



### **The Eurasian Badger (*Meles meles*)**

The European badger (*Meles meles*) belongs to the family of mammals known as the Mustelidae (possessing musk glands), otherwise known as the weasel family and includes the otter, stoat, polecat, ferret and pine marten. Despite an existing number of subspecies, the European Badger is the only species to be classified in the genus. It is indigenous to most of Europe (except where environmental conditions are not suitable, eg the arctic regions of Scandinavia and Russia), Asia and Japan. However they are particularly abundant in Britain and Ireland, with largest abundance found within southern England.

The name badger is believed to come from the French word 'becheur', meaning digger. Badgers are nocturnal animals and have an elusive nature and are adapted specifically for a life underground. Contrary to popular belief, badgers do not hibernate, although they have developed strategies for conserving their energy and body weight during the winter months when their normal diet of earthworms and grubs are not available.

Badgers have a small head, small eyes, a thick short neck and a long wedge shaped body with a short tail. They grow up to 30 inches (750mm) from head to tail, with a 6 inch (150mm) tail, and can weigh between 8 and 12 kilograms. Males are slightly larger and heavier than the female. Aside from the size difference, it is very difficult to tell a male from a female badger. Male badgers are called boars, females are sows and the young are cubs.

A badger's hair is black and white – leading to a grey appearance from a distance. The badger has a black chest and forepaws with a prominent black and white striped head with white tipped ears. However, some badgers may be albino (white), melanistic (black) or erythristic (ginger). These colour variations depend on the amount of melanin (a natural substance that gives colour (pigment) to the hair and skin) in the badgers hairs and is controlled genetically.

In England prior to the 19<sup>th</sup> century the badger is believed to have had a wide distribution, but heavy persecution in the 19<sup>th</sup> century caused numbers to drop dramatically and by the end of the 19<sup>th</sup> century badgers were considered rare. It is believed that the main cause of decline at this time was due to pressure exerted by game keepers who saw the badger as an immediate threat to their livestock. However during World War I, there was a distinct lack of game keeping, and this led to a respite for badger populations and numbers steadily began to increase and they once again became fairly common in suitable areas across England. Up until the 1960's numbers continued to increase, however between 1960 and 1972 numbers once again began to decline. This was due to the increasing number of badgers killed on the roads and railways, combined with a possible reduction in fertility resulting from the over use of pesticides and the increase of illegal gassing and shooting on farms and estates. However the passing of the Badger Act 1973 (and consequent amendments 1981, 1991 and 1992) has helped badger numbers recover and today they have a total estimated population density of around 300,000.

## Habitat

There are many factors which effect where a badger can live and these can include geology, altitude, inclination and orientation of slopes, suitable cover and a mosaic of habitat types. In Britain Badgers occupy a large range of habitat types and they are often found in woods and copses (deciduous, coniferous and mixed), scrubs, hedgerows, quarries, moorland, open fields and even in housing estates! They are however more abundant in areas where a mosaic of features are present such as deciduous woodland, pasture and arable habitat types.

Badgers often utilise areas of sandy soils in preference to clays because this type of soil is easier to dig and is well drained, however clays are used where there is little choice. Sandy soils can be prone to roof collapse and this is avoided by badgers actively choosing areas that help consolidate the material, such as digging into the roots of trees and hedges.

Badger sett density increases with hilliness and a survey undertaken by the mammal society found that 92 % of setts in Britain were dug into slopes. Slopes are advantageous to badgers for a variety of reasons. Firstly slopes help to facilitate in the excavation of soil, which can spill down the slope as it is excavated. Sloping land is also well drained and more likely to be warm and dry and in colder climates a depth below ground is quickly attained which is frost proof.

Food must be plentiful and varied throughout the year. A badger's food supply is undoubtedly one of the most important biotic factors influencing habitat selection. A badger's population density, group and territory size are all influenced mainly by food availability with particular importance attached to earthworm abundance (*Lumbricus terrestris*) in particular. However this main food source does need to be supplemented with a wide range of other food items and this is obtained through a varied, rather than uniform habitat.

