



PRACTICE NOTE

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PURPOSE

Rabbits have increased considerably in numbers in the British countryside. This Note gives a brief description of the problems associated with rabbits and summarises the control methods available.

BACKGROUND

Rabbit numbers are increasing by approximately 2% per year. This is mainly the result of the lessening effect of myxomatosis which, in the 1950s, accounted for 99% of rabbit deaths but now only kills about 20% of the population annually. Rabbit numbers are found at pre-myxomatosis levels in some woodlands but are generally still only at about 30% of pre-myxomatosis levels. Accordingly, the potential for damage to young trees is now very high in some areas and increasing in others.

The rabbit problem in woodlands is exacerbated by a number of management factors:

- many areas of new woodland are on ex-agricultural sites where a large rabbit population is already established;
- the presence of brash, and often windthrown stumps, on felled areas provides cover for rabbits and makes control difficult;
- the high cost of rabbit fencing inhibits its use around areas of planting;
- there is a lack of manpower available at the time of year when control is most needed;
- because myxomatosis eliminated the need for rabbit control for many years, the necessary skills and expertise have been lost.

There are no new techniques available to control rabbits. The protection of trees can only be achieved by good planning, careful evaluation of existing methods and thorough implementation of the most suitable options for

a given situation. Forestry Commission Practice Note 3 *The Prevention of Mammal Damage to Trees in Woodland* gives further advice on evaluating the cost-effectiveness of methods of mammal control.

Viral haemorrhagic disease (RVHD) has recently been diagnosed in wild rabbits but cannot be relied upon to reduce numbers, and therefore damage, in a similar way to myxomatosis. Although little is known about RVHD, experience in other countries suggests that rabbit damage may only be reduced in the short-term. Nevertheless, by more intensive use of appropriate control measures, low damage levels may be maintained for longer where rabbit populations are affected by the disease.



The rabbit: a problem that has increased considerably in the British countryside.

TREE DAMAGE

Damage to trees, by either browsing or bark-stripping, is the result of feeding. Therefore, the more rabbits that are present, the greater will be the level of damage. Browsing is the most common form of damage on young trees of all species and can occur up to a height 540 mm in normal conditions, higher over lying snow. Bark-stripping to the base of pole-stage trees (also up to 540 mm) is much less common than browsing; ash and beech are most vulnerable to this form of damage.

A number of other mammals can cause bark stripping and browsing damage that may be difficult to distinguish from that caused by rabbits. Forest Commission Practice Note 3 *The Prevention of Mammal Damage to Trees in Woodland* describes the characteristic features associated with each animal.

MANAGEMENT

The complete eradication of rabbits in woodland is impractical. The aim should be to protect tree crops through planned management taking the following into account:

- use of barriers
- the need for more fencing between forest edge and fields
- sufficient time to enable rabbit clearance of fenced areas before planting
- a reduction of rabbit harbourage - slash, windthrown pockets and clumps of thick cover
- the most effective control method is gassing
- the most effective control period is November-March
- co-operative rabbit control - rabbit control societies are on the decline and are therefore of limited value to rabbit control in woodlands. The National Federation of Rabbit Control Societies was disbanded in the mid-1980s.
- co-operation with neighbours to access their land
- the conservation of other wildlife habitats
- ranger/operator training
- regular communication between rangers and their management supervisors
- local markets for the sale of rabbits.

Rabbit populations are very resilient and can withstand high mortality. It must be considered therefore that there are likely to be some woodland areas where the rabbit problem is so great that current techniques may not be capable of reducing damage to an acceptable level unless virtually unlimited time and manpower are expended.



Browsing damage to Sitka spruce.



Bark stripping by rabbits.

CONTROL MEASURES

Physical barriers

Fencing

Areas should be rabbit-fenced prior to planting and in sufficient time to allow the removal of rabbits from within the fenced area before planting. Some internal subdividing fencing may be necessary to aid the removal of rabbits from heavily infested areas. The maximum manageable size of enclosure will depend on the number of rabbits present, but may be as small as 25 ha on the most heavily infested areas (40 rabbits per hectare or more). Fences must be regularly inspected and repaired.

