



Badger problems: use of electric fencing to prevent agricultural damage

The European badger (*Meles meles*) is widely distributed throughout mainland Britain which now supports some of the highest densities of badgers in Europe. Unfortunately, certain aspects of badger behaviour can cause problems for agriculture. In most cases, these are primarily of nuisance value. However, under some circumstances badgers can cause serious damage and in these situations, management action may be necessary.

Badgers and their setts are protected by law and damage prevention must therefore rely chiefly on controlling their behaviour. The most common form of management is to exclude badgers from vulnerable areas. This leaflet outlines the recommendations for the effective use of electric fencing.

Badgers and the law

Badgers and their setts are protected under the Protection of Badgers Act 1992, which makes it illegal to kill, take or injure any badger, to dig for a badger or to interfere with a badger sett. There is, however, provision within the legislation to allow action to be taken under licence from the Land, Nature and Forestry Division of the Welsh Government for the purpose of preventing serious damage to property, crops, livestock etc. In certain situations, however, it is possible to find solutions to problems without resorting to licensed action.

Problems associated with badgers

Badger related problems can vary widely in severity and type but the majority can be broadly placed into one of three categories:

- **Crop damage**

Forage maize and other cereals appear to be particularly vulnerable to badger damage and large quantities can be consumed or

flattened in the weeks prior to harvesting. Other crops damaged by badgers include vines, soft fruit and other horticultural crops.



Badger damage to forage maize

- **Structural damage**

Structural damage is generally associated with the tunnelling activities of badgers and can lead to potentially dangerous situations. The excavation of tunnels and the presence of sett entrances in fields and under roads, tracks and buildings can be of particular concern. Such activity can cause subsidence and collapse of vulnerable areas and may pose a risk to livestock and machinery operators.

- **Behavioural problems**

Behavioural problems are usually associated with the spoiling of pasture through either the deposition of urine and faeces in latrines or by badgers rooting below the soil surface for invertebrates.



Badger damage to grassland

How electric fencing works

Electric fences operate by applying high voltage pulses of electrical energy to conductive wires. When an animal touches these wires, the current flows through to the ground and causes the animal to receive an electric shock. The fence does not necessarily act as a physical barrier but instead relies upon the animal associating it with an electric shock, and subsequently learning to avoid it.

Where to use electric fencing

Electric fencing is a useful method of protecting selected areas, particularly high value crops, susceptible to extensive badger damage. The decision to use an electric fence will depend upon the amount of damage, the value of the area to be protected and the cost to purchase, put up and maintain the length of fencing required. Occupiers considering the use of electric fencing must weigh up each of these factors and make a decision based on the specific nature of their problem.

Types of electric fence

Two types of electric fence are commonly used to exclude badgers:

- **Strained-wire fences**

Strained-wire fences consist of a series of electrified parallel conducting wires at varying heights above the ground. The conducting wires of strained-wire fences can be made from either polythene twine interwoven with steel strands (polywire) or stranded galvanised steel. Polywire is cheaper to purchase but is a poorer conductor than galvanised steel wire.

The strained-wire design offers advantages over netting in terms of durability and versatility. It also carries a higher voltage than netting and can be less damaging to other wildlife, such as hedgehogs and amphibians which can become entangled within the mesh and killed as a result.

If both fence types are maintained properly they are equally effective. However, if both are poorly maintained, galvanised steel fences appear to be more effective than their polywire counterparts.

- **Netting fences**

Netting fences vary in specification but generally consist of a heavy-duty, polythene twine mesh in which the horizontal strands are interwoven with electrically conductive stainless steel wire.

Erecting fences

- **Strained-wire fences**

The strained-wire fence system is constructed of four electrified parallel conducting wires at heights of 10, 15, 20 and 30cm (4, 6, 8 and 12 inches) above the ground. The wires, which are all live, are held by adjustable plastic insulators supported on metal stakes. The stakes can be placed up to 10m (11 yards) apart,

although ground undulations may dictate closer spacing. Where the fence line bends, anchor posts should replace the normal metal stakes. The whole system is tensioned at a reel post placed at the end of the fence.



Electric strained-wire fence

- **Netting fences**

Electric netting fences vary in height and mesh size, depending on the manufacturer, and come in 25 or 50m (27 and 55 yards) rolls fitted with spiked posts at regular intervals and a clip at each end to join rolls together. Pegged guy ropes are also supplied with each roll to support the fences at the ends and at bends. These fences are very easy and quick to erect and dismantle.

Both fence types must be attached to an energiser, which can be mains, battery or even solar or wind powered. The energiser is responsible for generating a pulse of electrical energy along the conductive wires.



