Badger Rehabilitation Protocol 2018

Department
for Environment
Food & Rural Affairs

Preface

When the Badger Rehabilitation Protocol was published in 2003 it was very much a collaborative document between the three main charities involved in badger rehabilitation; Badger Trust, RSPCA and SWWR. Since 2003 many things have changed. Amongst these changes are new ways of rehabilitating and releasing badgers, new diagnostic tests and new preventative health care. There was no doubt that the document required updating and I thank Defra for providing the impetus for this to be done and making it possible.

In updating the Protocol I have tried as much as possible to include those involved in the initial work. Those who have given me their time, patience and expertise are acknowledged at the end of the document and I am indebted to them, for without them this really would have been an impossible task.

This Protocol document provides information for those involved in badger rehabilitation and release. It is not in any way a veterinary guide and sources of information for veterinary surgeons are referred to throughout. This Protocol is based on the experience and knowledge of the contributors. As so much of the work that is carried out has no published evidence base, some of the sections are intentionally 'guidelines' rather than policy, with an appreciation that others may do things differently. It is hoped the Badger Rehabilitation Protocol will be reviewed and updated on a regular basis.

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Abbreviations used in the text

Abbreviations used throughout the text are listed below:

APHA	Animal and Plant Health Agency
AWA	Animal Welfare Act
BCG	Bacillus Calmette-Guérin
BSAVA	British Small Animal Veterinary association
bTB	Bovine tuberculosis (*Mycobacterium bovis* infection)
BVA	British Veterinary Association
BVZS	British Veterinary Zoological Society
BWRC	British Wildlife Rehabilitation Council
CCTV	Closed-Circuit Television
COSHH	Control of Substances Hazardous to Health
Defra	Department for Environment Food and Rural
DPP	Dual Path Platform VetTB test
FERA	Food and Environment Research Agency
ELISA	Enzyme-linked Immunosorbent Assay
DIVA	Differentiate Infected from Vaccinated Animals
GP	General Medical Practitioner
GPS	Global Positioning System
HSE	Health and Safety Executive
HSENI	Health and Safety Executive Northern Ireland
IET	Initial Emergency Treatment

IFGγ	Interferon gamma
MAFF	Ministry for Agriculture Fisheries and Food
MNR	Monitored Natal Return
NE	Natural England
NFBG	National Federation of Badger Groups
NRW	Natural Resources Wales
NWCU	National Wildlife Crime Unit
PAW	Partnership for Action Against Wildlife Crime
PoBA	Protection of Badgers Act
POM-V	Prescription Only Medicine Veterinarian
PPE	Personal Protective Equipment
RCVS	Royal College of Veterinary Surgeons
RFID	Radiofrequency Identification
RSPCA	Royal Society for the Prevention of Cruelty to Animals
RTC	Road Traffic Collision
RVN	Registered Veterinary Nurse
SNH	Sottish Natural Heritage
SWWR	Secret World Wildlife Rescue
VSA	Veterinary Surgeons Act
WCA	Wildlife and Countryside Act
WIIS	Wildlife Incident Investigation Scheme
UK	United Kingdom

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Chapter 1: A policy for rehabilitation and release of badgers

1.1 Introduction

1.1.1 History

In 2000 the then Ministry for Agriculture Fisheries and Food (MAFF) questioned the responsibility of wildlife groups in their release of badgers (*Meles meles*) back to the wild, with respect to the possible transmission of bovine tuberculosis (bTB, *Mycobacterium bovis* infection) to cattle. Wildlife groups, farmers and scientists were brought together in a series of meetings in London to discuss this subject. The then National Federation of Badger Groups (NFBG, now the Badger Trust), the Royal Society for the Prevention of Cruelty to Animals (RSPCA), and Secret World Wildlife Rescue (SWWR) had already collaborated for a number of years on the rehabilitation and release of badgers. Most members of the wildlife groups were already working to high standards and testing badgers for bTB, based upon discussions with specialist scientists. The other parties at the MAFF meetings had been largely unaware of this and were generally surprised by the extent of the knowledge and care taken.

As a consequence of the MAFF discussions the wildlife organisations (NFBG, RSPCA and SWWR) produced a protocol for best practice[1] with the primary purpose of returning healthy badgers back to the wild in a responsible way that has high regard for animal welfare and for the control of disease. The protocol was also written to assist those involved with the rehabilitation of badgers, including vets, who may not have the information necessary to ensure that badgers are treated correctly. The protocol was published on the SWWR website from 2003 and promoted in veterinary journals[2,3].

1.1.2 A new protocol for the rehabilitation and release of badgers

Since 2003 many things have changed. In 2014 the Department for Environment Food and Rural Affairs (Defra) introduced a 25-year *Strategy for achieving Officially Bovine Tuberculosis Free status for England*[4] which included new regulations for cattle movement and testing, the devolved administrations in Wales and Scotland introduced their own testing and movement restrictions, a range of new bTB tests became available for both cattle and badgers and a bTB vaccine for badgers was licenced in 2010.

SWWR and the RSCPA have met on an informal basis since 2003 and made revisions of the protocol to take into account these changes as they have arisen. The organisations have continued to consult with badger and bTB specialists and taken on board their advice and suggestions regarding testing regimes. Other areas of badger rehabilitation have also changed as we have gained more knowledge and experience, and revisions in these areas had also been made. These changes all remained internal documents and no formal update of the Badger Rehabilitation Protocol had taken place.

In March 2017, following questions raised by cattle farmers, Defra again asked for the wildlife groups to come together for a workshop meeting in London. Representatives from Defra, bTB specialists from the Animal and Plant Health Agency (APHA) and Natural England (NE) also attended. As a consequence of this meeting, it was agreed that the Protocol would be formally updated and then more widely promoted to wildlife groups, veterinary surgeons and farmers. This new Protocol is the result of that work. Defra has been involved in updating this Protocol to promote best practice for the rehabilitation of badgers, but not to encourage the practice of badger rehabilitation.

Science and knowledge relating to bTB is ever changing and reviews of this Protocol will be made on a regular basis in order for it to remain the most current and definitive guide to badger rehabilitation.

1.1.3 Reasons for badger rehabilitation

The main reason for all wildlife rehabilitation is one of animal welfare[5,6,7]. As most of the common reasons for badgers, and other species[8], coming into wildlife rescue centres are related to human activities, rehabilitation may also go some way towards redressing the balance of these negative impacts. Individual badgers come into care for a variety of reasons; adults are usually injured due to road accidents, or being caught in snares, or may be found in domestic gardens and outbuildings suffering from bite wounds as a result of fighting with other badgers[9,10,11]. Cubs are usually orphaned, rather than injured[9]. The process of rehabilitation (Figure 1.1) provides an opportunity for healthy badgers to be released back into the wild. Of course, many badgers that come in to captivity will be too injured, unwell, or old, for release back to the wild to be in their best interest - these animals must be euthanased at the first possible opportunity, so as to prevent suffering through protracted amounts of time in captivity. In common with other rehabilitated species[12,13], around one third of adult badger casualties can be expected to be successfully released back to the wild[10].

