



Management of grassland areas

Habitat Science

Grasslands

- Prevention of succession
- Restricted location historically
- From Neolithic times – clearance woodland for farming
- Grazing, cutting and burning



Grasslands

- Enclosure Acts
- Agricultural development
- Old grasslands ploughed – converted to arable
- Fertiliser
- Drainage and liming
- Vigorous early growth



Range of grasslands

- Soil :
 - Acidic
 - Mesotrophic
 - Calcareous
- Drainage status:
 - Wet
 - Dry
- Intensity of improvement:
 - Improved
 - Semi-improved
 - Unimproved
- Level of grazing
 - Meadow
 - Pasture



Acid Grasslands

- Nutrient poor
- Low pH
- Low biodiversity
- Widespread over siliceous rock and peat – Upland Britain
- “rough grazing land”
- Pasture



Acid Grasslands



- Burning unpalatable species: *Molinia caerulea* Purple Moor-grass
- Bristle bent *Agrostis curtisii* – develop in response to burning and grazing
- Species-rich acid grasslands – Breckland, Norfolk

Acid grassland birds



Mesotrophic grasslands

- “habitats comprising plant species with a preference for soils that are neither too acidic nor too basic” (Ausden and Treweek, 2009:198)
- Lowland clays and loams



Mesotrophic grasslands

- Traditionally managed as meadow or pasture
- Arable conversion
- Agriculturally improved
- Hay meadows
- Nutrient compensation
- Prime siting
- Continuous management



Mesotrophic grasslands

- Common rights
- Lammas lands – consistent management since Medieval times
- Unimproved hay meadows – species rich



Mesotrophic grasslands

- Agriculturally improved or reseeded swards
- Temporary (leys) - mowed for silage or year long grazing – disastrous nesting birds
- Dominated by perennial rye grass and clover
- Uniform and poor
- Little conservation value
- Most wet grasslands are grazed



Calcareous grasslands

- Chalk or limestone areas
- Shallow soils
- pH – 7.0-8.4
- Free draining and well aerated
- Species rich
- Traditionally managed as sheepwalks



Calcareous grasslands

- Some cattle grazing
- Rabbits *Oryctolagus cuniculus*
- Short springy closed turf
- Low growing herbs
- Large number of rare plants and orchids



Calcareous grasslands

- More than 300 species plant
- 25+ species butterflies (Wells, 1969)
- Loss following Enclosure Acts
- Steep slopes
- Ancient monuments
- Military land
- Protected areas
- Cessation grazing & myxomatosis – rapid decline in plant diversity
- Rank grass dominates – False oat-grass *Arrhenatherum elatius*; Tor grass *Brachypodium pinnatum*



Calcareous grasslands

- Lapwings and wheatears
- Stone curlews
- Bird abundance and breeding densities poor



Grassland Management

- Grazing
- Cutting
- Burning
- Plus soil disturbance and hydrological management
- Boundary maintenance
- Environmental features



Management - general

- Distinguish between sites unmanaged, previously managed using different techniques and those continually managed using the same method
- Restorative management
- Maintenance



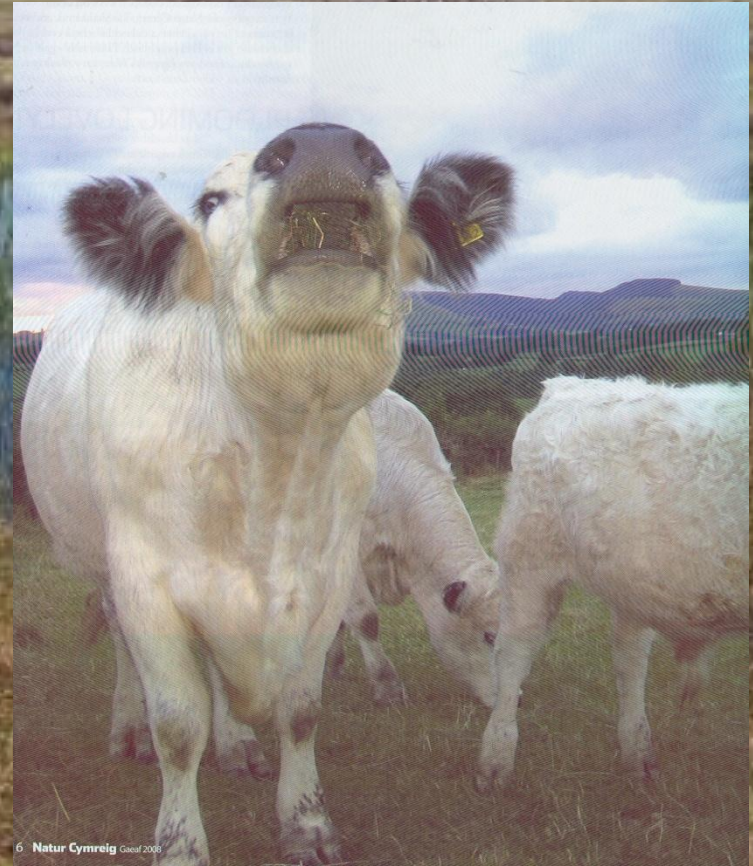
Management - Grazing

- Gradual form of removal
- Less impact than burning or cutting
- Selective feeding
- Removal more palatable species tall herbs
- Removal of aerial stems – can affect invertebrate fauna