Electric netting fence

When the fence is touched by a badger, it is this pulse that produces the electric shock. There are many models of energiser available depending on the power supply and output required, the fence length and the type of animal to be managed. Badger fencing requires, at least, a 1.5J energiser, preferably mains powered or, where this is impractical, connected to a 12V battery (leisure or deep cycle are recommended). If the fence forms a complete enclosure, the energiser can be connected anywhere along the fence but for line fencing, the unit should be placed as close to the middle of the fence system as possible, in order to maintain maximum output at both ends of the fence.

Dry sandy soil is generally a poorer conductor than wet clay soil and, therefore, less fencing can be run from a single energiser. Similarly, strained-wire fences have a smaller electrical resistance than electric netting and longer strained-wire fences can, therefore, be run off a single energiser. In recent trials, galvanised steel strained-wire fences over 1,000m (1,100 yards) in length were run off a single battery (110Ah) powered energiser (1.5J). This system was capable of maintaining a high voltage level (>6kV) for periods of up to one month. If significantly longer fence lengths are required the system should be divided and a second energiser used. **FOR SAFETY REASONS, TWO ENERGISERS SHOULD NEVER BE ATTACHED TO A SINGLE LENGTH OF FENCE.** Research indicates that to maintain effective badger deterrence,

batteries should be replaced when the fence voltage falls below 4kV.

A good earthing system is essential to ensure that the electric pulse can complete its circuit and give the badger an effective electric shock. Ideally, a copper earth stake should be used which penetrates at least 1m (3 feet) into the ground, preferably where damp. The earth stake is usually placed close to the energiser for ease of connecting the two. In extremely dry conditions, it may be necessary to use a number of electrically connected earth stakes set 3-5m (10-16 feet) apart.

Ideally, fences should be erected to surround fully the area to be protected. If this is not practical a strip fence, which extends well beyond either end of the problem area, may be used. Prior to erection, a 0.5m (2 feet) wide strip should be mown along the fence line or the vegetation killed off using an approved herbicide. This ensures that the conducting wires are kept clear of vegetation that would otherwise short circuit the system, thereby draining power and reducing efficiency.

Safety requirements

- Fence systems should comply to British and European Standards BS EN61011: 1992 (Mains powered) and BS EN61011-2: 1992 (Battery powered).
- Fence lines should not lie within 2m (6 feet) of telephone lines or within 15m (17 yards) of power cables. If in doubt, the relevant authority should be consulted.
- Fence earthing systems should be positioned at least 10m (11 yards) away from any electricity supply earth trip.
- Warning notices should be attached to the fence at intervals no greater than 100m (110 yards) where the general public has access to the fenced area.

- Careful consideration should be given to the erection of electric netting near ponds containing frogs, toads and newts, in particular natterjack toads and great crested newts which have special protection under the Wildlife and Countryside Act 1981.

Maintenance

Regular inspections are essential to make sure that electric fences are working properly. An electrical voltmeter can be used to indicate the state of electrification and, if this is poor, steps must be taken to reduce shorting. Research suggests that inspections should be conducted every two days during the first two weeks of use, to make certain that badgers receive an electric shock when they first encounter the fence. This will ensure that they quickly learn to avoid it. Subsequent maintenance visits should be made at least once a fortnight to check the fence voltage. Additional visits to clear grass and other vegetation, which will increasingly short circuit the fence, may also be required.

Fence effectiveness

The fences described in this leaflet were tested in trials where they were used to prevent badgers entering baited plots in which they had previously been encouraged to feed. Both fence types almost completely (99 per cent effective) prevented entry into the test plots.

The efficacy of the galvanised steel strained-wire fence was further tested on commercial farms in the south-west of England. Fences were erected to exclude badgers from fields of forage maize, a crop in which badgers can cause considerable damage. The effectiveness of the fence was determined by comparing the amount of badger damage in fenced and unfenced fields. The fence proved an extremely effective barrier with protected fields suffering overall damage levels 95 per cent lower than those in the unprotected fields.

Excluded badgers were found to forage on alternative crops close to the protected area. Occupiers considering the use of electric fencing should therefore be aware that further damage prevention measures might be necessary to protect other vulnerable areas nearby.

For high value crops susceptible to extensive badger damage, the fence should afford cost effective control, provided regular fence inspections are conducted and voltage levels are maintained above 4kV. The fence has a useful life of around ten years.

Further information

Further advice regarding badger damage and management can be obtained by contacting a Wildlife Management Adviser, e-mail: Wildlife@gov.wales or Tel: 0300 061 5920. .

Other Welsh Government publications on badgers and a range of leaflets on wildlife topics are available on line at: <http://gov.wales/wildlifemanagement> .