1.1.4 The approach to bovine tuberculosis

The subject of badgers, cattle and tuberculosis is one of great controversy and contention. The evidence for the transmission of bTB from badgers to cattle and the role of badgers in the control of the disease in cattle is beyond the scope of this document and has recently been reviewed elsewhere[14]. There is however no doubt that both cattle and badgers (in common with other wild mammalian species[15]) suffer from the disease and infected badgers are able to maintain and spread infection[16].

When dealing with badgers therefore, measures should be taken to prevent zoonotic risks during handling (see Appendix 4). As well as human risks, risks extend to other badgers, domestic animals and livestock. Strict rehabilitation procedures, as described in this Protocol, will mitigate risk of transmission of disease from infected badgers to other animals both during captivity and upon release back to the wild. Such procedures should help to allay public concern, especially the concern of farmers. As is the case in cattle, improved biosecurity and consideration of disease risks extend beyond the control of just bTB and are of benefit more generally to wildlife centres and the badgers in their care.

As will be described in Chapter 6, one of the problems in dealing with bTB in all species is the lack of 100% reliable tests for the disease in live animals. Understanding the limitations of the available tests and how they can be used to answer the questions being asked of them, is key to preventing disease risks and managing the expectations of those involved.

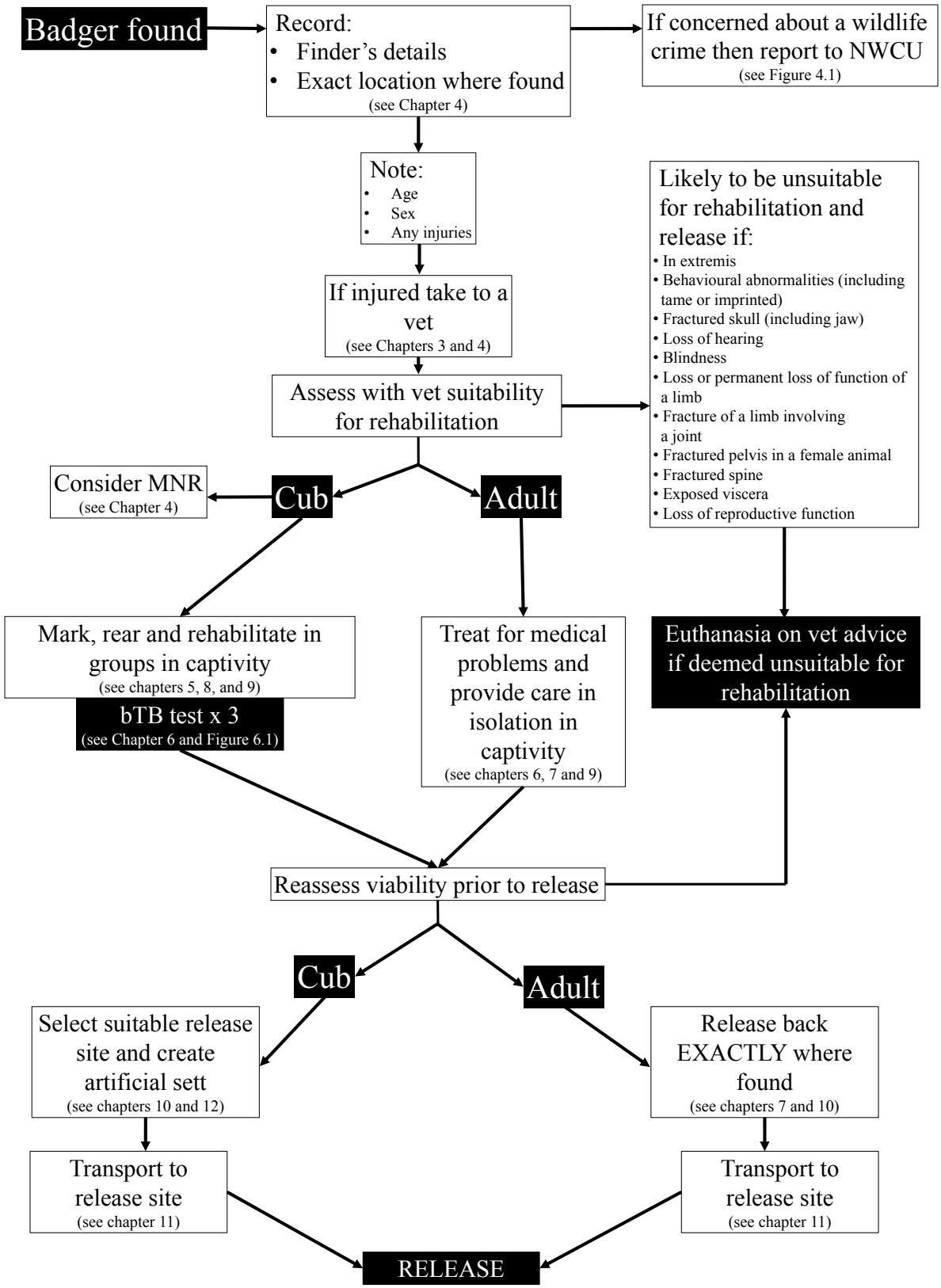
1.1.5 Regulation of badger rehabilitation

In common with most other areas of wildlife rehabilitation, badger rehabilitation and release in the United Kingdom (UK) is not currently directly regulated[17,18], although it is controlled to some extent by relevant legislation[17,18] (see also Chapter 3). *Good practice Guidelines for Wildlife Centres*[19] have however, been produced by the British Veterinary Zoological Society (BVZS) and are promoted by the British Wildlife Rehabilitation Council (BWRC) which also provides other resources for wildlife centres[20].

1.1.6 Use of references

References are included throughout this Protocol and are listed at the end of the document. References have been restricted to those directly relevant to badger rehabilitation, extensive references relating to bovine tuberculosis in cattle and badgers that do not directly influence badger rehabilitation and release have intentionally been kept to a minimum.

Figure 1.1 Overview of the badger rehabilitation process with reference to this Protocol



Chapter 2: Badgers

2.1 The Eurasian badger

The Eurasian badger (*Meles meles*) is the largest of Britain's mustelid species. Badgers are found throughout Great Britain and Ireland, only being absent in regions of altitudes over 500 m and on most offshore islands. Population densities are greatest in the southwest of England, Wales and the east of Ireland.

The ecology and biology of the species have been extensively described in several excellent texts[21, 22, 23] and the reader is directed to these. Several aspects of badger biology are however, specifically very relevant to rehabilitation of the species and these are briefly described below.

2.2 Ecology and biology

2.2.1 Social structure

Badgers are social animals, living in family groups. A typical social group consists of five animals, usually with a dominant male and female and a mixture of sexes and ages. Group size varies widely, from 2 to 35 animals. Communication between animals within social groups is mainly through scent marking, though vocalization and visual signs ('puffing up') are heard and seen, especially in cubs.

