lack of grazing, such as cocksfoot (*Dactylus glomerata)* and false oat-grass (*Arrhenatherum elatius)*.

Potentially, neutral grasslands offer the greatest potential for livestock grazing. With moderate levels of pH, legumes such as clover and *Lotus spp.* can make a significant contribution to the sward allowing some nitrogen fixation. Where hay meadows are cut annually, some nutrient application (up to 12 t/ha of organic manure) is permitted. This maintains sward potash and phosphate levels and can subsequently maintain a reasonable level of production. The subsequent aftermath can provide a nutritious sward for finishing lambs, provided that stock numbers are kept low. Sward height is a particularly useful tool for adjusting stocking levels in these swards, and an aftermath sward height of about 6 cm is optimum for lamb growth.

Where hay cuts are not routinely practised, cattle are useful graziers of neutral grasslands. Under low nutrient conditions, grass species tend to flower earlier and hence swards deteriorate in digestibility much quicker. Cattle can compensate for this lower digestibility by increasing retention time in the rumen. In addition, cattle are less selective graziers and are thus less likely to selectively graze specific plant species, unless the species are concentrated in patches within the sward. Daily liveweight gains of cattle grazing neutral species-rich grassland can be comparable with expected average performance levels under improved grazing systems, provided stocking rates are appropriately adjusted. Total dry matter (DM) output can be expected to be only about 45% of improved grasslands, with herbage growth generally occurring over a much shorter period, mainly between April and September, because they have a considerably lower growth potential in the spring and early summer compared with agriculturally improved and /or fertilized grasslands.

The digestibility of some hays from species-rich neutral grasslands can also be 10 to 40% lower than from forages cut from improved grasslands and this needs to be taken into consideration in stock rationing. Winter feeding of hay outside from these pastures can however be a valuable method of distributing seed.

3.4 Unimproved Calcareous Grassland

Calcareous or Limestone grasslands, which develop on soils rich in calcium, tend to be of high pH, and typically exhibit a particularly rich sward, typically with 30-40 species/m^2 being recorded with many being very distinctive, habitat dependant species. They fall under the UK HAPs for 'Lowland calcareous grassland' and 'Upland calcareous grassland'.

In addition to their intrinsic species-richness, calcareous grasslands also provide a habitat for a number of rare plant species such as, hoary rockrose (*Helianthemum canum),* spiked speedwell (*Veronica spicata)* and juniper (*Juniperus communis)*, which are priority UK BAP species.

Calcareous grasslands are also rich in invertebrates many of which are priority BAP species, including scarce moths such as the silky wave (*Idaea dilutaria)* and chalk carpet (*Scotopteryx bipunctaria)*. Priority UK BAP bird species are also found in this habitat, including skylark and linnet.

Environmental objectives for unimproved calcareous grassland are to maintain a lightly grazed sward in which species that are indicative of low nutrient, high pH status are favoured. Small-scale features including ant-hills, occasional scrub and small patches of bare ground are all valued as these are of benefit to a wide range of wildlife, especially insects and other invertebrates. Wild thyme, bird's foot trefoil, and salad burnet (*Sanguisorbia minor)* are all examples of native plant species that are encouraged. Whereas, species such perennial ryegrass, white clover and creeping thistle are all indicative of nutrient enrichment, and are consequently discouraged.

The impact of grazing intensity on grassland structure and composition is of fundamental importance in calcareous grasslands. The unique grassland invertebrate and bird species, and species assemblages, will have very different structural requirements including sward height, density and amount of bare ground and litter. In addition, different plant species will have different

requirements for seed germination, flowering and seed dispersal. Actual grazing intensity required is therefore dependant on the species present. In addition, although both beef and sheep will be suitable for managing calcareous grasslands, the actual species used will depend on the specific nature conversation objectives set for the site. Generally, calcareous grasslands respond to light winter grazing, which can increase bare ground allowing seeds, particularly from annuals, to germinate. Early spring grazing also maintains areas of bare-ground and can check the growth and abundance of competitive herbaceous dicotyledons and grasses, allowing seedlings to compete. Grazing in the autumn also reduces competition from more vigorous plants and can help pass seeds through the digestive tract of animals, and subsequent trampling can help to incorporate seeds into the soil.

Because of the high number of important flowering plants in calcareous grasslands, it is often seen as environmentally beneficial to exclude grazing during the summer (particularly from mid-April to late-June) to allow seed to actually set. Swards can then be cut for hay, or grazed. If grazed, this is ideally using cattle, which are less selective and more efficient at removing biomass.

The high pH of calcareous grasslands can aggravate a number of trace element deficiencies including cobalt, manganese, zinc and copper. Whilst these deficiencies can be treated, this should not be done using supplements which could lead to nutrient enhancement. These nutrient deficiencies also make these swards less appropriate for grazing young animals. Even for adults, such as dry cows and weaned ewes, grazing periods are generally kept short to minimise health problems

3.5 Marshy Grassland

Marshy grasslands, which are subject to the UK HAP for 'Purple moor grass and rush pasture', occur in high rainfall areas on mineral or peaty mineral soils with impeded drainage. Typically, marshy grasslands are characterised by rush species (*Juncus* spp.) and purple moor grass. However, this description conceals the fact that the term 'marshy grassland', covers a range of vegetation communities, frequently forming complex vegetation mosaics. Marshy grasslands are widespread in England, where they are often utilised as rough grazing.

Along with the dominant and characteristic rush species, and purple moor grass, a number of declining and localised plants, such as whorled caraway (*Carum verticillatum)*, and wavy St.-John's wort (*Hypericum undulatum)*, occur on marshy grasslands. Likewise, the structural diversity, which is common to many marshy grasslands contributes to a diverse range of invertebrates. This includes the marsh fritillary butterfly, which has declined rapidly and now occurs in increasingly isolated populations. Typical birds associated with marshy grassland include, lapwing, snipe, both of which have suffered significant recent declines, and a priority UK BAP species, skylark.