Badgers would choose habitats that are secluded if they had a choice, but nearness to habitation does not deter them from using an otherwise desirable site, and it is human interference that mainly causes badgers a problem. If a sett is repeatedly or drastically interfered the badgers will leave if there is an alternative site to go too.

Cover is another important factor when choosing a habitat as this allows the inconspicuous emergence and also allows cubs to play near the sett entrance without being visible to potential predators. This is another reason as to why most badgers are found in deciduous woods, mixed woods and copses. However hedgerows and scrubs can provide an adequate alternative if the latter is not present.

Thus an area must fulfil the following ecological requirements to be suitable for badger location:

- Soils which are well drained and easy to dig, but firm enough to prevent roof collapse,
- Adequate food supply available throughout all seasons,
- Sufficient cover to allow inconspicuous emergence from setts,
- Relatively free from disturbance.

## Setts

Badgers live in setts, a network of underground tunnels which they dig using their strong claws. Each social group can number up to about 15 badgers and is typically headed by a dominant male and female. Setts are usually found on sloping ground where there is some cover, for example in woods and copses, especially if attached to pastureland. Setts usually comprise a network of interconnected tunnels and chambers and are typically excavated in soil that is well drained and easy to dig.

Several categories of Setts have been identified. Every badger group has one main sett which is occupied continuously and is used for breeding purposes. They are usually large, well established setts

which have been excavated by several generations of badger and are therefore vital for the badger's survival. Main setts have a number of entrances, used and disused, with large spoil heaps. Main setts are always active with well trodden paths.

In addition to the main sett, most groups also have one or more additional setts within their territories. These secondary setts fall into three categories: - annexe setts (many well used entrances and well worn paths linked to the main setts; not always in use), subsidiary setts (a variable number of entrances and not directly connected to other setts; not always in use) and outlier setts (with 1 or 2 holes, no defined paths and only sporadically used).

## **Social organisation**

European badgers live in gregarious groups and display some signs of hierarchy with a dominant boar (usually an older larger individual) and a dominant sow (having the first choice of breeding sites and usually the older animal), heading the group in higher density areas.

The European badger is one of the few species of mustelids to show any form of social interaction at all, although their cooperative behaviour can be classed as somewhat limited. The marking and defence of the territory, excavation and sett maintenance are responsibilities shared by all members of the social group, but beyond this the reason for sociality in badgers has been hard to understand. Groups of badgers living in high population areas exhibit well defined social groups but in other less favourable areas the European badger can be found showing the normal solitary mustelid behaviour where individual animals defend their own territories. So what advantage does group living hold for badgers?

The most plausible theory put forward is that the main reason for this group living is due to the fact that badgers occupy patches of different habitat, and are much more efficient at defending all these patches as a group than they would if they lived solitary. In other words the badger's food resources are widely distributed in discrete patches. These patches are essential for the badgers to be able to find food within the different seasons of the year. A single badger could not defend a territory this large and so the responsibility is shared as a group. However when areas are less favourable they may revert back to normal solitary mustelid behaviour.

The proportion of sexes within social groups is variable from group to group but the most common proportion is two males and two females. Numbers can vary though and for adult males it can range from 0 – 5 individuals and for adult females 0 – 7 individuals, however it has been noted on occasions that all male 'bachelor' groups and also all female groups do form.

Although most individuals remain within their native social groups throughout their lifetime, movement of badgers between social groups is not uncommon and can be classified as either true dispersal (permanent) or visiting (temporary). Visiting by males takes place more often during the peak of the mating season at the beginning of the year and helps prevent inbreeding between within individual social groups. Males which disperse permanently often do so singularly, however females form coalitions of two or three individuals, often sisters and mainly choose to disperse into territories that contains only one female in the group, thus increasing the success of displacement.

## **Territories**

Badgers live in territorial groups called clans (also commonly referred to as social groups) consisting of up to 15 individuals, together they occupy and defend a territory against neighbouring badgers. Badger social groups are by definition exclusive and do not overlap. Members of the group show high fidelity to their native home range and actively defend against other social groups by marking the boundaries of their territories with an elaborate scent marked system of paths and latrines.