Each badger social group usually has one main sett within its territory, but may also have a variety of additional setts. There are well marked paths between the different sett areas, main feeding areas and latrines which are often on territory boundaries. Territories vary from about 30ha in high-density populations in optimal habitat, to 300ha in less ideal environments. Both group and territory sizes are determined by the quality and distribution of food.

Consideration must be given to this well-defined social structure when badgers are released back to the wild following rehabilitation. Adult badgers should always be released EXACTLY where they were found, so they can return to their social group (see Chapters 6 and 7). Cubs may require new sites and these should be chosen so as not to disrupt existing social groups (see Chapters 6, 8, 10 and 12).

2.2.2 Activity

Badgers are crepuscular and nocturnal animals. Emergence from setts is usually at dusk in the spring and summer (May–August) and after darkness at other times of year. Activity is greatly reduced in the winter months (November–February). Cubs usually emerge before adults. Diurnal activity, usually related to foraging, is not uncommon during the summer.

Consideration should be given to badgers' nocturnal nature and environmental conditions in captivity should be modified accordingly. In the winter, activity and feeding are likely to be greatly reduced, even in captivity, and this should be taken into account when treating badgers.

2.2.3 Feeding

Badgers are opportunistic omnivores, eating a wide variety of plant and animal matter including earthworms (*Lumbricus terrestris*), fruit and insects, small mammals and birds. Earthworms are the single most important foodstuff in badger diets and provide a source of water, although badgers may also drink from other sources. The bodyweight of badgers varies throughout the year, with weight gain occurring mostly in the autumn.

In captivity badgers will eat a wide variety of food stuffs (see Chapters 7 and 8) although as 'natural' a diet as possible should be fed, especially immediately prior to release. Variation in weight over the year should be considered when assessing casualty animals.

2.3 Anatomy and physiology

Badgers are powerful mammals, well adapted for digging and life underground. This makes them potentially dangerous to handle, and appropriate precautions should be taken (Chapter 4). Although there are significant anatomical differences, from a veterinary perspective badgers can be treated much as domestic dogs of a similar size and weight.

2.3.1 Dentition

Badger dentition reflects their omnivorous diet. Incisors, canines and premolars are typical of a carnivore, whilst the last premolar and the molars are greatly modified for crushing and grinding, being broad and cusped like those of a herbivore. The first premolar is often vestigial or absent and supernumerary molars and premolars have also been described. Milk dentition erupts from the age of 4 to 6 weeks (canines, premolars, incisors – in that order) and permanent teeth from 10 to 16 weeks (incisors first), tooth eruption can be used

to help age cubs (Chapter 8). Tooth wear can be a useful indicator of age in animals under 3 years old, but is not especially useful in practice or in older animals.

2.3.2 Colouration

The melanin band in the guard hairs gives the badger a greyish look from a distance, apart from its distinctive black-and-white striped head. Melanistic, albino and erythristic pelage types are recognized, with intermediate varieties. There is no colour difference between the sexes. Badgers moult from the spring into the summer months, the undercoat shedding and regrowing first, followed by the guard hairs.

2.3.4 Size

Size and weight depend on age, sex, food availability and time of year. Typical size and weight of adult male and female badgers is shown in Figure 2.1. Boars (males) generally have broader heads than sows (females), but the sexes are virtually impossible to tell apart at any distance in the field. In a clinical environment, boars are easily distinguished by their ventral prepuce, palpable os penis and visible scrotum, whilst sows have a short anogenital distance.

Figure 2.1 Range of typical size and weight of adult male and female badgers[9]

	Head and body length (mm)	**Weight (kg)**
Male	686–803	9.1–16.7
Female	673–787	6.5–13.9

2.3.4 Normal physiological parameters

Body temperature is around 37°C but can drop as low as 28°C in the winter months. Resting heart and respiratory rates in badgers familiar with human contact appear to be not unlike those of domestic dogs of a similar size (heart rate 80–120 bpm, respiratory rate 10–30 rpm).

2.3.6 Senses

The badger has a highly developed sense of smell, which is used in social communication. Scent is produced from several sources; subcaudal glands under the tail above the anus, anal glands similar to those of the dog, sweat and sebaceous glands and urine.

The sense of hearing is very good. Eyes are adapted for night vision, with a predominance of retinal rods and a well-developed tapetum; badgers are easily blinded by bright light. The eyes are not large for a nocturnal animal and cubs in particular are very short-sighted.

Care should be taken when badgers are in captivity to minimise distress caused by the sight, sound and smell of humans and other animals. As well as being stressful to the badger, such exposure can also result in 'habituation' which can negatively influence the ability to release the badger back to the wild successfully.

2.3.6 Reproduction

Mating in badgers occurs year-round with a peak between February and March when mature sows return to oestrus after cubbing and yearlings have their first oestrus. A second smaller peak occurs during autumn in late maturing animals and those sows that failed to conceive in the spring. Implantation of embryos is usually delayed at the blastocyst stage following conception and does not take place until December. True gestation lasts 6–7 weeks with the majority of cubs born in February. Litter size is usually between one and five cubs. Growth rates in cubs are rapid between July and November and cubs reach an average of 8kg in the first year (Chapter 8).

Admissions of badgers with 'territorial' wounds follow a similar pattern to the reproductive cycle, with peaks in admissions in the spring and autumn[9]. Consideration should be given to the release of juvenile badgers at this time of year. Female badgers admitted early in the year may be pregnant or have dependent cubs.

Chapter 3: Legal considerations

3.1 Legislation relevant to badger rehabilitation

Legislation covering mammals within the British Isles is extensive and includes International, European, Scottish, Welsh, and Northern Irish laws. The badger is a protected species in the UK, the Irish Republic and many other European countries. Legal considerations affecting the capture, treatment and release of British wildlife casualties[17, 18] and specifically badgers[9] have been reviewed elsewhere. The information below relates specifically to that affecting badgers in England and that especially relevant to badger rehabilitation and release. Legislation in the devolved areas of the UK is not greatly dissimilar, but should be carefully referred to in those countries. The legislative Acts, listed below, are far reaching and extend beyond those affecting the rehabilitation and release process. Relevant legislation includes:

- Animal Health Act 1981
- Animal Welfare Act 2006
- Health and Safety at Work Act 1974
- Medicines Act 1968
- Protection of Animals (Anaesthetics) Acts 1954 and 1964
- Protection of Badgers Act 1992
- Public Health (Control of Diseases) Act 1984
- Public Health (Infectious Diseases) Act 1988
- Veterinary Medicines Regulations 2009 SI 2297
- Veterinary Surgeons Act 1966 (as amended 2002)
- Welfare of Animals in Transport order 2006
- Wild Mammals (Protection) Act 1996
- Wildlife and Countryside Act 1981 (as amended)
- Zoo Licensing Act 1982 (as amended 2002)

3.2 Capture and rescue of badger casualties

Permission should be gained from the land or property owner to access badger casualties found on private land. There is no right of ownership of wild animals until taken into captivity at which point the finder may be considered to become the ‘owner’. Under the Protection of Badgers Act (PoBA) badgers can be taken from the wild for treatment with the intention of eventual release. Badgers are additionally protected under Schedule 6 of the Wildlife and

Countryside Act (WCA) which limits the methods of 'taking or killing' of the species which could in theory limit the use of traps to capture injured badgers, except under licence from NE.