The environmental objectives for marshy grasslands are focused on the maintenance of a soil type that favours plants that are adapted to damp conditions. The exact suite of plant species that are encouraged varies according site-specific conditions. For example, on lowland sites this will

include species such as, marsh lousewort (*Pedicularis palustris)*, devil's-bit scabious (*Succisa pratensis)*, lesser spearwort (*Ranunculus flammula)* and angelica (*Angelica sylvestris)*. Whereas, on damp upland soils cross-leaved heath (*Erica tetralix)*, tormentil and sedge (*Carex* spp.) are encouraged, purple moor grass, tufted hair-grass (*Deschampsia caespitosa)* and rush species (*Juncus spp.)* are all indicative of fertile soil conditions, and are consequently discouraged. As with other grasslands, the maintenance of small scale features including occasional scrub and small patches of bare ground is encouraged as being of value to a wide range of wildlife, especially insects and other invertebrates.

Overall productivity of marshy grasslands can be low at 2 to 3t DM/ha, however they can be particularly useful in summer droughts, providing much needed summer grazing. Where cattle utilise marsh grasslands, a continuous grazing system should be adopted to minimise stocking levels. Cattle should be moved in prolonged periods of wet weather and all grazing should be avoided during winter months when wet conditions can lead to poaching and damage to certain important sward species.

A typical grazing regime for marshy grassland would be an annual stocking rate not exceeding 0.75 livestock units(LU)/ha. The grassland would be grazed with ewes and lambs in early spring at about 8 ewes/ha. If the site is an important breeding area for ground nesting birds, grazing should either be removed or at best reduced to 4 ewes/ha during mid-May and mid-July. Swards can then be grazed with cattle, sheep or mixed species at up to 1.0 LU/ha until late November depending on the season.

Marshy grasslands can also contain a number of plant species that either contain toxins or produce allergic or hypersensitive responses. St John's wort for example will produce photosentitivity in lightly pigmented skins in cattle. Breeds including Charolais, Blonde D'Aquitaine, White Park and Belgium blue are particularly susceptible. Bog asphodel can produce photosensitisation in sheep. Horse tails contain the enzyme thiaminase which destroys vitamin B1 (thiamine) and sedges (*Carex spp.*), although generally unpalatable due to high silicate contents, contain cyanogenic glycosides. Yellow flag iris *(Iris pseudacorus)* can cause diarrhoea and haemorrhage even when leaves are eaten in hay and even rushes (*Juncus* spp.) can have high cyanide contents and have caused poisoning and partial blindness in cattle.

Prolonged exposure to wet conditions can also cause hoofs to soften and subsequently increases potential problems of lameness. In addition, it is imperative that sheep grazing marshy grasslands are free from footrot when put into wet habitats, as this painful disease will persist unless sheep are subsequently kept under dry conditions.

Wet conditions of marshy grasslands also favour the dwarf pond snail *(Lymnaea truncatula)* which is an intermediary host to liver fluke *(Fasciola hepatica)* which can affect both cattle and sheep. If present, dosing with an appropriate flukicide is required or livestock performance will either be impaired or, in severe cases, may lead to death.

3.6 Semi-Improved Grassland

By definition semi-improved grasslands have been subject to some degree of agricultural improvement. This may be in the form of a direct input of

fertilisers and/or lime, an increase in stocking density or previous reseeding with agricultural cultivars. This results in a reduction in sward diversity, as under high nutrient availability, competitive agricultural grasses are able to out compete other species. Consequently many semi-improved grasslands are relatively species-poor and management prescriptions are either targeted to reduce any further decline, or to convert semi-improved swards to unimproved.

The environmental objectives for semi-improved grasslands reflect those of unimproved grasslands. Consequently, emphasis is on the maintenance of a lightly grazed sward in which the value of small-scale features, such as ant-hills, occasional scrub and small patches of bare ground that are of benefit to a wide range of wildlife, especially insects and other invertebrates, are all valued. However, as the botanical composition of semi-improved grassland varies depending on soil type, the species of plants that are encouraged will be typical of either unimproved neutral, acid or limestone grasslands respectively. Nevertheless, in all cases, as with unimproved grassland types, species that are indicative of nutrient enrichment such as, perennial ryegrass, white clover and creeping thistle, are discouraged. As is, encroachment within the sward of bracken (*Pteridium aquilinum)* and coarse grasses favoured by lack of grazing such as, cocksfoot (*Dactylus glomerata)* and false oat-grass *Arrhenatherum elatius*.

Animal productivity is potentially improved over unimproved grasslands but where prescriptions are applied to revert semi-improved to unimproved, the management will often require cessation of all nutrient inputs and, where possible, a cutting treatment imposed to delete nutrients as rapidly as possible. This change in management will produce a rapid reduction in sward production as sown species decline. The precise management will be site-specific but production can fall by up to 50% in two years, and this will be reflected in stock carrying capacity. An important consideration for most semi-improved swards under conversion to unimproved is the creation of bare ground to allow seedlings to germinate, and this is best effected by grazing with cattle in the autumn followed by a very light grazing in spring to reduce competition from established species.

4.0 Summary of practical guidelines for producers to meet environmental objectives whilst achieving optimum levels of efficient grassland and livestock production

4.1 General Guidelines for unimproved grasslands

Grassland management for the greatest ecological benefit will usually inhibit optimum livestock production. Grazing unimproved grassland can make a valuable contribution to overall farm output if it is integrated sensitively into the whole farm management. Grazing unimproved or semi-improved land in summer can release better quality grassland for forage conservation. A mix of fields managed for their ecological value and fields managed for agricultural production, and judicious use of the two by livestock, will optimise potential benefits.

On improved grasslands ensure crop requirements for pH and nutrients, particularly phosphate and potash, but also sulphur, sodium and magnesium, are maintained for optimum response to nitrogenous fertilisers.

Where supplementary feeding is prohibited, only use the pasture for productive animals, such as growing stock or lactating stock, at times of maximum grass growth, such as early summer. Consider grazing ewes with single lambs only. At other times of the year, such pasture can be used for livestock that are not in a stage of high nutritional demand, such as drying off ewes or cows, those in early stages of pregnancy or barreners.

4.2 Acid Grassland

- Grazing management needs to avoid both over-grazing which would lead to a loss of structural diversity and species, and under-grazing which could favour the spread of invasive grasses, such as mat grass, or more competitive grasses, such as fine leaved fescues and perennial ryegrass.
- Grazing regimes should be site-specific but would normally be based on low levels of sheep production at a maximum of 3 to 4 ewes per ha for up to 10 months of the year.
- These pastures would not support winter grazing.
- Provision of supplements should be avoided as they would lead to nutrient enhancement.
- During spring and early summer, growth rates of single lambs to weaning can be perfectly acceptable.
- Cattle grazing is usually restricted to summer grazings at about 0.6 LU/ha to utilise an accumulated herbage mass.
- For sheep, continuous grazing is normally adopted, but for cattle grazing, improved animal performance can be expected from block grazing
- Long, coarse tussocky pasture can harbour ticks. Care should be taken to examine sheep for ticks and administer treatment as necessary to avoid risk of tick-borne diseases.