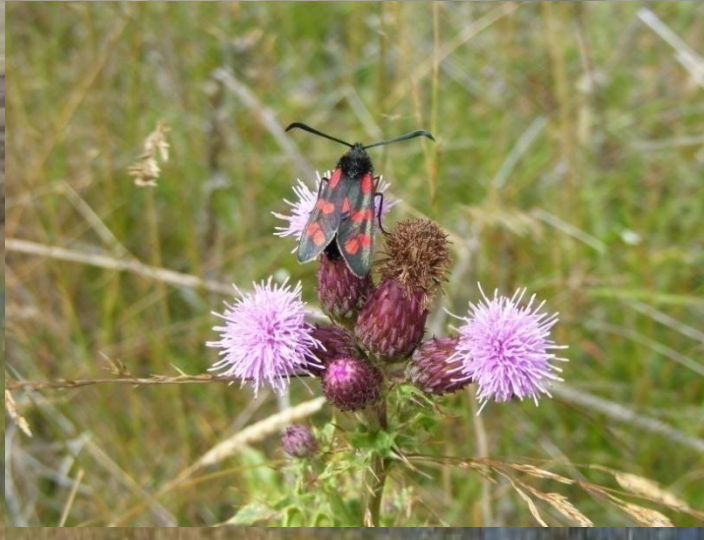


Management - Grazing

- Physical disturbance to vegetation and soil – germinating seedlings
- Stone curlews and woodlarks
- Too much trampling – erosion, destroys nests, changes in species composition



Management - Grazing



- Nutrient distribution – variation in grazing intensity
- Invertebrates – beetles, flies
- Birds – Chough, Yellow and Pied Wagtails
- Effects depend upon method of grazing, intensity and type of grazing animal



Rotational Grazing

- Sections rotated
- Planning vital
- Phytophagous invertebrates need specific food plants and correct stage of development or suitable microclimate
- Rotation creates a patchwork of support and general site interest



Continuous Grazing

- Low densities – mosaic of vegetation
- Higher densities – uniformly short turf
- Where rotational (compartmental) grazing is impractical or resources are limited
- Species specific habitat encouraged



Seasonal Grazing

- Winter grazing – prevents succession but allows plants to flower and set seed
- Chalk grasslands & managing for butterflies
- Less harmful for insects
- Growing season – favours those plants which can grow in spite of repeated defoliation



Grazing Animals & Intensity

- Variable behaviour and selectivity
- Varies with age and breed also
- Influences species composition and sward structure
- Differ in their dung and trampling intensity
- Stocking density critical



Sheep



- Ruminants
- Bite with lower incisors
- food preference variation
- Graze close to ground , producing tight sward
- Prefer flowers and herbs
- Upland and old breeds hard mouthed and can tackle scrub