The PoBA specifically exempts the taking of 'disabled' badgers for treatment provided the animal has not been injured by the finder or the injury was 'unavoidable as an incidental result of lawful action' and the badger has not been 'wilfully' injured (thus exempting those who unintentionally cause road traffic collision (RTC) injuries to badgers).

The Welfare of Animals (Transport) Order 2006 has specific exemptions for transport of animals directly to or from veterinary practices or clinics; transportation of the casualty to a wildlife rescue centre or from a centre for release may however be considered to be covered by the Order. The general principles of the Order should be implemented when transporting casualties (see Chapter 11). During any capture and handling animal welfare legislation as described below, must also be adhered to.

3.3 Keeping and treatment of casualties in captivity

The WCA, 1981 makes provision for protected wild animals to be kept in captivity for treatment until no longer disabled. The Act also makes provision for animals that cannot be released, to be killed for welfare reasons. The PoBA makes specific provision for the treatment and euthanasia of sick and injured badgers (see also Appendix 5). Whilst in captivity (and during capture and transportation) the welfare of mammalian wildlife casualties, including badgers, falls under the Animal Welfare Act 2006 (AWA). Veterinary treatment of badgers and other wildlife is covered by the Veterinary Surgeons Act (VSA) 1966 which limits the treatment of wildlife casualties by lay people to emergency life-saving care and alleviating suffering. All medical and surgical treatment must be provided by a veterinary surgeon registered with the Royal College of Veterinary Surgeons (RCVS). Amendments under schedule 3 of the VSA (2002) allow for medical treatments and minor surgery of wildlife, in common with other species, to be carried out by a suitably-trained and Registered Veterinary Nurse (RVN).

Any marking of badgers, including temporary marking (e.g. use of Tipp-Ex or nail varnish on cubs) and that carried out for clinical reasons (e.g. microchipping), falls under the PoBA and may only be carried out under licence from NE (see Chapter 5).

The RCVS 'Guide to Professional Conduct'[24] makes it a requirement of veterinary surgeons in practice to provide emergency care to all species including wildlife[17]. The British

Veterinary Association (BVA)/RSPCA 'Memorandum of Understanding'[17,25] covers payment for such initial emergency treatment (IET) and provides specific advice relating to wildlife casualties[25]. The Medicines Act 1968 and the Veterinary Medicines Regulations 2013 control the use and choice of medical treatments. Few medicines are licensed for use in 'exotic' species or wildlife so the prescribing 'cascade' as interpreted in the RCVS 'Guide to Professional Conduct'[24] must be adhered to. If the wild animal is considered to have an 'owner', consent for the use of 'off-label' products should be obtained. The Protection of Animals (Anaesthetics) Acts 1954 and 1964, require the use of anaesthetics for painful procedures.

The Animal Health Act 1974 makes provision for the notification of animals suspected of having a disease listed as 'notifiable' under the order. The order states that: 'any person having in their possession or under their charge an animal affected or suspected of having one of these diseases must, with all practicable speed, notify that fact to a police constable'; in practice reporting is made to the local office of APHA. Cases of tuberculosis (*M. bovis* infection) in badgers and other wildlife fall under this legislation though reporting is usually limited to infection in cattle and deer. Veterinary practices and rehabilitation centres must work under the Health and Safety at Work Act 1974 and as such should have risk assessments relating to the handling and treatment of wildlife and suitable training of staff to prevent risk, disease and injury. Specific precautions relating to the zoonotic risk of *M. bovis* infection in badgers have been described[9] (see also Appendix 4).

The Zoo Licensing Act 1981 applies to rehabilitation centres open to the general public for seven or more days in a twelve-month period and involves the inspection of animal husbandry, record keeping and veterinary care at the facility; many rehabilitation centres reliant on public funding fall into this category. Badgers are not considered to be 'dangerous' under the Dangerous Wild Animals Act 1976 (as amended). Where a wildlife centre is not a 'zoo', no formal regulation applies, although centres are encouraged to follow appropriate guidelines and standards (see Chapter 1, 1.1.5).

3.4 Release of casualties

Section 9 of the AWA makes it an offence to abandon an animal so it fails to thrive and as a result causes unnecessary suffering. Wildlife species should not therefore be released unless they are able to both survive and not endanger other wildlife. Other welfare legislation as described above would also apply at this stage. Badgers may be tattooed or otherwise marked (e.g. microchip) prior to release but this can only be carried out legally under the

PoBA under licence from NE who ‘Under Section 10(1)(c) of the Act have authority to issue licences to take badgers for the purpose of ringing and marking and to mark such badgers or attach to them any ring, tag or marking device as specified in a licence’. Transportation of a casualty to a release site should not cause additional injury, or unnecessary suffering, and may be influenced by The Welfare of Animals in Transport Order 2006 (see above and Chapter 11).

Chapter 4: Guidance on retrieving injured badgers

4.1 Initial response

Most badger related calls to wildlife rescue centres come from members of the public who discover casualties at the roadside (presumed RTC), or in outbuildings (often with 'territorial' wounds). Any badger either in unnatural surroundings or above ground during daylight hours may have been injured and should ideally be caught and examined. Badgers should be retrieved by experienced personnel only, those without suitable training and experience should refer calls to experienced colleagues.

Those taking phone calls from members of the public need to ask them for the exact location (based upon both local landmarks and global positioning system (GPS) findings if possible) and their telephone number. The EXACT location of a badger will be required to enable it to eventually be returned to the wild (see Chapter 7). The primary concern must be the health and safety of the person making the call (Appendix 4), they must be advised to take sensible safety precautions (e.g. use of hazard warning lights on their car) and not to touch the badger. If the badger is collapsed, if possible they should be asked to cover it. If the badger is trapped in a building, they should be asked to close doors to enclose the badger and stay with it until assistance arrives. If the badger becomes agitated or attempts to escape, the finder should retreat and monitor it from a safe distance.

If the incident reported is thought to be a wildlife crime, then appropriate action should be taken via the police National Wildlife Crime Unit (NWCU).

