



GAP Information Leaflet

How animals use the landscape - animal behaviour on site

We cannot totally predict how grazing animals will behave on site, how they will utilise the forage and the impacts on the vegetation that they will have. However we can have a better insight if we understand some of the factors that influence daily, seasonal and annual foraging patterns and diet selection. It is important to realize that animals will develop a daily, seasonal and annual pattern of activity on site and that this will become a routine.

1. Water

The need for water is a key driver of animal grazing patterns; obviously having most influence if lactating animals are used. On the Veluwezoom in Holland, where there is a free ranging herd of breeding Highland cattle managed with minimal human intervention, any cattle track you come across will lead to water! In very large grazing areas, sheep normally graze within a radius of about 2.5 km of a watering point, and cattle within a radius of about 5 km. Animals will continue to graze the section of a pasture close to the water supply rather than walk further to more lush growth. Therefore, moving the water will change where the animals spend their time grazing, and where they deposit their manure and urine. More watering locations mean manure and urine is more uniformly spread across the pasture. Should stock require more water due to lactation, salinity or dry feed, they may need to drink more than once a day, thus reducing their foraging radius and the area of the paddock being used.

2. Shade

Animals will seek shade in hot weather and to escape the attentions of flies.

3. Shelter

The prevailing weather (especially cold, wet conditions) at any one time will influence where animals are found. On Wolfhezerheide in Holland, research has found that cattle are very precise in their choice of grazing area at any one time. In one example the ambient temperature dropped significantly and immediately just a few metres away from where the cattle were sheltering (Bokdam, personal communication). Shelter will also be sought in hot weather and to escape flies. For example the scrub sheltering a resting site (in other words encouraging grazing animals to loiter in the area) on degenerate dry heath could be removed to discourage use of that location as a resting site, while a copse left on wet heath near a water source may encourage stock to spend longer on the wet heath.

**SHADE, SHELTER AND
WATER ARE KEY
DETERMINANTS
OF ANIMAL RANGING
BEHAVIOUR ON SITE**



4. Weather

In addition, weather conditions can have other effects on grazing patterns, both because weather can affect water intake (much higher in hot weather) and because drought, heavy snow or very cold weather will influence availability and quality of forage.

5. Existing tracks/ paths

Animals will use existing tracks and paths on site to get around, often foraging as they move; cattle will tend to conduct 'route marches' to get from A to B (for example to get to water) not doing much feeding on the way, whilst ponies and sheep tend to drift across sites, feeding as they go.

6. Lying up sites

Animals will tend to use the same areas to rest up, often as a group, evidenced by distinct dung piles. This process can actually lead to the movement of nutrients across sites over the long term.

7. Visibility

Herbivores tend to be prey animals, and consequently they have evolved various defensive mechanisms. In general they like to have good visibility of their surrounds, especially when resting. For example cattle and sheep will tend to rest on the slopes of small hills (near but not on the top) looking in to the prevailing wind. In this way they can smell what is around, avoid being more visible on the skyline but get a good view. Goats and many other agile (mountain) herbivores (including primitive breed sheep) like to climb above a predator and keep it in view at all times.

8. Wallows

Some animals like to use wallows or spend time in water and mud wallows to help keep cool and protect against flies and parasites.

9. Sexual behaviour – males, females and young, matriarchs, harems

Breeding behaviour will affect how animals distribute themselves across a site. For example mature breeding males will compete for females during the breeding season and will tend to distribute themselves more evenly across the landscape – if males meet at the edge of their territories, they will 'fight'. The females and young, under the leadership of a matriarch (dominant female) will tend to stay together as a loose group of animals, often with family groups staying together and using the same areas. Non-breeding and young males will hang around in groups, not doing much and keeping themselves to themselves. Stallions will gather harems of mares.

For example in the Veluwezoom breeding herd of Highland cattle, due to sexual competition, bulls are distributed evenly over the area, even though in some 'territories' the forage is relatively poor. The females and young spend 75% of their time on areas of former agricultural land where the forage is of better quality.

10. Illness

Animals that are unwell will often stay by themselves and seek out secluded areas of a site.

11. Latrines

At higher stocking densities animals will tend to dung and urinate in discrete areas, so-called latrines. Males (and females) will also use urine and faeces as territorial markers. These latrines and markers can be avoided or conversely attract animals.