4.3 Neutral Grassland

- The environmental objectives for unimproved neutral grassland are to maintain a lightly grazed sward in which species that are indicative of low nutrient, moderate pH status are favoured.
- Potentially, neutral grasslands offer the greatest potential for livestock grazing, as moderate levels of pH may allow legumes to make a significant contribution to the sward allowing some nitrogen fixation.
- Total DM output from neutral grasslands can be expected to be only about 45% of improved grasslands, with DM production generally occurring between April and September.
- Where hay is cut annually, the subsequent aftermath can provide grazing for finishing lambs provided a sward height of about 6 cm is maintained.
- Where hay cuts are not routinely practised, cattle are useful graziers of neutral grasslands, being able to compensate for lower digestibility vegetation by increasing retention time in the rumen.
- Cattle are less selective graziers and are thus less likely to selectively graze specific plant species.
- Daily liveweight gains of cattle grazing neutral species-rich grassland can be comparable with expected average performance levels under improved grazing systems, provided stocking rates are appropriately adjusted.
- The digestibility of some hays from neutral grasslands is often 10 to 40% lower than forages cut from intensively managed grasslands. This needs to be taken into consideration when feeding.
- Winter feeding of hay outside (made from these pastures) can be a valuable method of distributing seed.

4.4 Calcareous Grassland

- Environmental objectives for unimproved calcareous grassland are to maintain a lightly grazed sward which favours species that are indicative of low nutrient and high pH status.
- Actual grazing intensity required is dependant on the species present and can impact on both grassland structure and composition.
- Light winter grazing which can increase bare ground allowing seeds, particularly from annuals, to germinate.
- Early spring grazing maintains areas of bare-ground and can check the growth and abundance of competitive herbaceous dicotyledons and grasses allowing seedlings to compete.
- Grazing in the autumn reduces competition from more vigorous plants, helps pass seeds through the digestive tract and trampling can help to incorporate seeds into the soil.
- Excluding grazing from mid-April to late-June will help annual flowering plants to set seed and help ground-nesting birds.
- The high pH of calcareous grasslands can aggravate a number of trace element deficiencies including cobalt, manganese, zinc and copper.
- Nutrient deficiencies make these swards inappropriate for young animals.
- Even for adults, such as dry cows and weaned ewes, grazing periods are generally kept short to minimise health problems.

4.5 Marshy Grassland

- The environmental objectives for marshy grasslands are focused on the maintenance of a soil type that favours plants that are adapted to damp conditions.
- Overall productivity can be low at 2 to 3 t DM/ha.
- A continuous grazing system should be adopted to minimise stocking levels at any one time.
- Cattle should be moved in prolonged periods of wet weather and all grazing should be avoided during winter months when wet conditions can lead to poaching and damage to certain important sward species.
- A typical grazing regime would be an annual stocking rate not exceeding 0.75 LU/ha.
- Prolonged exposure to wet conditions can cause hooves to soften and subsequently increases potential problems of lameness.
- Wet grassland can harbour fluke and it is important to remain alert for signs of ill-thrift.
- Marshy grasslands can contain a number of plant species that either contain toxins or produce allergic or hypersensitive responses and stock should be inspected regularly for signs of ill-health.
- In a period of drought, an area of wet, unimproved pasture may provide the best grass on the farm, so it is worth looking after.

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6.0 Appendices

6.1 Appendix 1

Grassland management prescriptions and payment rates available under ELS

EK2 Permanent grassland with low inputs outside the SDA (of the LFA) and the Moorland Line

Permanent grassland managed with low inputs of fertiliser and sprays will sustain a greater variety of plants and wildlife. The development of a varied sward structure is of particular value to insects. Permanent grassland is an important feature of riparian and pastoral landscapes and can help to protect buried archaeological features. This option may deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off.

This option can be used on a whole- or part-field basis.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, but do not cut between 1 April and 31 May. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed or shut up for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm, to allow plants to flower and to provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 31 May.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- Do not apply more than 50 kg/ha nitrogen per year as inorganic fertiliser. Where animal manures are applied, either alone or in addition to inorganic fertiliser, the total rate of nitrogen must not exceed 100 kg/ha N per year.
- Only apply during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. If your current manure and fertiliser application rates are less than this, you must not increase applications.
- You may continue adding lime, where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EK2: 85 points per ha.

EK3 Permanent grassland with very low inputs outside the SDA (of the LFA) and the Moorland Line

Grassland managed with no fertiliser has a higher value for wildlife. Much species rich grassland has been lost to agricultural intensification, so it is important to maintain and, where possible, increase this resource. This option may also deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. It can be used on a whole- or part-field basis. If your field has more than a third of its area covered by rushes, it must be entered into option EK4, rather than this option.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, to remove the year's grass growth, but do not cut between 1 April and 30 June. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed or shut up for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm to allow plants to flower and provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut.
- Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You may continue adding lime where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spearthistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EK3: 150 points per ha.

EK4 Management of rush pastures outside the SDA (of the LFA) and the Moorland Line

This option is available for fields where at least a third of the field area is covered by rushes. Damp pasture on farmland is a very important potential habitat for lapwing, curlew, redshank, snipe and reed bunting. Different types of waders like different vegetation heights, so a variety in the sward structure is most beneficial. Rush pastures may also contain a wide range of plant and invertebrate species.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Cut rush-dominated fields each calendar year, but not between 15 March and 1 August. Cut no more than third of the area of rushes in each field (or a third of the fields if they are small) in rotation. It may be impractical to cut rushes in the wettest flushes, and therefore these can be left. Cattle trampling may help to control these areas.
- Once cut, if aftermath grazing does not control rushes, a second cut should be carried out within 8 weeks, but not between 1 April and 1 August.
- Where possible, graze the aftermath with cattle.
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut.
- Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You may continue adding lime where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EK4: 150 points per ha over the whole field.