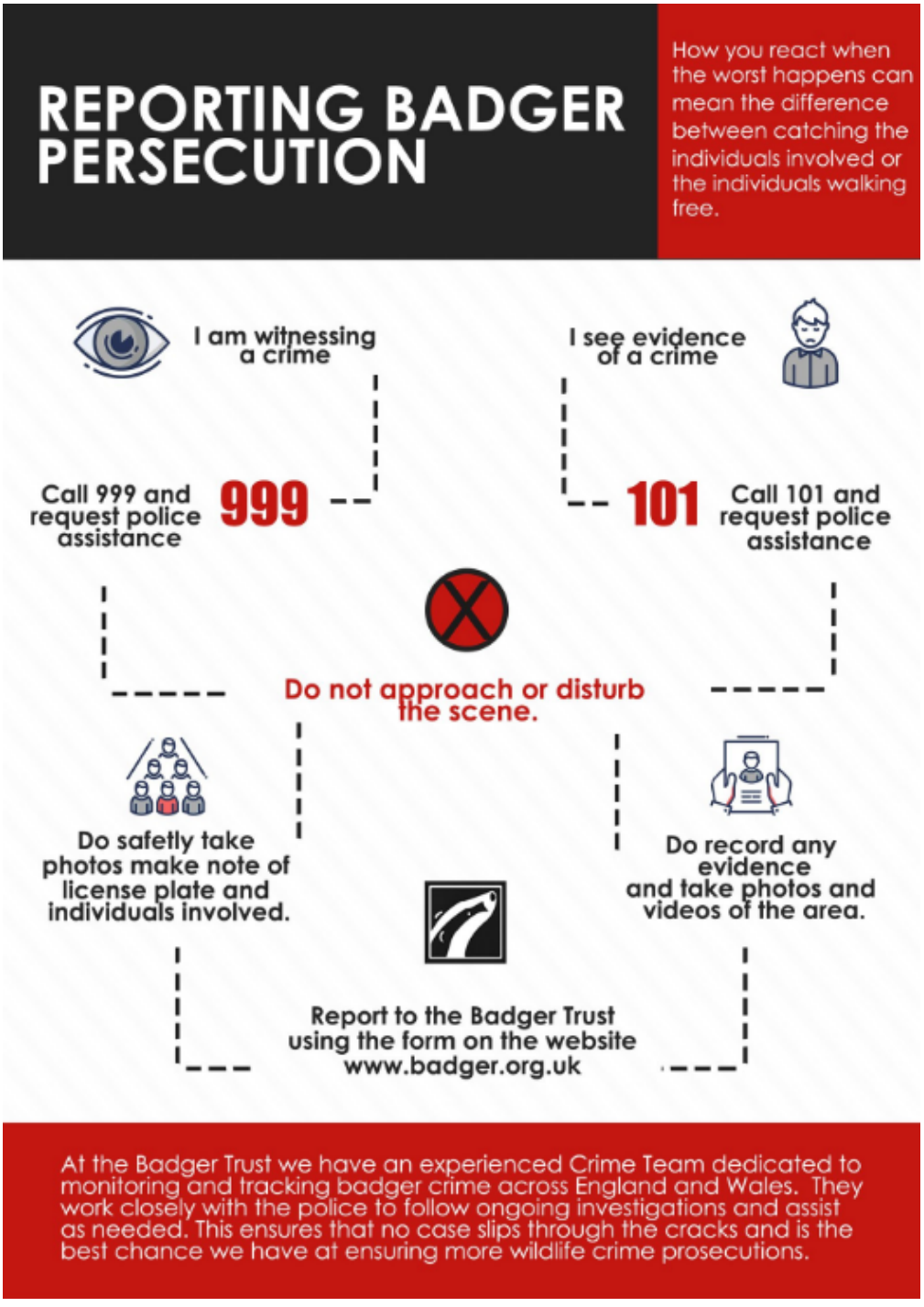
Whilst the welfare of the individual badger concerned should take priority, care should be taken not to disturb what may be a crime scene or damage evidence that might be essential for a prosecution to be made. The Badger Trust provides a useful aid to reporting badger crime which is reproduced in Figure 4.1.

4.2 Equipment

Those attending call-outs on a regular basis will require equipment that ensures they are able to retrieve the injured badger from any number of situations in a way that is both safe and welfare friendly. An equipment checklist for dealing with badger casualties is provided in Appendix 2. Roadside warning triangles and reflective clothing must be used when dealing with RTC badgers[26]. A containment box (cage), with a side and top opening for easy

access, is most suitable for badgers. Suitable cages are commercially available (see Appendix 1). Professional graspers are available through veterinary suppliers (see Appendix 1). Heavy-duty pincers or pliers are suitable for cutting snare wire. Side cutters will cut wire that is approximately 2.5-3 mm in diameter. Landing nets can be purchased at fishing tackle outlets.

Figure 4.1 Reporting Badger persecution (Badger Trust)



Gloves or gauntlets offer very little, if any, protection against a badger's bite. Rabies control gauntlets have metal rivets to cover the back of the hand and fingers, but their weight and size can make them difficult to use. Latex gloves should always be used when handling badgers as protection against potential zoonotic diseases (see Appendix 4). In addition, hands and equipment should be disinfected using appropriate chemicals (see Appendix 1 and Appendix 2).

The cost of some of the above equipment may discourage people from offering to help injured badgers. With a little thought however, an injured animal can be caught using a wide range of alternatives. A weak badger can be encouraged to enter a clean dustbin, or covered with a plastic storage box, then a board slid under and secured, and both, in an emergency, can be used to transport the badger for treatment. With such improvisation, the badger is at least contained safely until a person equipped to deal with the incident can attend.

4.3 Assessing the situation

Those going out to rescue badgers should always try and take someone with them on a call out and avoid 'lone working' wherever possible for their own safety. **Badgers should be retrieved by experienced personnel only**. On arrival at the call out site, those involved should take their time, not take risks and should initially assess the situation from a distance. Appropriate precautions should be taken if the call out is to the roadside[28]; leave car hazard lights on, use a warning roadside triangle and wear appropriate reflective clothing. Human health and safety must come first; ensure that all members of the public are safe from traffic and risk of other injury. Do not attempt rescue on a motorway or busy road without consulting the Police or Highways agency; it is illegal to stop on a motorway except in an emergency.

Appropriate equipment should be carried (Appendix 2) and the badger approached slowly, watching for any reaction. It should be remembered that a badger is a wild animal and regards humans as a threat. Assume that all badgers are conscious and able to respond to an approach; those involved in a rescue must be prepared to act quickly to avoid further injury to the badger occurring.

4.4 Initial handling

4.4.1 Unconscious badgers (e.g. RTC, collapsed) in the open

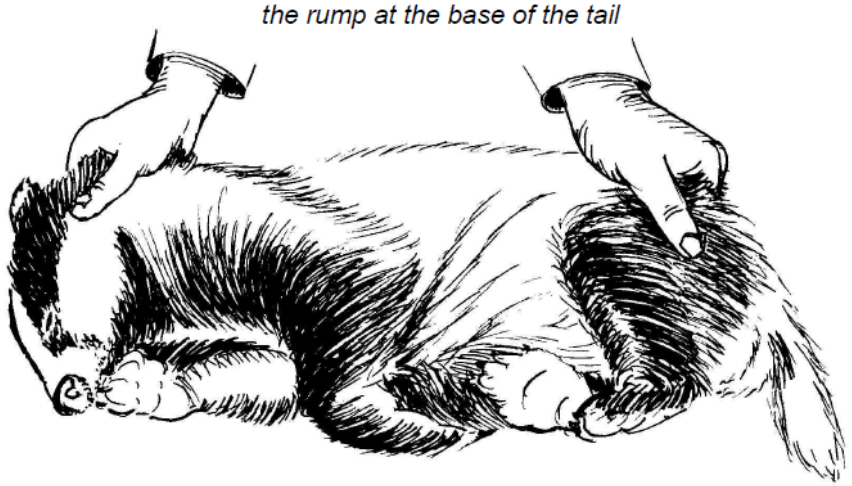
It is important to establish if the badger is conscious and the best way to do this is by touching it with a stick, starting from the hind-quarters and moving towards the head.

