The red fox in rural areas

The red fox *Vulpes vulpes* is native to the British Isles, and widespread throughout mainland Britain. Its opportunistic ability to adapt to available food sources has made it a successful species. However, this adaptability has also brought it into conflict with people. In rural situations, such problems can arise where livestock or game animals are kept.

Description

The fox is not a large mammal, only weighing around 6 kg (13 lbs) with a head and body length of 60-75 cm (24-30 in). The distinctive bushy tail is around 40 cm (16 in) long. The general overall colour is yellow to brown with much variation even between litter-mates. The lower parts of the legs are typically black (black socks) and the tail frequently has a white tip. Occasionally foxes with unusual coat colours and fur length are found, which have resulted in claims of dog/fox hybrids. These have not been substantiated.

The sexes are similar, but males (dogs) are generally larger than females (vixens). Mature dog foxes have slightly broader heads than vixens. Often foxes are only seen fleetingly and at a distance, which makes it very difficult to distinguish between the sexes.

Biology and behaviour

Distribution

Foxes are found throughout Great Britain in all habitats. They are present on Anglesey and the Isle of Wight but are not found on the smaller islands around the coasts of England and Wales.

Foxes thrive best in habitats where there is a mixture of scrub, woodland, grassland and arable land offering a wide variety of food, resting and denning sites. Large uniform areas such as dense conifer plantations do not support many foxes.

In the last 50 years foxes have expanded into areas where they were previously rare or absent. At one time, in some areas eg East Anglia, there were widespread intensive game rearing or commercial rabbit trapping operations and these areas were kept almost fox free by gamekeepers and trappers.

Food

Although classified as carnivores, foxes will readily eat a wide variety of foods including fruit and vegetable matter. Foxes prey on a variety of wild mammals, birds, insects and other invertebrates, such as earthworms. Foxes will scavenge almost anything edible - animal or vegetable. It is partly due to this ability to exploit a wide variety of different foods that foxes are common and found throughout Britain.

Second edition January 2011
www.naturalengland.org.uk

The red fox in rural areas

Foxes will cache food that cannot be eaten immediately, especially when a there is an abundance of a preferred food.

They may occasionally kill large numbers of easy prey such as ground nesting birds or captive hens without eating many of them. This is known as surplus killing. This phenomenon is not confined to foxes; many predators carry out surplus killing in response to an unusual super abundance of vulnerable prey.

Behaviour and movements

Foxes are mainly active between dusk and dawn but can be active during the day especially in more remote and less populated areas and when feeding cubs. Outside the breeding season, where surface cover is available, underground den or earth use is irregular. Adult foxes maintain a territory over which they range. Territory size varies and is related to the suitability of the habitat. Territories are smaller in areas with good food supplies and good denning sites than in less favourable areas. For example, a territory may be 100-200 ha (500-740 acres) in lowland mixed farmland, but over 600 ha (1,500 acres) in hill areas. At around 6-9 months old, juvenile foxes have a tendency to disperse from their parents' territories. Dog foxes tend to move further than vixens, with movements of 52 km (33 miles) having been recorded, although these are exceptional. Some vixens remain in their parent's territory throughout their life. The distances moved depend upon population size and the level of local population control. Greater fox dispersal movements have been recorded in areas where fox control is practised, than in those areas where culling is not undertaken.

Breeding

Although fox cubs have been found in nearly all months of the year, foxes are seasonal breeders with litters usually born in late March to early April. Vixens come into season in late January and early February; dog foxes are fertile for some time before this period and remain fertile until sometime afterwards. Like domestic dogs, foxes become locked or knotted during mating. A high proportion of vixens mate and become pregnant but not all carry their litters to full term. The reasons for this are complex, but there is a tendency for it to occur where foxes are numerous, where there is little fox control, and in younger females.

After a gestation period of 52-53 days the cubs are born, with short black fur, blind and deaf, usually in an underground den. The eyes and ears open at 11-14 days. For the first 2-3 weeks the vixen stays with the cubs all the time. From then on, she spends an increasing amount of time away from them and from 4-5 weeks onwards often only comes back to the cubs to feed them. The cubs start to take solid food at about 4 weeks and by 5-6 weeks old will be eating a wide variety of solid items. Both parents bring food to the cubs.