EK5 Mixed stocking

This option, previously only available outside the LFAs, has been extended and is now available on eligible parcels both outside and inside the LFAs. The decline of mixed stocking is one of the underlying causes of the reduction in numbers of several important farmland bird species. Mixed stocking encourages a diversity of sward structure and plant and invertebrate species, which in turn can be beneficial to a variety of ecological and historic features. It also contributes to the distinctive colour and patterning of local landscapes through mixed grazing systems. This option is only available on land that is grazed by both cattle and sheep, either in the same year or in alternate years, as part of a clean grazing system. Livestock Units (LUs) are calculated over a 2-year period.

Animal numbers converted into Livestock Units (LUs)

Dairy cow	1.0
Beef cow	1.0
Cattle over 2 years old	0.7
Cattle 6 months to 2 years	0.6
Lowland ewe and lamb	0.12
Hill ewe	0.08
Ram and teg over 6 months	0.15
Ewe follower and/or store lamb	0.08
Horse	1.0
Pony	0.8

For this option you must comply with the following:

- A minimum of 30 per cent of the LUs must be grazing cattle.
- A minimum of 15 per cent of the LUs must be grazing sheep.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.

You may not wish to graze both types of livestock in the same year. For this reason, the percentage of cattle and sheep LUs grazing the land is calculated over a 2-year period. This allows you either to graze both types of livestock on the land parcel in the same year or to graze each type in alternate years.

If you choose to graze them on the land in alternate years, at least 60 per cent of the LUs on the land parcel must be cattle in one year and at least 30 per cent must be sheep in the other. The remaining 40/70 per cent of the LUs can be made up of the same types of livestock or other types of livestock, such as horses or domesticated deer. Records are not required, but would be useful if you are inspected. These values are for medium-sized breeds. Large breeds will have approximately 20 per cent higher LU values, and small breeds will be approximately 20 per cent lower, for each category. Other grazing ruminants, such as deer or camelids, should be allocated an LU value in proportion to their liveweight, ie 60 kg animal approximately = 0.1 LU.

EK5: 9 points per ha.

EL2 Permanent grassland with low inputs (SDA land, excluding parcels within the Moorland Line)

This option is only available on land within the SDA but outside the Moorland Line.

Permanent grassland managed with low inputs of fertiliser and sprays will sustain a greater variety of plants and wildlife. The development of a varied sward structure is of particular value to insects. Permanent grassland is an important feature of pastoral landscapes and can help to protect buried archaeological features. This option may deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. This option can be used on a whole or part-field basis.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, but do not cut between 1 April and 31 May.
- Maintain a sward with a range of heights during the growing season, except when the field is closed or shut upfor a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm, to allow plants to flower and to provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 31 May.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- Do not apply more than 50 kg/ha nitrogen per year as inorganic fertiliser. Where animal manures are applied, either alone or in addition to inorganic fertiliser, the total rate of nitrogen must not exceed 100 kg/ha N per year. Only apply during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. If your current manure and fertiliser regime is less than this, you must not increase applications. You may continue adding lime where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EL2: 35 points per ha.

EL3 Permanent grassland with very low inputs (SDA land, excluding parcels within the Moorland Line)

This option is only available on land within the SDA but outside the Moorland Line.

Permanent grassland managed with no fertiliser has a higher value for wildlife. Much species-rich grassland has been lost to agricultural intensification and it is important to maintain and, where possible, increase this resource. This option may also deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. This option can be used on a whole- or part-field basis. If your field has more than a third of its area covered by rushes, it must be entered into option EL4, rather than this option.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, to remove each year's grass growth, but do not cut between 1 April and 30 June. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed, or shut up, for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm to allow plants to flower and to provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut.
- Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You may continue adding lime, where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EL3: 60 points per ha.

EL4 Management of rush pastures (SDA land within the LFA and Moorland Line parcels under 15 ha)

This option is available within the SDA and on parcels of less than 15 ha within the Moorland Line. This option is available for fields where at least a third of the field area is covered by rushes. Damp pasture on farmland is a very important potential habitat for lapwing, curlew, redshank and snipe. Different types of waders prefer different vegetation heights, so a variety in the sward structure is most beneficial. Rush pastures may also contain a wide range of plant and invertebrate species.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Cut rush-dominated fields each year, but not between 1 April and 1 August. Cut no more than a third of the area of rushes in each field, or a third of the fields if they are small (ie less than 3 ha), in rotation. It may be impractical to cut rushes in the wettest flushes, and therefore these can be left. Cattle trampling may help to control these areas.
- Once cut, if aftermath grazing does not control rushes, a second cut should be carried out within 8 weeks, but not between 1 April and 1 August.
- Where possible, graze the aftermath with cattle.
- Do not harrow or roll between 1 April and 30 June.
- Supplementary feeding is allowed, but move feeders as often as required to avoid excessive poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut. Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You may continue adding lime, where this is your regular practice.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed).

EL4: 60 points per ha.

EL5 Enclosed rough grazing (SDA land within the LFA and Moorland Line parcels under 15 ha)

This option is available within the SDA and on parcels of less than 15 ha within the Moorland Line.

Commonly known as 'allotments', 'intakes' or 'newtakes', these are areas of enclosed rough land of less than 15 ha used exclusively for grazing, of which the majority has not been drained, re-seeded or regularly cultivated. They have received only minimal applications of fertiliser, lime, slag or pesticides. They will contain predominantly seminatural vegetation, usually of moorland grasses and rushes, and sometimes rocky and very wet areas. They may also contain small areas of agriculturally improved land.

For this option you must comply with the following:

- Do not plough, cultivate or reseed.
- Protect permanently waterlogged wetlands, including peat bogs and other mires, and hillside flushes. Do not install any new land drainage or modify any existing land drainage, or remove any peat or sediment.
- Leave rocks, scree and mineral spoil in place.
- Do not increase your existing stocking level.
- Do not supplementary feed.
- Do not apply fertiliser, manure, lime or slag.
- Take action to contain bracken, rhododendron, gorse or similar infestation so that they do not spread to new areas of land, where this is within your control. Wherever possible, control of bracken should be by mechanical means, otherwise, to chemically control bracken, only asulam may be used, and care must be taken not to apply it to other ferns. For common gorse, control should be by cutting or burning in manageable blocks. If the land is in a water catchment area or scheduled monument, you must seek consent from the appropriate authority.
- Rhododendron and other invasive alien species must be cut and the stumps treated immediately with herbicide to prevent spread to new areas of land, where this is within your control. At least one follow-up treatment will be required in subsequent years to control re-growth.
- Only apply herbicides to spot-treat or weed-wipe for the control of injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).