Latrines are made up of one or more small pits dug by the badger into which excretory products are passed. They are often placed along natural boundaries and margins such as field edges and fence lines.

Male badgers patrol their territory boundary regularly during the main breeding season (February – March) and mark the borders of the territory with dung. If a stray boar from another colony is encountered the ensuing fight can be particularly fierce.

However there are always exceptions to the rules and territories are often less profound out of the breeding season, when boars are not actively defending their sows. Also during times of food shortage badgers have to roam further and so ranges become larger and thus boundary marking and patrolling of the territory perimeter becomes physically impossible. Latrines then become restricted to good worming patches or food areas that are seasonally abundant.

## **Diet**

Although badgers are members of the order carnivore, they are in fact omnivores, meaning they eat a wide range of plants and animals. They have a varied diet depending on what food is available and on the time of year. The badger is a forager rather than a hunter and as such, badgers are opportunists when it comes to diet – they will take whatever is available, which becomes more apparent when food is scarce!

Although immensely adaptable, badgers thrive best where a mosaic of habitat types are available within their territories. This allows access to adequate and varied food supplies throughout the year and is one of the main reasons why badger setts located in deciduous woodlands bordering arable and grassy meadows are such a popular choice for sett construction. Where habitat is more uniformed, it is reflected by lower population densities and larger territory sizes.

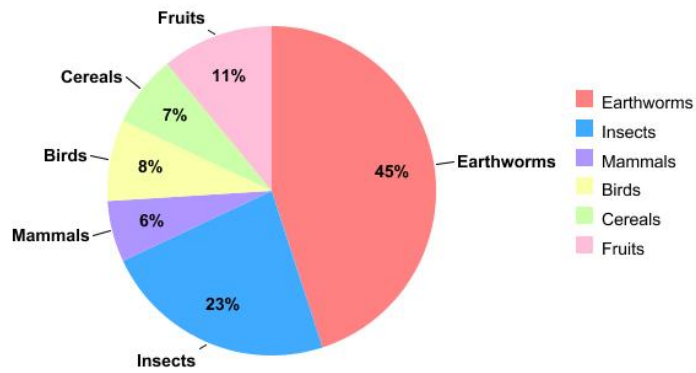
Badgers rely heavily on their extremely good sense of smell and have a large rubbery nose, which they use to forage for food. They will walk with their nose close to the ground sniffing out potential prey only stopping periodically to scent the air for danger.

A badger's diet mainly consists of earthworms and for badgers in Britain, Ireland and most of central and Western Europe their importance cannot be underestimated, they are the badgers single most important item of food – the stomach contents of a single boar once contained over 200 earthworms taken in a single night! Foraging for earthworms is most effective on areas of short grass this is why badgers are so keen on visiting regularly mown and carefully maintained lawns!

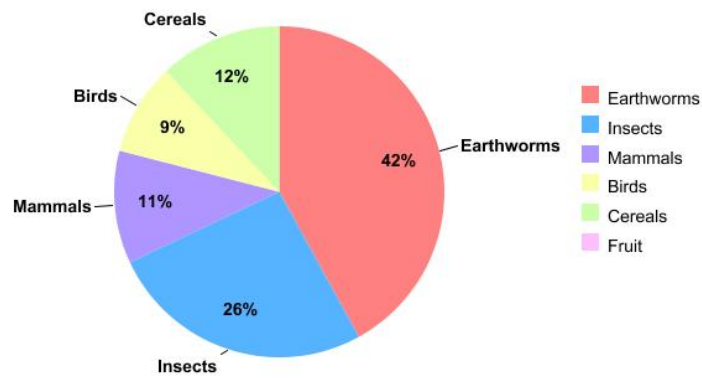
Their diet however must be supplemented with other food items and therefore they also eat insects, birds, small mammals, fruits and berries, cereals, reptiles and amphibians although the importance of which is determined by abundance and season (see charts below showing frequency (%) of main food items eaten throughout the year).