Watching for signs of movement and looking for evidence of breathing will help establish if the animal is alive and conscious. If the badger is unconscious (does not respond to touching

Figure 4.2 How to lift an injured badger

4.2a An injured but conscious badger should be lifted quickly into a carrying cage or dustbin with the aid of a dog grasper. Once restrained by the grasper, it can safely be held by the rump and lifted into the cage. It should never be lifted by the grasper alone.

4.2b A severly injured, unconscious badger may be lifted by grasping the scruff of the neck and the loose skin on the rump at the base of the tail



with a stick) it can either be firmly grasped by the scruff of the neck (Figure 4.2b) or, covered and rolled into a blanket. The back end of the badger should be supported when lifting to prevent aggravating possible injuries (Figure 4.2b).

If the badger is conscious (respond to touching with a stick), but is not actively moving about, and the finder is confident enough, it can be grasped by the scruff of the neck. Another technique sometimes used by rehabilitators, is to tempt the badger to bite a glove, cloth or stout stick and to grasp it whilst it is distracted. If there is any doubt about handling the badger then a grasper should be used (Figure 4.2a). It is not always easy to place a grasper over a badger's head. Holding a stick through the loop of a grasper which the badger can be tempted to bite can sometimes assist with the process, causing the badger to lift its head sufficiently to allow the grasper to be positioned. The grasper should then be lifted with the body supported at the same time by holding the rump (not the tail) and the animal can then be transferred into a secure container (Figure 4.2a). It is important to be firm, not to hesitate and not to give the badger the opportunity to bite. Covering the head with a blanket throughout this procedure will help calm the badger.

4.4.2 Fully conscious and mobile badgers (trapped or contained)

Fully conscious and mobile badgers should be assessed with care. Any means of escape should be blocked and, using boards or panels (minimum 1m high), the badger should be encouraged into a darkened container (e.g. a covered cage, front opening). Even if the badger appears uninjured, it should ideally be fully assessed before releasing it. It should always be released at the point of capture. Releasing in the evening when there is less human and traffic interference has many advantages.

4.4.3 Snared badgers

Badgers caught in snares can sustain significant injuries. It is important that the badger is caught and not released before veterinary care can be provided. Further movement of the badger in the snare must be avoided either by pinning the badger down using a heavy blanket or by holding down the snare with a forked stick to restrict its movement. A steel bar 8-10mm diameter with a "pig tail" twist at the end, similar to old electric fence stakes, can be used to trap the snare wire and when slid along the wire towards the badger, will aid control.

Do not cut the snare from its fixture until the badger is secured, for example with a cage over it. Then transfer the badger to a secure cage (see 4.4.1 and 4.4.2). Even if the badger appears uninjured it should be examined by a veterinary surgeon; snare injuries may not be obvious even when considerable damage has been done.

The snare should not be removed from the badger until the animal is anaesthetised by a veterinary surgeon. It is impossible to ascertain the level of injuries that may have been caused whilst the animal is conscious. Further information on treatment of snare injuries is available for veterinary surgeons[9]. Snared animals should be kept in captivity and not released for at least a week, as evidence of tissue damage can be delayed[9].

Targeted snaring of badgers is illegal and should be reported to the NWCU (see 4.1).

4.5 Further handling

Any further handling of a conscious badger should be kept to a minimum. The use of a grasper for routine capture and handling whilst undergoing treatment should be avoided. Cages with a crush facility (see Appendices 1 and 2) allow for easy handling. During examination, including veterinary inspection, use of a muzzle (e.g. Baskerville® type) is recommended[9].

4.6 Handling do's and don'ts

Do Mark the spot where the badger has been picked up, for example, tie a string around a bush or tree, or a plastic bag to fence. This ensures the badger is released on familiar ground. Ensure any such marks are removed later. One spot on a country lane can look very much the same as another in the dark. If possible take GPS co-ordinates of the location.

Do Avoid unnecessary stress to the badger. During transportation, at a veterinary location, or whilst in care avoid contact with other animals or in close proximity. Keep noise to a minimum. Cover the cage as the badger will settle during transit if in a darkened cage. Keep the badger warm whilst allowing good ventilation.

Do Note the weight of the cage and any blankets/sheets, so that the badger can be weighed within the cage. Then subtract the weight of the cage etc. from the weight of the badger and cage. This vital information is needed to ensure the correct dosage of anaesthetic and drugs. If you have invested in a cage with a 'crush' mechanism do not put blankets in the cage as this will stop this facility being used.

Do Liaise with a veterinary surgeon

Don't Put yourself and others at risk

Don't Put an apparently unconscious badger loose in the car

4.7 Orphaned cubs

It may not always be necessary to admit an apparently orphaned badger cub to a wildlife centre. For the cub being reared in a centre is nearly always second best to be reared in the wild and it is consequently better for the cub's welfare for it to be reared in its natal group if possible. The process of rearing badger cubs (Chapter 8), their rehabilitation and release including bTB testing (Chapter 6), is a long and difficult one. Recent work looking at a technique referred to as 'Monitored Natal Return' (MNR)[27], indicates that some cubs can be successfully returned to their natal sett with minimal intervention. This process involves examining the cub (keeping handling to a minimum), return under safe conditions to where it was found and careful monitoring to ensure that it is recognised and accepted by its dam or other members of the social group. The decision to admit a cub or attempt MNR is however, not an easy one and professional help should be sought by contacting a specialist centre such as SWWR or the RSPCA (see Appendix 1). Further information on this subject has been published and provides an additional very useful resource[27]. If a cub does need to be admitted to a wildlife centre, most can be covered with a blanket, picked up and placed into a suitable secure box or cage.

4.7.1 Monitored Natal Return (MNR)

Badger cubs should be assessed as early as possible for consideration for MNR and in most cases before they are actually admitted into a rescue centre. Figure 4.3 outlines the main factors that need to be taken into consideration and a form for assessment is provided in Appendix 3.1. This information helps to establish the cubs that will require immediate attention, against those that may be able to be released quickly back into their local environment. It is imperative that the cub has been assessed fit and healthy prior to any release attempt. It is important that the age of a cub is established as early on as possible (see Figure 8.1), as this will have a bearing on the type of release and the level of support the cub may require. Field observations[26] have suggested that a cub can integrate back into its social group following treatment at a rescue centre over several days. The period a cub can spend in a rescue centre and be successfully returned is partly dependant on the age of the cub when it enters the facility and guidance should be obtained from the RSPCA or SWWR (see Appendix 1). It must be remembered however, that the majority of badger cubs found in the wild by members of the public will need to be admitted as they have been injured, or are at risk (Figure 4.3), and will subsequently require hand rearing (see Chapter 8).