EL5: 35 points per ha.

5.2 Appendix 2

Grassland management prescriptions and payment rates available under OELS

OK2 Permanent grassland with low inputs outside the SDA (of the LFA) and the Moorland Line

Permanent grassland managed with low inputs of fertiliser and sprays will sustain a greater variety of plants and wildlife. The development of a varied sward structure is of particular value to insects. Permanent grassland is an important feature of riparian and pastoral landscapes, and can help to protect buried archaeological features. This option may deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. This option can be used on a whole- or part-field basis.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed
- Manage by grazing and/or cutting but do not cut between 1 April and 31 May. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed, or shut up, for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm to allow plants to flower and to provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 31 May.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut.
- Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Control injurious weeds (ie creeping and spear field thistles, curled broad-leaved docks and common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) by cultivation before establishment, by cutting in the first year and by selective trimming or manual removal thereafter.

OK2: 115 points per ha.

OK3 Permanent grassland with very low inputs outside the SDA (of the LFA) and the Moorland Line

Grassland managed with no fertiliser has a higher value for wildlife. Much species rich grassland has been lost to agricultural intensification, so it is important to maintain and, where possible, increase this resource. This option may also deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. It can be used on a whole- or part-field basis. If your field has more than a third of its area covered by rushes, it must be entered into option OK4 rather than this option.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, to remove the year's grass growth, but do not cut between 1 April and 30 June. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed, or shut up,for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm, to allow plants to flower and provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds.
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut. Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks and common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) by cultivation before establishment, by cutting in the first year and by selective trimming or manual removal thereafter.

OK3: 180 points per ha.

OK4 Management of rush pastures outside the SDA (of the LFA) and the Moorland Line

This option is available for fields where at least a third of the field area is covered by rushes. Damp pasture on farmland is a very important potential habitat for lapwing, curlew, redshank, snipe and reed bunting. Different types

of waders like different vegetation heights, so a variety in the sward structure is most beneficial. Rush pastures may also contain a wide range of plant and invertebrate species.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Cut rush-dominated fields each calendar year, but not between 15 March and 1 August. Cut no more than a third of the area of rushes in each field (or a third of the fields if they are small) in rotation. It may be impractical to cut rushes in the wettest flushes, and therefore these can be left. Cattle trampling may help to control these areas.
- Once cut, if aftermath grazing does not control rushes, a second cut should be carried out within 8 weeks, but not between 1 April and 1 August.
- Where possible, graze the aftermath with cattle.
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut. Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks and common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) by cultivation before establishment, by cutting in the first year and by selective trimming or manual removal thereafter.

OK4: 180 points per ha over the whole field.

OK5 Mixed stocking

This option, previously only available outside the LFAs, has been extended and is now available on eligible parcels both outside and inside the LFAs. The decline of mixed stocking is one of the underlying causes of the reduction in numbers of several important farmland bird species. Mixed stocking encourages a diversity of sward structure and plant and invertebrate species, which in turn can be beneficial to a variety of ecological and historic features. It also contributes to the distinctive colour and patterning of local landscapes through mixed grazing systems. This option is only available on land that is grazed by both cattle and sheep, either in the same year or in alternate years, as part of a clean grazing system. Livestock Units (LUs) are calculated over a 2-year period.

For this option you must comply with the following:

- A minimum of 30 per cent of the LUs must be grazing cattle.
- A minimum of 15 per cent of the LUs must be grazing sheep.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.

You may not wish to graze both types of livestock in the same year. For this reason, the percentage of cattle and sheep LUs grazing the land is calculated over a 2-year period. This allows you either to graze both types of livestock on the land parcel in the same year or to graze each type in alternate years. If you choose to graze them on the land in alternate years, at least 60 per cent of the livestock units on the land parcel must be cattle in one year and at least 30 per cent must be sheep in the other. The remaining 40/70 per cent of the livestock units can be made up of the same, or other types of livestock, such as horses or domesticated deer. Records are not required but would be useful if you are inspected. These values are for medium-sized breeds. Large breeds will have approximately 20 per cent higher LU values and small breeds will be approximately 20 per cent lower, for each category. Other grazing ruminants, such as deer or camelids, should be allocated an LU value in proportion to their liveweight, ie 60 kg animal approximately = 0.1 LU.

OK5: 9 points per ha.

OL2 Permanent grassland with low inputs (SDA land, excluding parcels within the Moorland Line)

This option is only available on land within the SDA but outside the Moorland Line.

Permanent grassland managed with low inputs of fertiliser and sprays will sustain a greater variety of plants and wildlife. The development of a varied sward structure is of particular value to insects. Permanent grassland is an important feature of pastoral landscapes and can help to protect buried archaeological features. This option may deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. This option can be used on a whole- or part-field basis.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, but do not cut between 1 April and 31 May.
- Maintain a sward with a range of heights during the growing season, except when the field is closed or shut up, for a cut of hay or silage. At least 20 per cent of the sward should be less than 7 cm and at least 20 per cent should be more than 7 cm, to allow plants to flower and to provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 31 May.
- Supplementary feeding is allowed, but move feeders as often as required to avoid poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut. Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Control injurious weeds (eg creeping and spear thistles, curled and broad-leaved docks and common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) by cultivation before establishment, by cutting in the first year and by selective trimming or manual removal thereafter.

OL2: 35 points per ha.

OL3 Permanent grassland with very low inputs (SDA land, excluding parcels within the Moorland Line)

This option is only available on land within the SDA but outside the Moorland Line.

Permanent grassland managed with no fertiliser has a higher value for wildlife. Much species-rich grassland has been lost to agricultural intensification and it is important to maintain and, where possible, increase this resource. This option may also deliver benefits to resource protection where placed on fields that are at risk of soil erosion or run-off. This option can be used on a whole- or part-field basis. If your field has more than a third of its area covered by rushes, it must be entered into option OL4, rather than this option.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Manage by grazing and/or cutting, to remove the year's grass growth, but do not cut between 1 April and 30 June. You must remove any cuttings.
- Maintain a sward with a range of heights during the growing season, except when the field is closed, or shut up, for a cut of hay or silage. At least 20 per cent of the sward should be less than 7cm and at least 20 per cent should be more than 7 cm to allow plants to flower and provide a more varied habitat.
- Do not top at any time, except in patches to control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks or common ragwort).
- Do not harrow or roll between 1 April and 30 June.
- Do not supplementary feed.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut. Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks, or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) may be controlled by selective trimming or manual removal.

