

Rabbits: use of fencing to prevent agricultural damage

Rabbits (*Oryctolagus cuniculus*) cause extensive economic losses to agricultural, horticultural and forestry interests. Landowners and occupiers therefore require cost-effective and humane means of controlling rabbit numbers. One of the most common forms of managing the problems rabbits pose is to deny them access to vulnerable areas. Fencing is currently recommended as a humane and environmentally acceptable means of excluding rabbits and thereby reducing damage to agricultural, horticultural or forestry interests.



Fencing

Fencing is a particularly useful method of protecting crops where rabbit burrows are inaccessible and where measures such as gassing rabbits in their burrows, the most effective method of reducing numbers, cannot be used. Burrows can be inaccessible because they are located in dense vegetation, which farmers may be reluctant to clear owing to conservation or game interests, or because they are located on neighbouring properties. Fences should be erected along the

boundary between the field to be protected and the infested harbourage. If the field is not to be completely encircled, the fence should be extended beyond the end of the infested harbourage by at least 150m (165yd) at each end.

Types of fencing

Both traditional wire-mesh netting and electric fencing can be used to exclude rabbits. There are two types of electric fence in common use: electric netting and electric strained-wire (a scaled-down version of the kind more commonly used to manage cattle and sheep).

Materials and construction

Wire-mesh netting fencing

The recommended design of wire-mesh netting fence should be a minimum of 75cm (30") high with a further 15cm (6") lapped on the surface of the ground towards the rabbit harbourage. Turfs of grass should be placed on the lapped netting at 1m (3') intervals to hold it firmly in place; vegetation will later grow through the mesh to complete this job. The netting should be attached to two 2.65mm (1/10") high tensile spring steel, straining wires (one at the bottom of the fence

and one at the top) with galvanised fence rings and the straining wires supported by wooden stakes 1.7m (5'6") high, and 5-7½cm (2-3") in diameter. The stakes can be placed up to 15m (16yd) apart although ground undulations may dictate closer spacing. End posts 2.1m (7') high, and 10-12½cm (4-5") in diameter, need be placed only at the ends of the fence and at bends.

The wire netting should be constructed of 18 gauge, 31mm (1") hexagonal mesh netting and must conform to the British Standard which measures mesh size across the widest part of the hexagon. Other standards, such as the European DIN, measure across the narrowest part. Consequently, 31mm (1") DIN mesh is wider than 31mm (1") BS mesh and is large enough to let rabbits squeeze through. It is recommended that the netting used is of 18 gauge wire as rabbits may bite through the thinner 19 gauge wire.

Electric netting

Portable electric netting fences come in 25m or 50m (27yd or 55yd) rolls fitted with spiked posts at regular intervals and a clip at each end to join the 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 or take down. They vary in height from 50 to 85cm (20-34") and in mesh size from about 7½ x 6½cm (3 x 2½") to about 50 x 5cm (20 x 2"). The horizontal strands are made of polythene twine and, with the exception of the bottom strand, contain stainless steel wires which conduct the current. This type of wire is known as polywire. The vertical strands are usually made of non-conducting twine.

Electric strained wire

The strained-wire fence system is constructed of seven parallel electrified conducting wires (7-strand, 16 gauge medium tensile mild steel) at heights of 5, 10, 15, 20, 25, 30 and 40cm (2, 4, 6, 8, 10, 12 and 16") above the ground. The lowest wire is earthed and the remaining six are live (a small length of wire should be wound round each of the top six wires to electrically connect them). The wires are held by adjustable plastic insulators supported on metal stakes. The stakes can be placed up to 7m (24') apart, although ground undulations may dictate closer spacing. Where the fence line bends, anchor posts replace the normal metal stakes. The whole system is tensioned at a reel post placed at the end of the fence.

The wire is usually supplied in 400m (440yd) reels and should be unwound, one reel at a time; the lowest wire is put in place first, working sequentially upwards to the top wire. Alternatively, a dispenser can be purchased which can facilitate the feeding out and winding in of

four reels of wire. If fences are more than 400m (440yd) long, a corner post should be placed alongside the reel post and the fence set out as before. A small length of wire can be used to connect the electrified wires of both sections together and another length used to connect the earthed wires.

Energisers

Both electric 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. This pulse produces the electric shock when a rabbit touches the fence.

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. Rabbit fencing requires, at least a 1.5J energiser, preferably mains powered or, where this is impractical, connected to a 70 amp 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. The minimum voltage required to deter adult rabbits is about 2.5kV, measured on a dry day with a digital voltmeter. Using the type of energiser described above, which has an output of about 1-2 joules when measured into a 500 ohm resistance, up to about 1km (3/5 miles) of electric netting and 2km (1¼ miles) of strained-wire fencing can be operated. 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!**

A good earthing system is essential to ensure that the electric pulse can complete its circuit and give the rabbit an effective electric shock. Ideally, a copper earth stake should be used which penetrates at least 1m (3') 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') apart.

Ideally, fences should be erected to surround fully the area to be protected. If this is not practical a strip fence, which extends at least 150m (165yd) beyond either end of the problem area, may be used. Prior to erection, a ½m (2') 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') of telephone lines or within 15m (17yd) of power cables. If in doubt, the relevant authority should be consulted.
- Fence earthing systems should be positioned at least 10m (11yd) away from any electricity supply earth trip.
- Warning notices should be attached to the fence at intervals no greater than 100m (110yd) where the general public has access to the fenced area.
- Careful consideration should be given to the erection of electric netting near ponds with frogs, toads and newts, in particular natterjack toads and great crested newts which have special protection under the Wildlife and Countryside Act 1981.