12. Nutritional demands

Food quantity and nutrient status required by an animal and that actually ingested depends on many factors, for example:

- Age
- Growth rate
- Sex
- Dentition
- Breeding / non-breeding status and stage of pregnancy
- Forage availability (it may be frozen, under water or inaccessible)
- Forage quality
 - Some plants contain toxic compounds in varying levels, so for example herbivores can tolerate a proportion of heather in their diet but above a certain threshold the toxic compounds contained will inhibit rumen function; highly toxic plants like bracken tend to be avoided
 - There is variation in quality between young, more palatable, more nutritious plants and older, more fibrous, less nutritious plants of the same species, as well as between plant species
- Forage quantity
 - Several studies have shown that plant quantity may be more important than plant quality in diet selection. In other words animals often prefer areas of highest biomass where they can maximize forage intake even if it isn't the most nutritious grazing available on site
- The stocking density at any one time and the rate over time, so for example the impact that 1 sheep kept on 1 hectare for a 100 days on the vegetation will not be the same as that which 100 sheep will have on that same hectare of vegetation even though the stocking rate is the same (the stocking density is different). Generally animals will take more nutritious and palatable species first
- Size of site, the relative cover of different habitat and vegetation community types in relation to stocking density and rate, and spatial distribution of those habitats. So for example stock will remain on 'lawns' of more palatable grasses if they can get adequate nutrition from them alone; on a similar sized site with less area of these lawns grazed by the same stocking density of animals of the same type, breed etc, the animals will have to venture off the lawns sooner as they do not get adequate nutrition from them. In the New Forest cattle seem reluctant to graze areas of less than 10 hectares in size

It is important to remember the degree to which any herbivore is a browser (i.e. taking woody growth) or a grazer (i.e. taking grasses and other ground vegetation).



ALL ANIMALS WILL STAY ON 'BETTER' GRAZING IF IT IS AVAILABLE; AS IT IS DEPLETED THEY WILL MOVE ON TO OTHER VEGETATION, AND IF MOVING AROUND FOR OTHER REASONS, FOR EXAMPLE AS PART OF DAILY PATTERN OR TO FIND WATER, THEY MAY TAKE SOME LESS PALATABLE FORAGE AS THEY GO

13. Comparative anatomy and physiology

The anatomy and physiology of different species of herbivore will dictate their preferred food and where they will feed. Key things to remember are:

- Dentition (including when permanent teeth erupt):
 - Anatomy of the mouth determines bite size and thus intake, so for example cattle have a relatively small bite size compared to their size, so will struggle to maintain themselves on short swards
 - Teeth eruption can be painful and put animals off their feed
 - Animals are most efficient when they have all their teeth, the converse being true when they start to lose teeth
 - Ponies have two sets of opposing forward facing incisors which are effective at cutting even quite fibrous vegetation, so they can graze short swards compared to cattle which use their tongue to pull and tear their forage and prefer longer swards (although they will graze short swards if they have no choice)
- Digestive system (ruminant, monogastric or hindgut digester): ponies spend more than 75% of any 24 hour period grazing and are less selective in what they eat, whilst cattle and sheep will spend 50% of the 24 hours grazing
- Body size and mass (the ratio between them and the relationship with metabolic rate): smaller animals have a greater metabolic rate per unit of body weight than larger ones and thus need better quality forage to meet metabolic requirements
- The limb and hoof anatomy affects agility and hoof ground pressure (of relevance on wet or unstable sites)
- Muzzle size and agility, so for example goats have narrow muzzles so can forage in the foliage of even very thorny shrubs; sheep and goats can be more selective and take individual plants from within a sward. If they can, Goats will climb in to the canopy of low trees and shrubs to forage. Animals will also be selective along the vertical plane within a sward, dependant on their body height

14. Minerals, roots, tubers etc

In some circumstances, animals may have special dietary requirements and seek out specific foods, for example tubers, roots and minerals. A classic example of this is the animals (for example elephants, bushbuck and buffalo) of Mount Elgon in Kenya that seek out salt within cave systems.

15. Supplementary feeding

Animals will loiter in the vicinity of supplementary feed sites / feed blocks if provided.