OL3: 60 points per ha.

OL4 Management of rush pastures (SDA land within the LFA and Moorland Line parcels under 15 ha)

This option is available within the SDA and on parcels of less than 15 ha within the Moorland Line.

This option is available for fields where at least a third of the field area is covered by rushes. Damp pasture on farmland is a very important potential habitat for lapwing, curlew, redshank and snipe Different types of waders prefer different vegetation heights, so a variety in the sward structure is most beneficial. Rush pastures may also contain a wide range of plant and invertebrate species.

For this option you must comply with the following:

- Maintain as grass. Do not plough, cultivate or re-seed.
- Cut rush-dominated fields each year, but not between 1 April and 1 August. Cut no more than a third of the area of rushes in each field, or a third of the fields if they are small (ie less than 3 ha) in rotation. It may be impractical to cut rushes in the wettest flushes, and therefore these can be left. Cattle trampling may help to control these areas.
- Once cut, if aftermath grazing does not control rushes, a second cut should be carried out within 8 weeks, but not between 1 April and 1 August. Where possible, graze the aftermath with cattle.
- Do not harrow or roll between 1 April and 30 June.
- Supplementary feeding is allowed, but move feeders as often as required to avoid excessive poaching. Do not feed on or next to archaeological sites, steep slopes, footpaths or watercourses.
- You may apply up to 12.5 tonnes/ha (5 tonnes/acre) of FYM a year, but only where the grassland is regularly cut.
- Only apply FYM during the growing season, provided no birds are nesting in the field, and ground conditions are dry enough to prevent soil compaction. No other type of fertiliser or manure may be applied. If your current manure and fertiliser regime is less than this, you must not increase applications.
- You can only apply lime with the consent of your inspection body. They must be consulted and a need must be demonstrated.
- Injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks, or common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) may be controlled by selective trimming or manual removal.

OL4: 60 points per ha.

OL5 Enclosed rough grazing (SDA land within the LFA and Moorland Line parcels under 15 ha)

This option is available within the SDA and on parcels of less than 15 ha within the Moorland Line.

Commonly known as 'allotments', 'intakes' or 'newtakes', these are areas of enclosed rough land of less than 15 ha used exclusively for grazing, of which the majority has not been drained, re-seeded or regularly cultivated. They have received only minimal applications of fertiliser, lime, slag or pesticides. They will contain predominantly semi-natural vegetation, usually of moorland grasses and rushes, and sometimes rocky and very wet areas. They may also contain small areas of agriculturally improved land.

For this option you must comply with the following:

- Do not plough, cultivate or reseed.
- Protect permanently waterlogged wetlands, including peat bogs and other mires, and hillside flushes. Do not install any new land drainage or modify any existing land drainage, or remove any peat or sediment.
- Leave rocks, scree and mineral spoil in place.
- Do not increase your existing stocking level.
- Do not supplementary feed.
- Do not apply fertiliser, manure, lime or slag.
- Take action to contain bracken, rhododendron, gorse or similar infestation so that they do not spread to new areas of land, where this is within your control. For common gorse, control should be by cutting or burning in manageable blocks. If the land is in a water catchment area or scheduled monument, you must seek consent from the appropriate authority.
- Rhododendron and other invasive alien species must be cut to prevent spread to new areas of land, where this is within your control.
- Control injurious weeds (ie creeping and spear thistles, curled and broad-leaved docks and common ragwort) or invasive alien species (eg Himalayan balsam, rhododendron or Japanese knotweed) may be controlled by selective trimming or manual removal.

OL5: 35 points per ha.

Appendix 3 Grassland management prescriptions and payment rates available under HLS

Species-rich, semi-natural grassland

Unimproved hay meadows and pastures are important to the character of locally distinctive pastoral or mixed farming landscapes. They support distinctive mixes of grasses and wildflowers that reflect acidic, neutral or calcareous soil conditions, often contain uncommon species such as orchids, and are also valuable for butterflies and other invertebrates. These grasslands are a precious but threatened habitat. Fragments survive in areas that have not been re-seeded, drained or heavily fertilised and therefore often contain some of our best preserved archaeology. Active management of these habitats will maintain their value for wildlife, contribute to the protection of valued landscapes and archaeology and promote good soil conditions.

You will need to submit evidence of current soil pH and nutrient status with your application when proposing the creation or restoration of species-rich grassland. Results that are up to 3 years old are acceptable.

HK6 Maintenance of species-rich, semi-natural grassland

This option is aimed at maintaining grasslands that are already species-rich and in good condition by continuing, or making adjustments to, the current management.

Management must include:

- grazing and/or cutting for hay;
- no ploughing, re-seeding, or installation of new drainage; and
- no heavy poaching.

Other management, including use of organic manures and supplementary feeding, will be tailored to each site based on the type of grassland and the farming system.

This option can be located on the same land as ELS or OELS option K5 without reducing your HLS payment, and on ELS or OELS options K2, K3, K4, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK7 Restoration of species-rich, semi-natural grassland

This option is used for restoring grasslands that were species-rich in the past, but have suffered from management neglect or have been agriculturally improved. Grasslands that are suitable for this option may still have some diversity of grasses and flowers. Potential for this option will also depend on soil type, pH and soil nutrient status (particularly the amount of available phosphorus).

This option will be managed as option HK6, but restoration may include scrub clearance, invasive weed control and/or seed introduction by an agreed method – such as spreading species-rich green hay from a suitable nearby site.

This option can be located on the same land as ELS or OELS options D5 and K5 without reducing your HLS payment, and on ELS or OELS options K2, K3, K4, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK8 Creation of species-rich, semi-natural grassland

This option is aimed at creating species-rich grassland on former arable land, ley grassland or set-aside. The creation of species-rich grassland is very demanding and will be feasible only in a few situations. Potential for this option will depend on soil type, pH, soil nutrient status (particularly the amount of available phosphorus). This option will normally be targeted at sites close to existing species-rich grassland. Creation of a species-rich grassland will include establishing the sward by natural regeneration or using a seed source or mixture recommended by your Natural England adviser. The sward will need to be cut or grazed in the first year to encourage the grasses to tiller and to control annual weeds. Once established, management will be the same as for HK6.