Maintenance

Wire-mesh netting fencing

Maintenance visits are recommended at least once a month, mainly to block burrows dug under the fences but also to repair damage caused by farm machinery or fallen tree branches.

Electric fencing

Maintenance visits are usually required at least every three weeks for both battery and mains operated fences, to check the voltage and to rectify any problems, such as tensioning sagging wires. However, more frequent inspections (for example, every two days) will be necessary during the first three weeks after erection. This is to make certain that rabbits receive an electric shock when they first encounter the fence. This will ensure that they quickly learn to avoid it. If power subsequently fails between inspections, many rabbits will continue to be excluded from the crop because they will still be avoiding the fence. It is extremely rare for rabbits to dig burrows under properly

maintained fences. Additional maintenance visits to clear vegetation from the fence by mowing or herbicide application may also be required.

If maintenance is poor, rabbits can do considerable damage to electric netting fences by chewing through the wires. This could result in sections becoming inoperative which may be difficult to detect. By contrast, rabbits have not been recorded chewing through the wires used in strained-wire fences.

Fence life-span

Wire-mesh netting fencing

Trials conducted by the Forestry Commission showed that these fences on average have a useful life of about 10 years.

Electric fencing

Trials to determine the number of years of useful life of electric netting fences were terminated after seven years at the end of which they were working effectively. However, if maintenance is poor the useful life of the fence will be considerably shortened because of the damage rabbits will do to it by chewing. No trials have been conducted to determine the number of years of useful life of strained-wire fences. However, braided galvanised wire is more durable than polywire and, unlike polywire, is not damaged by rabbits if maintenance is poor. Therefore, strained-wire fences are likely to last longer than electric netting.

Fence effectiveness

The fences described in this leaflet were tested at sites where there were heavy infestations of rabbits. The wire netting and electric netting fences were used to exclude rabbits living in woodland from adjoining arable fields and were equally effective throughout seven years of research. The fences were erected along the boundary of the field and wood and extended by 150m (165yd) at each end after the crop had been planted. This resulted in about an 80% reduction in the number of rabbits counted on the fields.

The strained-wire fence and electric netting fence were used to exclude rabbits from fields of cauliflower and were equally effective during a two-year trial. The fences were erected, immediately prior to the crop being planted, to surround fully each field. Over 95% of the plants protected by each fence produced heads at harvest compared with only 50% of the plants on fields which were unprotected. The farmers on whose land the research was conducted estimated that the additional profit arising from subsequent yield increases was sufficient to cover the costs of electric fencing in one year and of wire netting in two. Although electric fences are initially more cost-effective

than wire netting, by the end of their effective life there is little difference between the two types because of the additional maintenance costs of electric fencing.

Rabbits are highly territorial animals. Therefore, excluded rabbits may not be able simply to move to unprotected fields if these fields are already part of the territory of other social groups. Indeed, recent research indicates that rabbits excluded from vulnerable fields by open ended fences rarely leave the fenced areas to forage elsewhere.

Limited trials have taken place at sites where fields on one side of woods several kilometres (miles) long and up to 150m (165yd) wide have been protected and fields on the other side have not. Rabbit numbers on the unprotected fields did rise, but not nearly to the same extent as they fell on the protected fields. Therefore, rabbits spent more time in the wood than before the fences were erected. Where woods are wider than 150m (165yd), increases in numbers on unprotected fields are likely to be even smaller and vice-versa.

Which fence?

If your field requires year round protection for several years, wire mesh netting is probably more suitable but if you require protection for only part of the year, electric fencing may be more cost-effective and convenient. On holdings with game interests, electric fences are generally more acceptable because they interfere less with pheasant drives and chick rearing. As these fences are lower than wire netting, adult pheasants will fly over them more readily and chicks can easily pass through them.

Choosing between electric netting and strained-wire is to some extent a matter of preference, although on balance strained-wire may be better.

- Electric netting is much quicker to erect and take down and about 5-10% cheaper, depending on the length to be erected.
- Strained-wire fences, by contrast, use materials which many farmers and growers may already have on the farm to manage domestic stock, which would therefore make them cheaper than electric netting

fences. They are also likely to last longer and can carry higher voltages over equivalent distances.

Additionally, some frogs, toads, rabbits and hedgehogs were killed in netting fences but no deaths were recorded in our trials with strained-wire fences; this is probably because the fence is less of a physical barrier, in which animals can become entangled and because the lowest electrified wire is slightly further off the ground than that of netting fences. Wildlife such as deer can also become entangled in the netting if power is disconnected.

Further information

General advice

In England, further advice regarding rabbit damage and management, as well as problems caused by other mammals and birds can be obtained by contacting the Department for Environment, Food and Rural Affairs (Defra) Wildlife Management Team at:

Address: Wildlife Administration Unit, Defra, Burghill Road, Westbury-on-Trym, Bristol, BS10 6NJ

Telephone: 0845 601 4523 (local rate)

E-mail: enquiries.southwest@defra.gsi.gov.uk

A range of leaflets on wildlife topics is available online at: <http://www.defra.gov.uk/wildlife-countryside/vertebrates>

Wire mesh netting fencing

Detailed information on methods of fence erection is available from the Forestry Commission, Publication Section, Forest Research Station, Alice Holt Lodge, Wrecclesham, Farnham, Surrey GU10 4LH, telephone 01420 23337.

Electric fencing

Further information on these fences and the equipment required is available from the manufacturers. Additional detailed technical information is available in the 'Electric Fence Reference Manual' available online at: <http://www.defra.gov.uk/wildlife-countryside/vertebrates/leaflets.htm> or from the Library at Defra, Nobel House, 17 Smith Square, London SW1P 3JR, Telephone 020 7238 6572.

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