The average litter size is 4-5 cubs. The vixen will move the cubs a number of times to different dens and these moves may be caused by human disturbance. Something as simple as a person making a short visit to a den may cause such a move. Cubs first appear above ground at 5-6 weeks old. Over time, cubs become more and more independent and by early July, where sufficient surface cover is available, cubs will often lie above ground during the day. Cubs are adult-size at 6-7 months old and will come into breeding condition before they are 1 year old.

Social organisation

Although less social than mammals like badgers, foxes live in family groups. The group can be as small as a pair of foxes and any dependent cubs. Family groups consist of a number of vixens (often related to each other – mother and daughters or sisters), usually with a single dog fox plus dependant cubs. These larger groups tend to be found in areas of higher fox numbers and/or where little fox control takes place. Itinerant animals, more often dog foxes, also occur. In family groups with more than one vixen it is not unusual for only one of the vixens to produce a litter of cubs. Animals of the same family group may forage together, or separately. Foxes will scent-mark by anal gland secretions and urine. Distinctive faeces (scats), often deposited in prominent places such as on logs or on large stones, are used as a means of fox-to-fox communication. Foxes also communicate by distinctive calls, most frequently heard during the breeding season.

The red fox in rural areas

Population size and numbers

Various estimates of national fox numbers have been made, usually about 200,000-300,000. How accurate these estimates are is difficult to know. Whether or not fox control reduces fox numbers to levels below that which food supplies can support, is a subject of debate. In areas where a considerable amount of fox control takes place over 60% of the foxes may be less than one year old and the population turns over quickly.

Foxes live longer in areas where little fox control takes place but cub production is likely to be low in these areas. This is because an individual's breeding success will decline with the rising numbers of foxes and the consequent increase in competition for food and space.

Parasites and disease

Foxes can be infected with a number of zoonoses (these are diseases communicable to man). In Britain, foxes are not the only reservoir of any particular disease, so normally fox destruction purely for disease control purposes is generally not appropriate as other animals (such as dogs) are more likely to be the cause of human infection. However, all wild animals should be thought of as potential vectors of disease and sensible precautions taken where handling is necessary.

Foxes are susceptible to sarcoptic mange. This is a skin condition caused by a mite resulting in extensive hair loss and it can be fatal. It is highly contagious among foxes, and can be passed to domestic pets such as dogs and cats, especially if they use the same areas as foxes such as holes through fences and hedges.

Foxes carry a number of internal parasites. For people, the most important are probably the roundworm *Toxocara canis* and tapeworm *Echinococcus granulosus* which causes hydatid disease (the formation of fluid-filled in cysts in organs such as the liver). These parasites also occur in dogs and are transferred between hosts through the ingestion of worm eggs passed in the droppings of an infected animal.

Foxes are also susceptible to Weil's disease (Leptospirosis), which can be passed on to other animals and humans through contact with their urine. Distemper has not been recorded in wild foxes in this country.

Britain is currently rabies-free, but in countries where rabies occurs, foxes can contract and pass on the disease.

Problems with foxes

It must be expected that a carnivore like the fox is likely to prey upon animals of economic importance. Foxes are often blamed for killing lambs, poultry and piglets reared in outdoor pig units. They also prey on many species of wildlife, including game.

Problems of livestock predation are often local, unpredictable and sporadic. Farms may suddenly experience losses of livestock after long periods free from problems. Often, the only explanation is fox or other animal predation. This unpredictability can be very frustrating and lead to hasty and sometimes illegal action. It is difficult to tell whether or not a new-born lamb has been killed by a fox, or if it has died as a result of the sudden onset of bad weather or mis-mothering and been subsequently scavenged by a fox. Thus foxes may be blamed for killing a lamb when in fact they have simply found it dead. Surveys of farmers show that, on a national and local level, reported losses of young lambs are small and not of overall economic significance.

However, whether this is because sheep farmers vigorously control foxes in high risk areas and consequently reduce lamb losses to a low level, or that fox control is unnecessary, is the subject of debate and are questions that have not yet been resolved.

The fact that foxes prey on game animals is beyond dispute but the effects on game numbers and the economic losses are more difficult to calculate. The Game and Wildlife Conservation Trust (GWCT) has shown that predator control (including fox control) during the nesting period has a positive effect on wild partridge numbers resulting in a surplus for shooting in the autumn.