Figure 4.3 Consideration of the suitability of cubs for MNR (always ask for help from a specialist centre if you are unsure)

Information that suggest a cub needs to be admitted to a wildlife centre and/or be seen immediately by a veterinary surgeon	Information that might suggest a cub is suitable for MNR
It is in immediate danger (e.g. on a road, in a public place, near pond) There is a dead adult badger nearby Is it pink with little fur present The eyes are closed It is cold to touch It is visibly injured It is very quiet.	It is near a sett or sett entrance It is covered in fur with black and white markings The eyes are open Is it quite mobile (e.g. walking around) It is not obviously injured It looks chubby and healthy in appearance.

The level of support required for cubs released using MNR will be dependent upon the age of the cub involved (see Figure 8.1):

- Cub pre-weaned (up to about 10 week) will require MNR which will involve establishing that there is a lactating sow present at the sett and she is expressing interest in the cub and the ability to feed the cub(s). The usual method is to place the cub in a remote release cage (Figure 4.4) at the sett just prior to the expected emergence of the sow. If the sow shows a strong attachment to the cub then the cage can be opened remotely and this will enable the sow to interact and potentially take the cub back into the sett complex. Where the cub is immobile (because of its age and lack of development) then the cub can be placed near the sett without a cage. Weather conditions should be considered and appropriate shelter provided for the cub. Cubs that are pre-weaned should not be left at the sett without regular and discrete monitoring. Where there is clear evidence that a nursing sow is dead and the cubs are pre-weaned then the cub must be admitted and reared in a rescue centre (see Chapter 8).

- A cub once weaned (approximately 12 weeks old) can be returned to the sett associated with the clan providing it displays positive signs that it recognises its environment (typically excited behaviour / wickering / keckering). In the case where a cub is weaned it is not necessary to establish the presence of the sow; as the cub is not directly dependant on the sow for sustenance. A remote release cage (Figure 4.3) is useful in observing a cub's behaviour from a distance and only allowing the release to take place if the cub exhibits signs that it is familiar with its environment. If a cub remains quiet, subdued, or shows a lack of interest in its immediate environment then its release should be treated with caution, as it may be in the wrong territory. In these circumstances, the cub must be admitted and reared in a rescue centre (see Chapter 8).
- When cubs reach the age range of 14-16 weeks old then generally they can be considered for a release back into the EXACT area they were found without establishing the exact location of the natal sett. Cubs at this age are much more independent and whilst there may be risks associated with such a return these are often less than the risks associated with admission and rearing in a rescue centre.

  Support feeding of cubs returned to the natal sett is an important factor in their early return. Many cubs enter rescue centres when they are beginning to wean (approximately 10-12 weeks old). If this weaning process coincides with dry weather then the number of cubs affected by the lack of suitable food and/or water increases. Cubs affected by malnutrition and/or dehydration will often respond very well to treatment in a rescue facility. If the cub is still considered suitable for MNR after treatment and the environmental conditions have not improved, it could be considered irresponsible to return a cub without some form of support feeding and provision of water. This support feeding may extend for weeks or in severe cases where the weather continues to be an issue for many months.

  A remote release cage for a cub can easily be made from a wire cat carry cage (Figure 4.4). A counterbalanced weight is secured with cable ties to the lid. The securing pin is attached to a length of string that allows the observer to keep down wind of any potential emerging badgers, but still observe interaction with the cub.

Figure 4.4 Example remote release cage for MNR

4.8 Veterinary care

Early veterinary intervention is essential to assess injuries or disease (see Figure 1.1) and establish if the badger is likely to be one that can be released. If the badger is unsuitable for release it should be euthanased as soon as possible. All veterinary surgeons should provide emergency care, including first aid and euthanasia if required (see Chapter 3; 3.3 and Appendix 5). General information for veterinary surgeons on first aid in wildlife has been published[27, 28]. Specific information on the emergency care of badgers can be downloaded free of charge on the SWWR website[30]. More extensive information on the veterinary care of badgers is available in the British Small Animal Veterinary Association (BSAVA) Manual of Wildlife Casualties (2016)[9].

Chapter 5: Identification and record keeping

5.1 Record keeping

It is good practice for wildlife centres to keep records of animals in their care, including reasons for admission and outcomes[20]. This allows for reflection on the success or otherwise of the rehabilitation process. Legislation protecting the badger (see Chapter 3) additionally provides compelling reasons for meticulous record keeping, as the finder or wildlife centre may be required to prove why they have taken a protected animal from the wild, justify the reasons for keeping it in captivity and explain why it was euthanased, or released, at a particular point in time. It is useful for the rescue centre to have some sort of internal numbering system for badgers (or other animals) admitted each year. An appropriate admission form should be used and an example is given in Appendix 3.2.

The following information should be recorded for **all badgers** coming into captivity:

- Date the animal was found
- Admission number
- Location of EXACTLY where the badger was found, complete with six figure grid reference
- Nature and cause of the badger's injuries (if any)
- Any treatment prior to admission (if seen by a vet)
- Any peculiarities – colour, mark, scars, etc.
- Age and sex of the badger
- Other medical info etc.
- Date badger released
- Location of release, complete with six figure grid reference

Additional information for **badger cubs** should include:

- Microchip number (see 5.2.1 and Chapter 6; 6.4)
- bTB testing information (including laboratory reports), including frequency, dates and results
- Details of any other laboratory testing (including laboratory reports)
- Details of any vaccinations given (with batch numbers)
- Details of any post mortem examinations (including laboratory reports)

5.2 Marking

Identification of rehabilitated and released wildlife, including badgers, can provide useful information on the success or failure of a rehabilitation programme. Marking also allows individual animals to be identified when they are kept in groups and for this reason all badger cubs should be micro-chipped on admission (see 5.2.1 and Chapter 6; 6.4).

Under the PoBA, all methods of marking badgers including non-invasive methods, such as identifying individual badger cubs by using small amounts of Tipp-Ex® or nail varnish, require a licence to mark from NE (or the relevant devolved authority). Licences are relatively easy to obtain from the NE website (see Appendix 1).

5.2.1 Microchipping

Microchips are essential in reared badger cubs, as they allow for the clear identification of individuals going through the rehabilitation process. Microchip numbers should be linked to all bTB blood tests and other treatments.

Any licenced and suitably trained person may microchip a badger. Microchips are readily available to vets and animal rescue centres. In common with other mammalian species, microchips in badgers should be inserted in the mid-line between the shoulder blades. Anaesthesia or sedation is usually required to restrain the badger for microchips to be implanted. As all badgers also require sedation or general anaesthesia for veterinary examination (which should be carried out within 24hrs of admission to a rescue centre), microchips are best administered at the same time (see also Chapter 6).

5.2.2 Tattooing

Until recently, centres rehabilitating badgers tattooed them on a regular basis prior to release. Tattoos provide a visible mark, allowing identification of the badger if found dead and occasionally when found alive. The lack of a current central database makes this a less useful procedure than it once was. Modern methods of identification, such as the use of RFID (Radio Frequency Identification) to track released badger cubs[27, 31], have also made tattooing less essential. In addition, the marking of released badgers in this way has resulted in negative publicity for some organisations from farming groups. As a consequence, the routine tattooing of rehabilitated badgers prior to release has largely stopped.