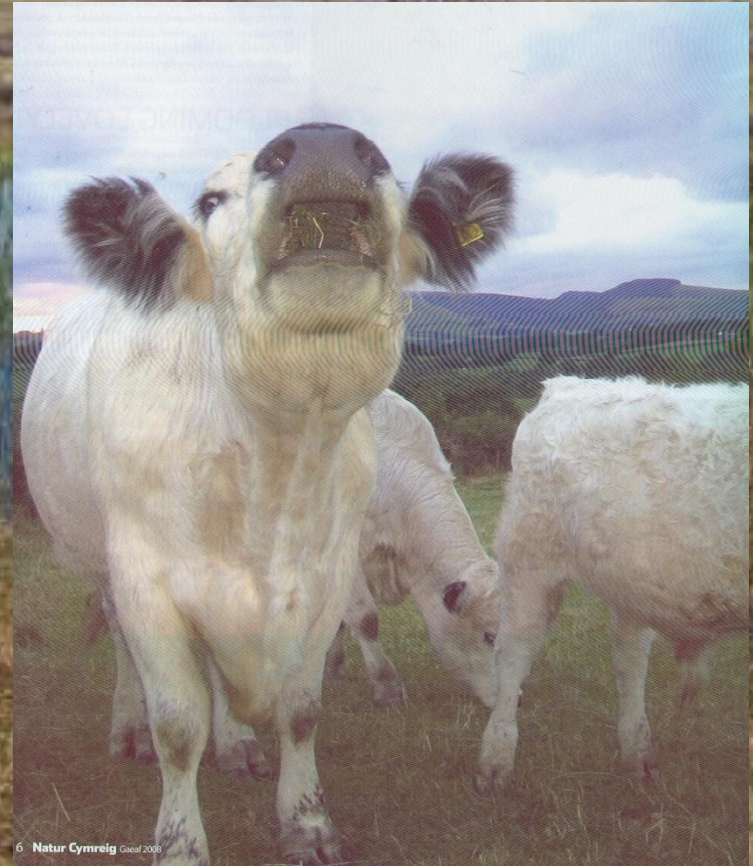
Sheep



- Light trampling
- Unsuitable for restorative management
- Can encourage bracken
Pteridium aquilinum
- Less suitable for wet grasslands – susceptible to disease
- Easier to handle and manage than cattle

Cattle

- Large rasping tongue
- Feed on taller vegetation
- Ideal for neglected sites
- Selective feeding and heavy trampling – uneven sward
- Better for invertebrates than sheep grazing
- Avoid areas around pats – distinctive areas of ungrazed land



Hughes (2006: 31)

LOCAL ACTION 



“The cattle do the most amazing job”

“Linking sustainable business with nature conservation is a major issue for all the Trusts. We’re running an experiment on trying to market meat from Rhos Fiddle, one of our nature reserves.

“It started with an entrepreneurial local grazier called Trevor Wheeler. He’s organic to begin with, and uses traditional breeds. Over the last 18 months his highland cattle have done the most amazing conservation job on Rhos Fiddle’s mixture of wet and dry heathland. They’ll put on

weight on a diet of twigs and stones as far as I can see! But it’s far from optimum commercial farming, and there are fewer and fewer people who want to rent our land for grazing. So how do we help him to help us?

“Part of it is offering the beef mail-order to our members on shropshirewildlifetrust.org.uk. It’s a premium price because of what it is, where it is, what it means to people, and what it means to wildlife. But the cattle are also a little tourist attraction in their own right. Trevor’s also

developing an eco-friendly holiday on his farm near the reserve, and we can promote that too.

“Across The Wildlife Trusts we have phenomenal potential in our nature reserves – not just commercially but in health and wellbeing. If we’re going to sustain our work in the future we’ve got to think about the types of staff we employ. We need our ecologists, but we also need people who see the opportunities.”



Cattle

- Waders – tussocky sward
- Fewer required – reducing trampling risk
- Age – variable behaviour
- Small groups preferred
- Fattening beef animals and sucklers most suitable for most sites.



Horses and Ponies

- Love grass and will eat sedges and rushes esp. when not much grass
- Graze patchily
- Don't like flowers unlike sheep; good for flower meadows
- Produce patchy mosaic of tall and short swards.
- At moderate stocking levels, beneficial for invertebrates
- Development rank vegetation – common nettles and thistles

(Allen, 2009)



Rabbits

- Most selective grazers
- Concentrate on short sward
- Patchy mosaic at moderate densities
- Scrapes and burrows – bare and disturbed land
- Annual abundance varies – difficult to manage
- Not suitable for restorative mgt



Mixed Grazing

- Danger that resultant habitat is uniformly poor
- Supplementary feeding
- Ivermectin concerns



Cutting

- Sudden, unselective form of vegetation removal
- Creates uniformity, soil compaction, damage to topographical features (anthills) and nutrient enrichment
- Detrimental to invertebrates



Cutting

- Useful in restorative management
- Successful – growing season
- Flailing
- Rotational
- Frequency site dependent
- Preferred sward height is species dependent



Preferred Sward Heights of grassland butterflies (Fry and Lonsdale, 1991)

Species		Sward Height (cm)
Small Skipper <i>Thymelicus sylvestris</i>		15
Common Blue <i>Polymmatius icarus</i>		4-10
Ringlet <i>Aphantopus hypercantus</i>		15-30
Gatekeeper <i>Pyronia tithonus</i>		2-6 (prefers sparse turf)

Cutting

- Cutting once a year – late autumn or early spring
- Focus of attention- invertebrates – rotation
- Maintain traditional management



Burning

- Sudden process – greater floristic uniformity than grazing
- Favours those plants with perennating structures
- Detrimental to invertebrates



Burning

- Quick shallow burns create less damage
- Variable topography
- Removal unpalatable plants – restorative management
- Nutrient can encourage growth of undesirable plants – grazed
- Rotation and never over the entire site
- Lowlands – 31st Mar and 1st Nov
- Uplands – 15th Apr – 1st Oct