This option can be located on the same land as ELS or OELS option K5 without reducing your HLS payment.

Management of wet grassland for waders and wildfowl

Wet grasslands are important and distinctive components of the coastal and river flood plain landscape. Well managed wet grasslands provide wintering and/or breeding habitat for wading birds and wildfowl. Winter flooding that creates islands of damp grassland surrounded by shallow surface water (up to knee-deep) provides secure feeding and roosting sites for wildfowl and waders. In addition, it will enhance the grassland habitat for wetland plants and may, in the right situation, provide an area of flood containment. The shallow flooding concentrates seeds and invertebrates that can attract large numbers of ducks, geese, swans and lapwing and other wading birds.

Breeding waders such as snipe, redshank, curlew and lapwing need damp soil conditions, with some areas of very shallow standing water in the spring and early summer, to provide an abundant supply of insect food for their chicks. Larger, open areas are generally preferred by waders and wildfowl, so scrub control may be necessary.

These options will be almost entirely located in the lowland river valleys, in areas where surface water can be controlled. In most situations, Environment Agency consent and/or a management plan will also be required.

A range of capital items such as sluices, bunds, scrapes and ditch restoration can be funded by a CWP.

HK9 Maintenance of wet grassland for breeding waders

This option is used for maintaining wet spring and summer grasslands that already provide suitable habitat for breeding waders. In some instances it may be necessary to change the water management regime to continue to attract these birds. In addition, these grasslands may, in the right situation, provide an area of flood containment and some benefits to flood risk management.

Management includes:

- controlling in-field and ditch water levels in the spring and early summer;
- maintaining ditches and existing field drainage systems;
- creating a varied sward structure by the end of the growing season by grazing and/or taking a late hay cut;
- restricting the stocking density in the bird-nesting season;
- avoiding heavy poaching (although small areas of bare ground are acceptable); and avoiding disturbance of birds by recreational or non-essential activities.

This option can be located on the same land as ELS or OELS options D5 and K5 without reducing your HLS payment, and ELS or OELS options B6, B7, K2, K3, K4, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK10 Maintenance of wet grassland for wintering waders and wildfowl

This option is used for maintaining wet grasslands that already provide suitable habitat for wintering populations of wildfowl and waders. In some instances, it may be necessary to change the water management regime to continue to attract these birds. In addition, these grasslands may, in the right situation, provide an area of flood containment and some benefits to flood risk management.

Management includes:

- controlling in-field and ditch water levels over the winter months;
- maintaining ditches and existing field drainage systems;
- creating a varied sward structure by the end of the growing season through grazing and/or cutting for hay;
- no grazing over the winter months;
- no heavy poaching (although small areas of bare ground are acceptable); and
- avoiding disturbance of birds by recreational or non-essential activities.

This option can be located on the same land as ELS or OELS options D5 and K5 without reducing your HLS payment, and ELS or OELS options B6, B7, K2, K3, K4, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK11 Restoration of wet grassland for breeding waders

HK12 Restoration of wet grassland for wintering waders and wildfowl

These options aim to provide suitable habitat for waders and wildfowl and/or breeding habitat for wading birds by re-wetting permanent grassland and by managing the grazing to create a mosaic of grass structure. These fields will

have been wetter in the past but have since been drained or improved for agriculture. The potential for this option will depend on both the availability of surface water and the ability to control it. In addition, these grasslands may,

in the right situation, provide an area of flood containment and some benefits to flood risk management.

Fields under this option will be managed as HK9 or HK10, but for restoration of wet grassland you may need to:

- alleviate any areas of soil compaction (except on archaeological features);
- implement a water management regime; and
- excavate scrapes and re-profile ditches.

These options can be located on the same land as ELS or OELS options D5 and K5 without reducing your HLS payment, and ELS or OELS options B6, B7, K2, K3, K4, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK13 Creation of wet grassland for breeding waders

HK14 Creation of wet grassland for wintering waders and wildfowl

These options are used to create wet grassland habitat for breeding waders in the spring and summer and waders and wildfowl in the winter months. Fields suitable for these options are current arable land or temporary grassland.

These fields will have been wetter in the past but have since been drained and improved for agriculture. The potential for this option will depend on both the availability of surface water and the ability to control it. In addition, these grasslands may, in the right situation, provide an area of flood containment and some benefits to flood risk management.

Fields under this option will be managed as HK9 or HK10, but additional management for the creation of the wet grassland habitat includes:

- establishing a grass sward by natural regeneration or by sowing a seed mixture recommended by your Natural England adviser;
- alleviating areas of soil compaction;
- implementing water-level management;
- restoring the ditch network; and
- excavating scrapes and ponds.

These options can be located on the same land as ELS or OELS option K5 without reducing your HLS payment, and ELS or OELS options B6 and B7 but with a reduction of your HLS payment.

Management of grassland for target features

These options are used to manage grassland for target features such as great crested newt, chough, cirl bunting or buried archaeology, as well as particular groups of species such as scarce bumblebees and ground-nesting farmland birds. The FEP will contain records of target features that would benefit from management under options HK15–HK17. These options may also be used to link, buffer and extend existing sites of high wildlife value, where the management will be specifically tailored to the features found on the high-value site. They may also be used, at the discretion of your Natural England adviser, to protect other grassland types identified through local targeting, such as enclosed upland grassland priority habitats; local variants of priority habitats; habitat mosaics or good quality semi-improved grassland where there is low potential for restoration to species-rich grassland.

Within the LFA, the upland options HL7 and HL8 (Maintenance/Restoration of rough grazing for birds) may be more appropriate for ground-nesting birds.

HK15 Maintenance of grassland for target features

HK16 Restoration of grassland for target features

These options will maintain or restore semi-improved or rough grassland, which is known to provide good conditions for target species and other features. These options can also be used to maintain moderately species-rich, semi-improved and enclosed unimproved grassland, but only where this is a local target and where the grassland lacks the potential to be restored to species-rich, semi-natural grassland (option HK7).

Management must include grazing and/or cutting for hay. Other management, including fertiliser and supplementary feeding, will be tailored to each site based on the target species present.

These options can be located on the same land as ELS or OELS options D5 and K5 without reducing your HLS payment, and ELS or OELS options K2, L2, L3, L4 and L5 but with a reduction of your HLS payment.