The red fox in rural areas

Management options

Choosing the best approach

It is difficult to give comprehensive advice on how to alleviate all possible problems that may be caused by foxes, as much depends upon the individual circumstances. Before any action is taken, a thorough assessment of the problem should be undertaken and the consequences of any action carefully thought through. It is clearly pointless to spend money on livestock protection, or fox control, if the cost is likely to be more than that of the damage it is designed to prevent. The overall aim of any fox management needs to be considered. Is the problem due to year-round predation, or the protection of vulnerable of animals during a short period?

If the overall objective is to reduce fox numbers, you will have a greater chance of success if your neighbours are controlling foxes and/or you are in a low fox-density area. In high fox-density areas, killing foxes to reduce numbers (and thus predation) is often not successful or cost effective. If culling takes place during the fox dispersal period (October to March), resident foxes will be quickly replaced. Killing foxes gives only a short-term benefit, so culling requires a long-term commitment.

Non-lethal control measures

Protection of livestock and control of damage is preferable to fox destruction. Investment in adequate poultry housing is preferable to a continual commitment to killing foxes. Also, there is no substitute for good husbandry to ensure that livestock are healthy and able to withstand the sudden onset of bad weather that may result in stock deaths for which foxes are blamed.

Repellents and deterrents: These may be effective in reducing livestock losses and a number are available. However, it is illegal to use a substance as a repellent or deterrent unless it has been approved for the purpose. Registration and de-registration is an ongoing process and only approved products should be used to repel or deter foxes. Renardine, a bone oil formulation, is no longer approved. Information on approved products is available from the Chemicals Regulation Directive (CRD), part of the Health & Safety Executive.

On occasions when livestock only need protecting for a short time, novel objects in an area (eg flashing lights in lambing fields) are claimed to be effective deterrents of foxes. In addition, close shepherding at lambing time may be as effective as any deterrent and will allow the early identification of problems (such as mis-mothering) and allow action to be taken to reduce the risk to new born lambs.

Permanent fences: These exclude foxes, but are uneconomic except for highly valuable livestock. A fox-proof enclosure requires a fence that is 1.8 m - 2 m (6 ft - 6 ft 6 in) high with an overhang at the top and a buried section at least 45 cm (1 ft 6 in) deep, to prevent foxes digging under it. Ideally, a sheet of smooth durable material of at least 30 cm (1 ft) depth should also be positioned at the top. The addition of an electric wire will also improve the security of this fence.

Electric fences: An electric mesh net fence or multi-strand wires around a field may be an effective deterrent for a short period when lambs or piglets are at their most vulnerable. If a fence is required for stock control regardless of fox problems, then electric fencing may be an economic solution to the problem; to deter foxes such a fence should be at least 105 cm (3 ft 6 in) high. In experiments, foxes would not cross multiple strand electric fences and electrified mesh fences. These experiments used captive foxes in a small enclosure and, as yet, have not been tested on a field scale. Guidance on erecting electric fences, including details of materials and safety considerations, is given in leaflet TIN027 *Badger problems: use of electric fencing to prevent agricultural damage*. Additional detailed, technical information is available in the Electric Fence Reference Manual (see Further information).

Novel methods: In the USA, llamas have been used to guard livestock, especially sheep, from predators. In Britain this technique has been little used but a number of farmers claim it is a successful method of reducing predation by foxes on lambs.

Game birds released for shooting are vulnerable to foxes. The GWCT.and British Association for Shooting and Conservation (BASC) offer advice

on methods of protecting game. Specifications for fences for pheasant release pens are available from the GWCT.

Lethal control of foxes

There are number of legal methods by which foxes can be killed, but before embarking on any method, first assess whether or not the problem could be solved by non-lethal means, such as better protection of vulnerable animals. Such approaches can provide a long-term solution and avoid the need for continuous culling. If fox destruction is the only option then consideration should be given to find the most appropriate method.

Shooting: A number of different shooting techniques are used to kill foxes. The shooting of foxes at night using a rifle with the aid of a spotlight - lamping should only be done by competent shots who know the area well and are familiar with it in daylight.

Shots at long range should not be taken; and weapons and ammunition chosen with care. A rifle of .22 calibre or larger should be used. Similarly, the use of dogs to flush foxes from cover should also only be undertaken by competent people using appropriate guns and ammunition and in accordance with the provisions of the Hunting Act 2004 (see below).

A large breed of dog should be used, as terrier-type dogs, no matter how well controlled, are likely to investigate any fox den or hole they come across. A shotgun can be used so long as the fox is within range (the BASC Code of Practice for lamping recommends a maximum range of 20 metres) and the ammunition is appropriate; cartridges loaded with shot of at least size four and no larger than BB should be used.