THESE FERAL GOATS IN GALLOWAY FOREST PARK LOITER IN THE VICINITY OF CAR PARKS WHERE THEY ARE FED BY PEOPLE THUS THEIR BROWSING BEHAVIOUR WILL BE MORE CONCENTRATED WITHIN A CERTAIN RADIUS OF THE SITE

16. Breed

There are differences between breeds in terms of their size, diet, ability to convert forage of varying nutritional quality in to body weight, and hardiness (how well they can cope with more challenging environments in terms of forage quality, weather conditions, disease challenge etc.).

17. Background of animal

Animals which are used to people, dogs and other stimuli will be less likely to be moved around the site and away from disturbance, than will relatively wild individuals. In addition they may be prone to seeking out human attention, for example hanging around car parks and access gates.

There is some evidence that diet selection is learnt from an animal's mother and other animals with which the young animal associates (there is also undoubtedly a genetic component to diet selection and this can be highly variable between individuals). In this way the background of the grazing animal (i.e. where it was raised and what diet it has had) can be important in determining foraging behaviour.

18. Predators

As noted above agile herbivores like goats like to get above predators and are especially happy on cliffs and steep terrain. The presence of predators will move animals around an area, for example in Yellowstone National Park, the increased wolf population has pushed elk in to areas with reduced availability and quality of forage, with consequent impacts on the vegetation. Dogs and humans are seen as predators by many grazing animals and will tend to be avoided.

19. Flock / herd dynamics

Goats, for example, are social feeders with the whole group coming in to feed when one animal finds something nice, before moving on to the next feeding site. Social interactions within and between groups also influence how animals forage. For example cattle and ponies on larger sites will tend to form family groups that disperse and use the same areas each year.

20. Inter-species interactions

Where sites are grazed by several species of herbivore (including wild animals), there will be some inter-species impacts on foraging behaviour, so for example once forage is depleted, only the smaller species will be able to utilize short swards, larger species will be forced to move on to forage that is still available but less palatable. This has been seen on Rum where red deer displace cattle in the winter, and elsewhere where sheep displace red deer.

21. Crèche

Cattle will leave their calves in the care of a single female who will keep an eye on them and warn the rest of the herd in case of danger.

22. Topography

Whilst most animals will use slopes, there will be a physical limit to what they will tackle. If nutritional needs can be met using forage in areas where less energy is required to get it than on the slopes, they will not be inclined to venture away from these areas. In addition sheep on heathlands prefer to graze on

small grass patches and to graze facing uphill, so for example their utilization of heather at the grassland - heather interface will be greatest at edge of grassland patches than further away, leading to increase of grassland areas and loss and fragmentation of the heather above certain stocking densities and rates.

23. Hefts

Animals will 'heft' to an area, becoming acclimatized to a home range or territory and staying within that territory even though the forage available is sub-optimal; they will take forage that is relatively unpalatable even though outside their heft there is more nutritious food.



SHEEP HEFT ON COASTAL HEATHLAND IN NORWAY:

SHEEP ESPECIALLY HEFT TO AN AREA, STAYING IN A PARTICULAR TERRITORY AND USING REGULAR RESTING/LYING UP AREAS.

NOTE THE DUNG ON SHORT SWARD WHERE SHEEP TAKE SPECIES THAT THEY WOULD NOT NORMALLY SELECT, AND WITH VEGETATION UTILISED LESS THE FURTHER YOU MOVE AWAY FROM THE HEFT

24. Fencing

Fences on site will, by nature, exclude or control the areas where animals can forage.

25. Other management techniques

Management such as controlled burning, mowing and tree and scrub clearance can and do create areas of vegetation that are more attractive to grazing animals either because of the presence of younger more palatable and nutritious grasses (for example after burning) or because the area is more accessible to the animals (for example bracken management can open up areas for sheep which, because of their small body weight, they previously would not utilize).



CATTLE AND PONIES CAN BREAK INTO DENSE AREAS OF BRACKEN (SCRUB, BRAMBLE) THAT WOULD DETER SHEEP

26. Shepherding

In many places, livestock are shepherded or herded; their overall grazing patterns being controlled by shepherds or herders, so for example on Dutch and German heaths sheep are used to help control silver birch and scots pine encroachment.



SHEPHERDED STOCK GRAZE VEGETATION THAT THEY WOULDN'T NORMALLY UTILISE

27. Age groups

Often when stock from different areas are brought together on one site, for a short period they will stay as discrete groups in different areas. Family groups will also tend to stay together and this is most obvious when different breeds with different colourings etc are run together so that this behaviour is more obvious.

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