Charts showing diet of badger through the different seasons; winter – summer and the difference in occurrence of food items.

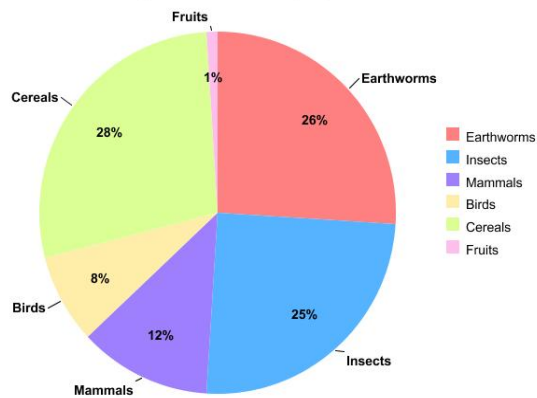
Badger Winter Diet and Frequency of Food Occurrence

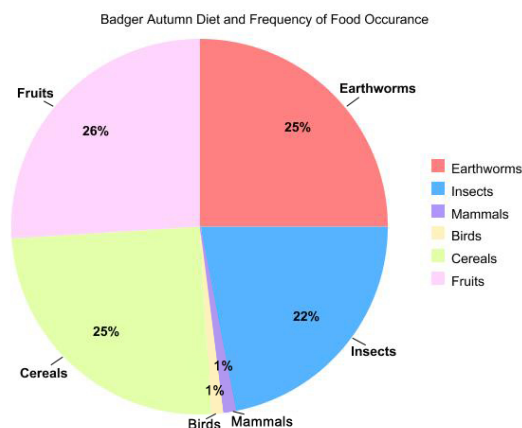


Badger Spring Diet and Frequency of Occurrence



Badger Summer Diet and Frequency of Food Occurrence





The effect of season and weather on a badger diet can not be easily separated, for example some winters may be mild and provide plenty of food while others may be severe and food becomes limited. Generally food of animal origin is of greater importance than plant food over most of the year except during late summer and autumn when cereals and fruits are of major importance in a badger's diet.

Maximum food intake occurs during the period of September – November, while the minimum is between December and February. During periods of drought (especially in June) badgers may become desperate for food as earthworms become unavailable but cereal and fruits are not yet developed, badgers may exhibit odd behaviour. This could include raids on poultry, scavenging in gardens and much earlier emergence from setts to lengthen foraging periods.

Exploitation of mammals birds and insects also show seasonal fluctuations, more mammals are taken in spring and early summer as young animals are numerous and easier for a badger to prey upon.

If you are interested in attracting wildlife into your garden and want to feed badgers, it is safe to give them dog food, fruit, root vegetables, peanuts and raisins. Peanuts are particularly nourishing for badgers but please make sure to provide only small amounts of food so that the badgers do not become dependant on you.

## Breeding

Reproduction in badgers is unusual and involves a phenomenon called 'delayed implantation'. Badgers mate at any time of the year but the embryo does not implant into the womb and start growing until winter. This means that all cubs are born at the same time of year – mostly from January to March. Litter sizes range from one to five with the average number of cubs being born to a group as three.

The system of delayed implantation maximises the badger's chances of being successfully mated and also ensures that cubs are born at the best time of year for survival.

When cubs are born, they are blind, pink with white silky fur and measure 12cm long with weight varying from 75 – 132 g. The eyelids are fused, and do not open until around 5 weeks of age (although this does not mean the cubs are able to see fully because they will remain underground in the dark for several more weeks). After being suckled underground for approximately eight weeks, they start to emerge from the sett at the end of April/ beginning of May. This provides them with plenty of time to feed and to develop sufficient fat reserves to see them through their first winter. Cubs are not totally independent from their mothers until they are about 15 weeks old.

Badgers have been shown to exhibit allopaternal behaviour, ie. Related individuals co-operate with the mother in rearing her young. This kind of behaviour is of potential benefit to all participants, not only

is the mother able to get more food during the time she is suckling, it also improves the chances of the cubs surviving and also gives the 'baby sitter' essential experience which may help when she produces cubs of her own.