The opportunistic shooting of a fox at a game shoot should not be attempted because the correct ammunition is unlikely to be at hand or used. Wounded animals should be followed and humanely killed. The Codes of Practice available from BASC and GWCT should be followed.

Snares: Snares must be free-running as self-locking snares are prohibited. It is a legal requirement that all snares must be inspected at least once every day. A fox caught in a snare becomes a Protected Animal under the Animal Welfare Act (2006), making it an offence to cause unnecessary suffering, so more frequent inspections are recommended. In the winter, snares should be inspected soon after sunrise and preferably again near dusk. In the summer, when foxes may be active following an early sunrise, inspection after 7-7.30am but before 9am is preferable, with a further inspection in the evening.

When inspecting snares it is essential that a means of humane destruction of a snared fox (and other pest species) is available. A .22 firearm or a shotgun is suitable for the purpose. Air weapons should not be used, as they are not sufficiently powerful. When shooting a snared animal great care should be taken so there is no risk of personal injury or danger to others.

Snares should be set so that the chances of catching a non-target animal are minimal. All protected non-target animals should be released unharmed. It can be difficult to release non-target animals such as badgers from snares without injury to both parties; this should be a further incentive to reducing the chances of capture of non-target species.

Stopped snares, where the loop is prevented from closing smaller that a set diameter, reduces the chances of livestock or deer being caught by the leg. Both the BASC and GWCT have produced their own codes of practice on fox snaring.

Traps: Live capture cage traps are not much favoured as a method of fox control in rural areas as they are believed to be inefficient in most circumstances. A number of different traps are available commercially. All are of similar design and depend upon attracting a fox to a suitable bait placed in the trap with a trip mechanism to close the door.

If you want to make the trap yourself, we recommend that it is constructed of rigid wire mesh not greater than 50 x 50 mm (2 ft x 2 ft). It should be about 1.2 m long, 450 mm wide and 450 mm high (4ft x 1ft 6in x 1ft 6in).

The door should be spring-loaded and hinged 450 mm (1 ft 6 in) from the opening. The closure of the door is triggered by the fox pulling on a bait hanging on a string towards the back of the cage. It is essential that the bait is not accessible to the fox from outside the trap.

Fallen livestock, including dead poultry, should not be used as bait in cage traps due to the potential risk of spreading disease. Otherwise most meat baits are suitable, but the use of live bait or decoys is prohibited.

Traps should not be placed where they are likely to be interfered with and should be sheltered so that trapped animals receive protection from inclement weather. Cage traps are likely to catch badgers so traps should not be placed close to badger setts or in other places where there are signs of frequent badger activity.

The smaller mesh size traps (eg 25 mm x 25 mm) are also likely to catch grey squirrels or small carnivores (stoat, polecat and mink) that may be attracted to the bait. All protected species caught must be released unharmed, but grey squirrels and mink must not be released and should be humanely destroyed.

As with snares any animal caught in cage trap becomes a Protected Animal under the Animal Welfare Act (2006), making it an offence to cause unnecessary suffering. Traps should therefore be inspected at least once a day, ideally twice. In the winter, traps should be inspected soon after sunrise and preferably again near dusk. In the summer, when foxes may be active following an early sunrise, inspection after 7-7.30 am but before 9 am is preferable, with a further inspection in the evening.

When inspecting traps, it is essential that a means of humane destruction of a captured fox (and other pest species) is available. The advice given for snares regarding humane destruction of foxes (and other pest species) also applies to cage traps.

The removal and release of trapped foxes elsewhere is not recommended on welfare grounds and may constitute an offence under the Animal Welfare Act (2006).

It should also not be undertaken unless the landowners in the release area agree to such action. All trapped animals must be treated humanely. Causing unnecessary suffering whether deliberately or through neglect is an offence. The provisions of the Wild Mammals Protection Act (1996) should also be considered.

Middens: This technique is favoured in parts of the country as a method of improving the effectiveness of cage trapping, snaring or shooting. A midden is anything considered attractive to foxes, eg a buried rabbit carcass bait. Whole or part livestock carcasses (a dead sheep for example) should not be used as bait; fallen livestock should be disposed of by legal means.