Soil Disturbance and Non-Intervention

- Scraping, rotovating or ploughing
- Avoided on permanent grassland sites
- Non intervention – allows aggressive species to dominate
- Lowland wet grasslands – suitable nesting habitats
- Eventually scrub and woodland



Upland Heath Action Plan: Powys

- Wet heath (soils/peat with impeded drainage)
- Habitat requires a high soil water table
- Dominated by Purple moor-grass *Molinia caerulea* and an understorey of bryophytes often *Sphagnum spp*
- Mosaic of blanket bog, acid grassland, freshwater, rock habitats, bracken and scrub



Upland Heath Action Plan: Powys

- Blanket mire – occurs on deeper peats >0.5m – hare's tail cottongrass *Eriophorum vaginatum*
- Upland heaths – widely distributed in Wales
- Managed by rough grazing & selective burning



Targets

1. Maintain extent and distribution of upland heath in a favourable condition
2. Through management, achieve favourable condition of all statutory sites by 2010; 50% of non statutory sites by 2010
3. Identify potential restorative areas of dwarf shrub heath – reducing fragmentation of existing heath. Aim to recreate 300 ha of restored heath by 2015
4. Ensure owners/occupiers, planners and foresters are aware of the importance of the habitat and seek ways to raise the habitat's profile. (LBAP, 2002)

Current Upland Heath status

- 80,000 ha of dry heath principally in Snowdonia, Powys and the Brecon Beacons
- 12,000 ha of upland heath within Powys (17.5% of Wales total)
- 360 ha of wet heath
- 2,870 ha grassland/heath mosaic

(CCW, 2002)



Areas of Concern

- Inappropriate management of sheep
- Uncontrolled & frequent burning
- Heather beetle infestation
- Conifer plantations
- Invasion by bracken
- Achieving harmony on Common Land
- Interaction between two or more of the above



Current action

- Management plans for ten of the upland and lowland SSSIs
- Tir Gofal schemes – 56ha managed in Powys
- Review & selection of heath wildlife sites
- Some key species – skylark, stonechat, yellowhammer, emperor moth, adder



Brecon Beacons National Park

- Shaped by thousands of years of human use interacting with a natural environment
- Variety of habitats – exposed open moors of the uplands to the gravel river beds of the Usk
- Management over the centuries has modified most natural habitats

Brecon Beacons National Park

- Extensive grasslands – grazing livestock
- Managed woodlands – cutting, removing timber and replanting
- Rivers and wetlands altered by drainage and flood defences
- Semi-natural landscape

Upland bog Flora



Waun Fignen Felen: Upland bog

- Wet cool conditions of uplands prevents dead vegetation from rotting
- Peat – blanket bog
- Water-logged, acidic and nutrient poor
- Specialist plants – Sphagnum mosses *Sphagnum spp*; cotton grass *Eriophorum, spp*; heathers *Ericaceae spp*
- Nutrient replenishment from rainfall
- Fauna – Golden ringed *Cordulegaster boltonii* and black darter dragonflies *Sympetrum danae*

Peat bog vulnerability

- Vulnerable to pressures of over-grazing, fires, drying out, acid rain deposition, trampling and cutting
- Erosion and drying out is significant during hot summers – carbon release
- 40% of Wales' soil carbon is in upland and grassland soils.

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- Solutions?
 - Change grazing pressures
 - Re-establish diminishing peat reserves
 - Encourage growth moorland grasses and shrubs
 - $\Rightarrow$ restore carbon sequestration

Black to Green Project

- To conserve and revegetate an eroding upland mire
- Locally generated gorse mulch
- Seedbank of acid grassland species

Waun Fignen Felen

- **Valley Mire**
- **Southern valley end – exposed area of peat – vegetation removed through erosion**
- **Causes?:**
 - **Catastrophic wild fire**
 - **Changes in groundwater and surface drainage patterns**
 - **Changes to rates of subterranean cave formation in underlying limestone**
 - **Climate change**
 - **Acid rain**
 - **Livestock grazing pressures**

Historical accounts

- Likely fire started process
- Combination events especially wind and rain erosion
- Aerial photographs- erosion present 1940s
- Current rate of change is slow enough to warrant intervention

First prevent exposed
peat being washed
away





The main sink at southern part of the bog











Twyn Walter.



Swallow Hole + Stream
to Dan-yr-Ogof.







Twyn Walter.

Swallow Hole + Stream
to Dan-yr-Ogof.





Gorse spreading





Case Study: Waun Fignen Felen



- **PERSONAL RESEARCH:**

- Research upland grasslands/peat bogs in the UK.
- What is their current status?
- What is the rate of decline?
- How are other areas managing their peat bogs?