New rabbit fences should be 0.9 m high, made of 18 gauge (= 1.2 mm diameter wire) x 31 mm hexagonal mesh netting, and with no point along the fence lower than 0.75 m (Figure 1a). An out-turn of 150 mm at the base should be allowed for; this should be buried or covered with cut turves. The wire netting must conform to the British Standard and not just to the European DIN Standard. The latter specifies 31 mm mesh but allows a tolerance up to 36 mm which is too large to stop all but fully-grown rabbits. 19 gauge (= 1.0 mm diameter wire) netting is too lightweight and should not be used because rabbits can bite through the wire. Where rabbit numbers are high and they are known to be fence-climbing, consideration should be given to increasing the specification to include a turnout at the top of the fence (Figure 1b). This may lead to additional burrowing under the fence but this activity is visible and the runs can be easily closed.

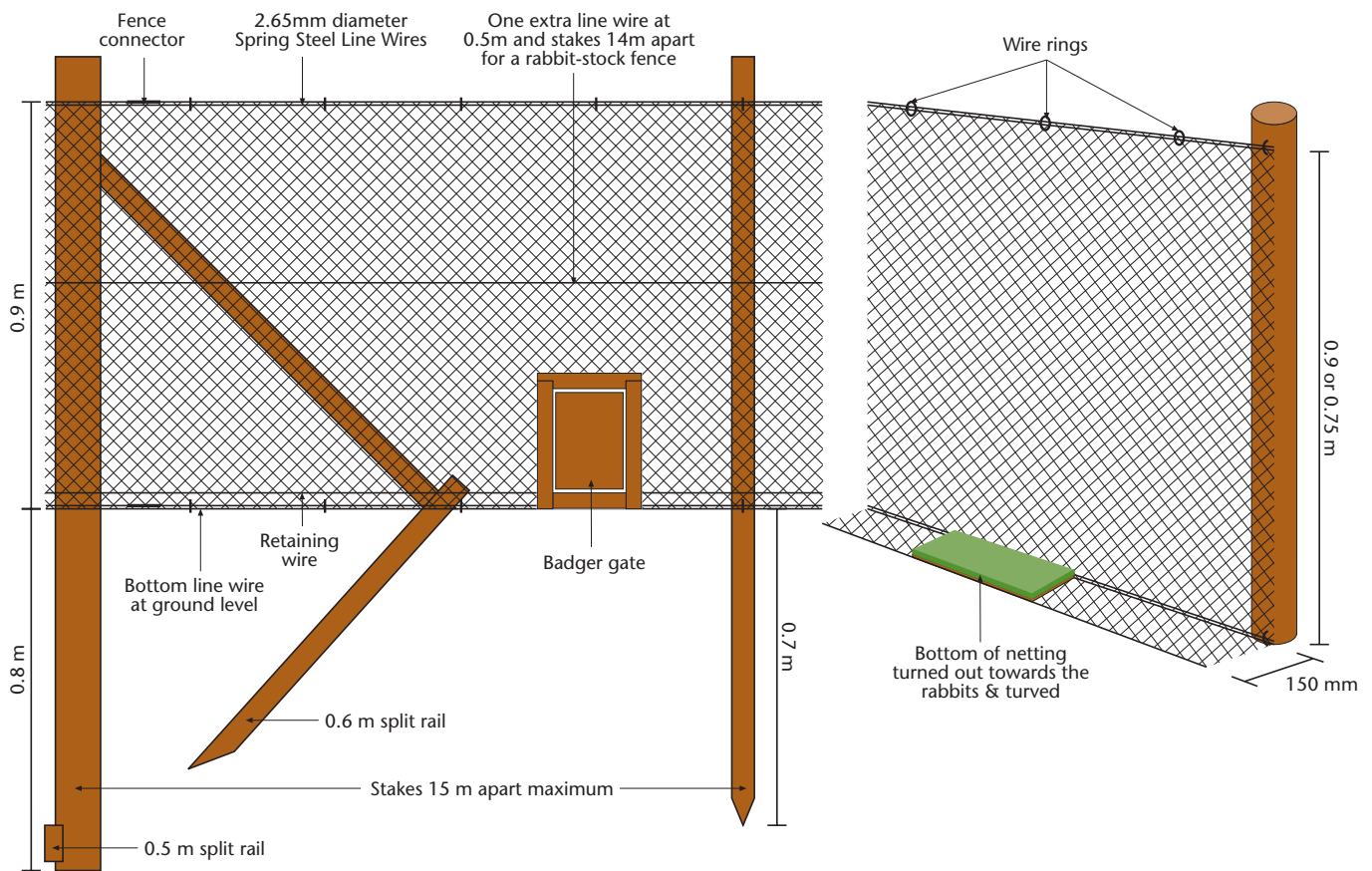


Figure 1a Specification for rabbit and rabbit-stock fences. See Table 1 for woodwork sizes.

Figure 1b Increased specification for rabbit and rabbit-stock fences to include a 45° turnout.

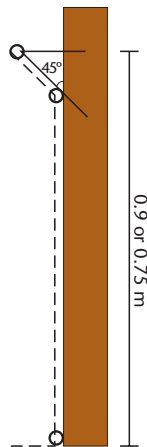


Table 1 Woodwork sizes - rabbit and stock

Rabbit	Length (m)	Top Diameter (cm)
End posts	2 or 2.3	10 - 13
Struts	2	8 - 10
Stakes	1.7	5 - 8
Rabbit & Stock	Length (m)	Top Diameter (cm)
End posts	2.3	10 - 13
Struts	2	8 - 10
Stakes	1.7	8 - 10



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A rabbit fence around a restock area in the Forest of Dean.



FOREST LIFE

The out-turn at the base of the fence should be buried or covered with cut turves.

Tree guards and tree shelters

0.6 m high mesh guards or shelters, in a range of diameters, are sufficient for protecting newly planted trees and shrubs from browsing and bark-stripping. Split plastic tubes can be fitted over the stems of whips and standards, and plastic spiral guards used on feathered trees. Spiral guards must be wound between branches and it is important to ensure that no gaps are left between the spirals - rabbits are capable of gnawing bark through a space as little as 5 mm wide.