Where the intention is to attract foxes to an area so they can be cage trapped or snared, the midden is surrounded by a fence that allows foxes free passage but keeps out livestock. Cage traps or snares are set within the fenced area. Where the intention is to attract foxes so they can be shot, shooting is usually with a rifle, with shots taken from a suitable vantage point or a high seat.

Fox hunting and terrier work: The Hunting Act 2004 prohibits all hunting of wild mammals with dogs in England and Wales, except where it is carried out in accordance with the conditions of the few tightly drawn exemptions intended to allow certain necessary pest control activities to continue. These exemptions, which require the consent of the occupier or owner of the land, include:

- stalking and flushing out with up to two dogs, provided that the wild mammal is shot as soon as possible after it is flushed from cover;
- using a single dog underground to flush out wild mammals in order to protect birds kept for shooting (the gamekeepers exemption); and
- using up to two dogs to search for an injured animal, provided that appropriate action is taken to relieve the animal of its suffering as soon as possible after it is found, and that it was not deliberately injured in order for it to be hunted under this exemption.

All the specific conditions of each exemption must be complied with if the hunting is to be lawful.

Legal aspects

Traps Trapped and captive animals must be treated and killed humanely (Protection of Animals Act 1911). Live baits and decoys are prohibited (Wildlife & Countryside Act 1981).

Snares These should be inspected at least once per day. Neglecting to check a snare could be an offence (Animal Welfare Act 2006). Self-locking snares are prohibited (Wildlife & Countryside Act 1981).

Bows, crossbows The use of these weapons to kill foxes is prohibited (Wildlife & Countryside Act 1981).

Poison baits It is illegal to place poison baits with the intention of killing foxes (Protection of Animals Act 1911).

Gassing Although legislation allows the use of a gas, in a den, to kill foxes (Agriculture Act 1947), currently no products are registered under the Control of Pesticide Regulations (1986) for this purpose. So for all practical considerations introducing a gas into a fox den is illegal.

Repellents and deterrents Only products registered under the Control of Pesticide Regulations (1986) should be used.

Blocking / destroying earths This could be considered an offence under the Wild Mammals (Protection) Act 1996 if occupied.

Hunting The Hunting Act 2004 makes all hunting with dogs of wild mammals, including foxes, illegal, except those limited activities covered by the exemptions in Schedule 1 to the Act, summarised above.

Contact details

In England, further advice on dealing with fox problems, as well as problems caused by other mammals and birds can be obtained by contacting Wildlife Management and Licensing at:

Natural England, Wildlife Licensing Unit, First Floor, Temple Quay House, 2 The Square, Bristol, BS1 6EB
0845 601 4523 (local rate)
wildlife@naturalengland.org.uk

Further information

A range of leaflets on wildlife topics is available online at **www.naturalengland.org.uk**

Leaflets available include:

- SIN003*: Urban foxes*
- TIN 027: *Badger damage: using electric fencing to prevent agricultural damage*
- *Electric fencing reference manual* (R&D Surveillance Report 607)

The full text of the Hunting Act 2004 can be obtained from The Stationery Office (Tel 0870 6005522) or from the HMSO website (**www.legislation.hmso.gov.uk**).

In addition, a leaflet about the Act and a short summary of its provisions are available from the Defra website (**www.defra.gov.uk**) or the Defra publication centre (Tel: 0845 9556000).

Codes of Practice on snares and lamping are available from the British Association for Shooting & Conservation, Marford Mill, Rossett, Clwyd LL12 0HL. (**www.basc.org.uk**)

A guidance leaflet on using snares, and advice on many aspects of Game Management, including predator control, are available from The Game and Wildlife Conservation Trust, Fordingbridge, Hampshire SP6 1EF. (**www.gwct.org.uk**)

Information on approved pesticides and biocides is available from the Chemicals Regulation Directive **(www.pesticides.gov.uk**) and the Health & Safety Executive (**www.hse.gov.uk**).

The following books provide further information on the subject of foxes:

BURROWS, R., 1968. *Wild fox*. Newton Abbott: David & Charles.

HARRIS, S., 1986. *Urban foxes*. London: Whittet Books.

KOLB, H., 1996. *Rural foxes*. Newton Abbott: David & Charles.

LLOYD, H.G., 1980. *The red fox*. London: Batsford.

MACDONALD, D.W., 1988. *Running with the fox.* London: Unwin Hyman.

This leaflet was produced by Natural England and the Central Science Laboratory, now known as the Food and Environmental Research Agency (FERA).