HK17 Creation of grassland for target features

This option is used to create semi-improved or rough grassland on former arable, set-aside or temporary grassland.

Fields under this option will be managed in the same way as for option HK15, but creation of the grassland will include establishing a grassy sward through natural regeneration or by sowing a seed mixture recommended by your Natural England adviser.

This option can be located on the same land as ELS or OELS option K5 without reducing your HLS payment.

Supplements

HK18 Haymaking supplement

This supplement is not intended for all fields that are cut for hay. It is available, at the discretion of your Natural England adviser, on meadows of high existing or potential value. These sites will typically be in pastoral areaswhere the ready availability of livestock and/or the climatic difficulty of haymaking mean they would otherwise be grazed and not cut.

This supplement is suitable for use with options HK6 to HK8, HK15 to HK17 and HD10 and HD11. Providing one of these main land management options is in place, and all eligibility criteria are met, it may also be used on the samesites as other supplements, such as the HR6 supplement for small fields.

Haymaking encourages botanical diversity by allowing flowers to set seed.

HK19 Raised water levels supplement

This supplement supports the raising of water levels in ditches and adjacent land, where exceptional and time consuming management is needed at key periods of the year. This supplement may be used to provide feeding and nesting habitats for wetland birds. In addition, it will enhance the grassland habitat for wetland plants and may, in the right situation, provide an area of flood containment. This supplement can also be used to manage specialised wet grassland communities or to maintain the diversity of fauna and flora in important ditches.

The supplement is available on options HK6 to HK18. HK9 to HK14 are eligible for this supplement, but only in exceptional circumstances where specific management is required to raise water levels. The payments for HK9 to HK14 include an element for raised water-level management, so applicants will need to provide evidence to show that extra effort is needed to raise levels.

HQ13 Inundation grassland supplement

This supplement is designed to allow the inundation of areas of the river flood plain that are currently protected by flood defence banks. Grassland that is made available for additional inundation by floodwater can develop as a valuable habitat, complement adjacent habitats and, in appropriate locations, contribute to flood management. The supplement is used in designated washlands subject to prolonged and random flooding. It should be used in sites identified through local Environment Agency flood management strategies.

This supplement is only available on options HK10, HK12 and HK14 to HK17 where there are not significant numbers of breeding waders using the site. The site, either alone or as part of a group application, should form a natural hydrological unit, and there should be no significant negative impact on other valuable features.

HR1 Cattle grazing supplement

This supplement promotes grazing by cattle where this is likely to be beneficial in meeting environmental objectives.

Cattle grazing produces a more varied sward structure than sheep grazing and is often better for diversity of plants, invertebrates and birds. In addition, mature cattle are often more suitable for grazing fibrous herbage of low digestibility, trampling bracken, controlling scrub and grazing wet habitats. Cattle treading creates patches of bare soil where new plants can establish themselves, but it can also damage the soil unless it is well managed.

You can use this supplement with options HC12 to HC21, HD7 to HD8, HD10 to HD11, HJ3 to HJ8, HK6 to HK17, HL7 to HL11, HO1 to HO5, HP1 to HP10, HQ6 to HQ10, HQ13, HR2 to HR8, HD4 to HD5 and OHD4 to OHD5.

The number and breed of cattle and the way in which they are managed must be suitable for meeting the objectives of the option(s) to which the supplement is added. Cattle must normally be the main grazing animal in any parcel or part-parcel for the period during which cattle grazing is required under this supplement. If the cattle also meet the eligibility requirements for HR2, the two supplements can be used on the same parcel providing their combined payment rate does not exceed the maximum payment rate for HR2.

HR2 Native breeds at risk grazing supplement

This supplement encourages the use of appropriate native breeds of livestock (from the list below) for grazing to help achieve the aims of relevant options. Evidence suggests that some native livestock breeds have attributes that are particularly well suited to harsh climatic conditions, to difficult terrain, to grazing semi-natural vegetation and to achieving conservation objectives. This supplement is also designed to contribute towards the genetic conservation of native breeds at risk.

The use of this supplement can be considered with options HC12 to HC21, HD7 to HD8, HD10 to HD11, HK6 to HK17, HL7 to HL11, HO1 to HO5, HP1 to HP10, HQ6 to HQ10, HQ13, HD4 to HD5 and OHD4 to OHD5.

The number and breed of livestock and the way in which they are managed must be suitable for meeting the objectives of the option(s) to which the supplement is added. Only pedigree-registered animals and/or their genetically traceable, purebred offspring are eligible because of the need for independent verification by the relevant recognised-breed society.

You are advised to seek the view of your Natural England adviser about which native breeds may be considered suitable for grazing your land early in the application process. HR2 can also be located on the same parcel as HR1 – providing their combined payment rate does not exceed the maximum rate for HR2.

Approved list of native breeds at risk

Sheep	Cattle	Equines	Goats
Badger face Welsh	Aberdeen Angus	Cleveland Bay	Bagot
Balwen	Ayreshire	Clydesdale	Golden Guernsey
Black Welsh mountain	Beef Shorthorn	Dales	
Border Leicester	Belted Galloway	Dartmoor	
Boreray	British white	Eriskay	
British milk sheep	Chillingham	Exmoor	
Cambridge	Dairy shorthorn	Fell	
Castlemilk moorit	Devon	Highland	
Clun Forest	Galloway	New Forest	
Cotswold	Gloucester	Shetland	
Derbyshire gritstone	Guernsey	Shire	
Devon and Cornwall longwool	Guernsey 2	Suffolk	
Devon Closewool	Hereford	Welsh mountain section A	
Dorset down	Hereford 1		
Dorset horn	Highland		
Greyface Dartmoor	Irish moiled		
Hampshire down	Jersey		
Hebridean	Lincoln red		
Hill Radnor	Longhorn		
Jacob	Luing		
Kerry Hill	Northern dairy shorthorn		
Leicester longwool	Red poll		
Llanwenog	Sussex		
Lonk	Vaynol		
Manx longhtan	White park		
Meatlinc	Whitebred shorthorn		
Norfolk horn			
North Ronaldsay			
Oxford down			
Portland			
Ryeland			
Shetland 1			
Shropshire			
Soay			
South Wales mountain			
Southdown			
Teeswater			
Wensleydale			
Whitefaced Dartmoor			
Whitefaced woodland			
Wiltshire horn			