FOREST RESEARCH



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Plastic mesh tree guards to protect against browsing damage (left) and bark-stripping (right).

Chemical repellents

The application of an effective repellent can provide a more economical method of protecting trees than either fencing or individual protection with guards or shelters. However, this advantage is lost if repeated annual applications are necessary. "Aprotect" has proved to be the most consistently effective repellent. It can be applied by spraying the whole tree (to protect against browsing) or by painting or spraying vulnerable areas of bark. Only treated parts of the tree are protected; untreated areas, however close they may be to treated areas, are at risk of damage. Spraying can only be carried out between mid-November and the end of February as the material is phytotoxic to emerging foliage. Spring growth cannot, therefore, be protected.

CONTROL OF RABBIT NUMBERS

The optimum time for controlling rabbit numbers for tree protection is from the beginning of November to the end of February. In the north, this period may be extended to the end of March. Rabbit numbers are naturally at their lowest, and populations are therefore most vulnerable to further reduction, at this time of year. Research by MAFF has shown that winter rabbit populations are unaffected by natural mortality (including that due to myxomatosis) or control killing that occurs at other times of the year. Moreover, the fact that vegetation is down during the winter aids gassing operations by making burrow entrances easier to find.

Owners or occupiers of land may be legally obliged to carry out rabbit control at any time of the year under the Pests Act 1954, the Agricultural Act 1947 and the Agricultural (Scotland) Act 1948. These are likely to apply where horticultural or agricultural crops require protection.

Gassing

The fumigation of burrow systems with either sodium cyanide or aluminium phosphide is the most effective method of control. Both compounds release poisonous gas (hydrogen cyanide in the case of sodium cyanide and phosphine in the case of aluminium phosphide) on contact with moisture and both can be hazardous to the operator if the prescribed methods are not fully observed. Carbon monoxide, which is judged to be a more acceptable gas, may be available as an alternative fumigant in the future. Gassing should only be carried out by properly trained and equipped operators. The operation must be risk assessed according to the provisions of the Management of Health and Safety at Work Regulations Act (1992). It is particularly important in the case of sodium cyanide that proper arrangements are made for emergency first aid and that the procedures are detailed in writing beforehand. All gassing compounds are activated by moisture and they should never be used in wet weather or stored in damp conditions. Full safety guidance is given in HSE Agriculture Information Sheet No 22 *Gassing of rabbits and vertebrate pests*; anyone involved in rabbit gassing should have read this publication.

The details given in the following paragraphs are intended only to enable evaluation of the methods by managers and supervisors - they do not constitute an operational guide and should not be substituted for proper training or for the instructions on the product label.

Sodium cyanide fumigation with a hand or power pump should only be contemplated for the largest inter-connected burrow systems - those having more than 40 entrances. After the operation is complete, consideration should be given to ripping out such large burrow systems with a tine, **but there must be a delay of at least 48 hours between gassing and any subsequent treatment that involves opening up burrows.** If ripping is carried out, any subsequent new burrows will initially be smaller and can be dealt with by single entrance treatment. The suitability of various materials to fill and block burrow systems is under investigation.

Comparative trials have shown that spoon-gassing with sodium cyanide and use of phosphine-generating tablets will kill rabbits effectively. Phosphine, which is less toxic and slower acting than hydrogen cyanide, is less hazardous to the operator and is therefore preferred by risk assessment. However, it is considered by some to be less humane. Tablets should be applied by injector rather than by hand.

It is imperative to drive rabbits to ground before gassing and to find and treat every entrance to a burrow system. Any missed hole will allow a rabbit a safe escape route. To gas a burrow the prescribed amount of compound is placed inside the entrance which is then sealed with soil or (preferably) with a turf, grass-side down. Care must be taken not to cover the compound with soil during this part of the process. A single gassing treatment should account for approximately 65% of the rabbits present. Gassing becomes less effective when soil moisture is very low or air temperature is below 5°C.

The effectiveness of a gassing operation should be monitored by recording the number of burrow entrances treated and then recording the number of re-opened entrances that require re-treatment at subsequent follow-up visits. A follow-up visit and re-treatment should not be carried out until at least 48 hours after the previous treatment. Ideally, the procedure should be repeated until no new burrows are found.

Kill trapping

Kill trapping is less effective than gassing. Only approved spring traps may be used (Spring Traps Approval Order 1975); they should be set inside the burrow entrance.

Live trapping

Cage traps baited with carrots can be used to mop up small numbers of rabbits that remain within, or have subsequently entered, ring-fenced areas. They are also useful for taking rabbits outside the recommended control period when required to fulfil the owner's or occupier's legal obligation to control rabbits. In common with all live capture traps, once set, there is a legal requirement to visit them every day. It may sometimes take several days before rabbits enter the traps.

Wooden or metal box traps, permanently sited along or through fence lines, can take substantial numbers of rabbits. Such traps can be particularly useful on perimeter fences between woodland and fields but the capital cost involved can be high.

Snaring

Although reasonably effective, snaring is not recommended. It is unselective, considered to be inhumane, and could generate antagonism from visitors to forests and other members of the public. Use of snares should only be considered in the rare situations where all other methods have been tried and found to have failed. The Wildlife and Countryside Act 1981 prohibits the use of self-locking snares and requires snares to be visited daily.

Shooting

Shooting should only be used as an adjunct to other methods. A person on their own with a dog and gun can make little impact on a rabbit population unless considerable time and effort are expended. It is only possible to shoot a limited number of rabbits at any one time in one place before the remainder take flight. In order to kill substantial numbers, it is necessary to make regular visits to several places in turn. However, rabbits become wary after repeated shooting and do not show themselves, giving the erroneous impression that they have all been killed or driven away. Suitable terrain for shooting, that is open ground with a minimum of cover, is not generally available in woodland.

Ferretting

This is not generally an effective method of reducing population size. Generally, more females are captured than males and the cost of keeping ferrets is high.

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*HSE Agriculture Information Sheet No 22
Gassing of Rabbits and Vertebrate Pests.

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