Any licenced and suitably trained person may tattoo a badger. Equipment for tattooing is commercially available. All badgers require deep sedation or general anaesthesia for tattooing to take place, so a veterinary surgeon will need to be involved although they are unlikely to have the necessary equipment or be licenced to tattoo the badger.

Badgers should be tattooed on both sides of the lower abdomen with a number representing the rescue centre, the individual badger number and the year.

Centre code (SWWR = W)/badger number (12)/year (2014), e.g. W/12/14

Most of the large wildlife centres have a code previously allocated by the NFBG. To make tattooing useful careful records need to be kept (see 5.1).

Chapter 6: Testing for Bovine tuberculosis

6.1 Bovine tuberculosis and badgers

Mycobacteria bovis (M. bovis) is a member of a group of bacteria called the *Mycobacterium tuberculosis* complex. *M. bovis* is able to affect a wide range of species including man, cattle and badgers. Bovine tuberculosis, the disease caused by *M. bovis infection,* is a cattle disease with a geographical range parallel to distribution of livestock in the world. The disease is important economically because of its effects in cattle, as well as effects on public health, wildlife, international trade and tourism around the world. The risk of infection in man is largely removed by the pasteurisation of milk and *M. bovis* infection rates in people in the UK remain extremely low despite increased incidence in cattle[32].

Those dealing with badgers in a rehabilitation situation must be aware of the possible risk of *M. bovis* infection and take suitable precautions (see Chapter 4, 4.2 and Appendix 4). Excretion of bacteria in infected badgers may occur in saliva, urine, faeces and pus from wounds and lymph node abscesses. Badgers may also transmit infection, via contaminated saliva during social disputes that result in wounding ('territorial' wounds). Clinical signs of tuberculosis in badgers, as in other species, are typically weight loss leading to emaciation.

6.2 Why test?

As explained earlier (Chapter 1; 1.1.4), reasons for testing rehabilitated badgers include preventing zoonotic risks in those handling badgers and decreasing the risk of disease transmission to other animals, including livestock. Maintaining the confidence of landowners providing release sites for badger cubs is key to the rehabilitation of these animals.

6.3 Available tests and the limitations of testing

6.3.1 Options for testing badger for bTB

Post-mortem examination of badgers combined with bacterial culture of tissue samples using selective media is considered the most 'accurate' (sensitive) method for detecting *M. bovis* infection in badgers. More detailed post-mortem techniques[33] may increase the sensitivity of standard procedures[34] (see 6.3). Clearly post-mortem examination is unsuitable for use in live badgers.

Although a variety of tests can be used to detect mycobacterial infections in live animals, including culture and examination of body secretions (saliva, urine, faeces), radiography and

other methods of diagnostic imaging, these have practical limitations in badgers for rehabilitation as well as poor accuracy (sensitivity and specificity). Intradermal testing, as is used in cattle, is ineffective in diagnosing *M. bovis* infections in badgers.

Interferon gamma (IFN-γ) blood tests can be used to identify *M. bovis* infection in cattle and badgers. A commercial badger IFN-γ test is however, not currently available and use of IFN-γ tests in badgers for rehabilitation would have practical complications as a result of the need to process samples within relatively short time periods.

Other blood tests (serological tests) are the most appropriate tests for *M. bovis* in badgers. For many years the only *M. bovis* serological test available to badger rehabilitators was the indirect 'Brock' enzyme-linked immunosorbent assay (ELISA). This test was replaced by the Brock Tb Stat-Pak® (Chembio Diagnostic Systems, Medford, NY) in 2009. In 2016 the Stat-Pak was replaced by the Dual Path Platform VetTB® (DPP®) test (Chembio Diagnostic Systems, Medford, NY; see below). Other serological tests are commercially available, but have not been validated for badgers.

Serological tests typically have low sensitivity (ability to detect infection) but high specificity (accuracy in detecting infection). For example, the Brock ELISA test was 37-53% sensitive and 89-98% specific[35, 36], so it detected only half of any infected badgers but if a badger tested positive it was very likely to be truly infected. The Brock Tb Stat-Pak® was shown to be 49% sensitive and 93% specific for detecting *M. bovis* in badgers[37]. The sensitivity of both tests was increased in infected badgers with more severe disease[37].

Testing an individual animal with a serological test on more than one occasion increases the sensitivity of the test but reduces test specificity. In 2001, it was shown that using the Brock ELISA test three times increased test sensitivity to 79.5% but reduced specificity to 83.1%[38]. In 2009, when the Brock Tb Stat-Pak® was considered in a similar way[39], it was found that 'triple' testing increased sensitivity to 91.7% but reduced specificity to 89.0%[39]. Badger cubs being reared and rehabilitated for release have been 'triple tested' by the RSPCA and SWWR since 1996. The three tests are performed at approximately equal intervals during the 4-6 months of the badger rearing process in an attempt to ensure that badger cubs are free of *M. bovis* infection prior to release[1].

6.3.2 DPP®

Chembio Diagnostic Systems discontinued the production of the Brock Tb Stat-Pak® in 2015 and the test became unavailable in 2016. After this time, the serological testing of badgers

was continued with an alternative lateral flow assay, the Dual Path Platform (DPP) VetTB (commercialised for Cervids Catalogue number 65-9150-0, Chembio Diagnostic Systems). Like the Stat-Pak assay, it requires a relatively small sample volume and involves a simplified test protocol with minimal equipment. It also provides a rapid test result. The DPP VetTB has the additional advantage of being used in conjunction with an electronic reader, thus providing a semi-quantitative measure of the antibody response in a given sample. The DPP VetTB assay measures the specific antibody response to one of the antigenic targets already included in the BrockTB Stat-Pak (MPB83), but also to other important M. bovis specific antigens ESAT6/CFP10. Each response to a specific antigen group is shown as a separate line visible on the cassette alongside the control line.

The use of the DDP VetTB is currently under validation for badgers at APHA Weybridge in order to:

1. better understand the diagnostic value of each of the antigenic responses
2. define cut-off points for positivity
3. estimate test diagnostic characteristics (sensitivity and specificity).

All data used for this validation were generated under the standard operating procedure BAC0399 in use across APHA laboratories. Positive responses are based on a parallel response to antigens MPB83 and ESAT6/CFP10. Responses generated so far suggest a similar sensitivity to the BrockTB Stat-Pak of approximately 50% and a high specificity of approximately 95%. The test responses reveal an infection with virulent *M. bovis* and are not affected by vaccination status of the animals with Bacillus Calmette-Guérin (BCG), thus the DPP is a test that differentiates infected from vaccinated animals (DIVA).

6.4 Taking and testing of blood samples for bTB in badgers

6.4.1 Sample collection

Badger cubs must be scanned to confirm their microchip number before samples are collected. This number must be used in the sample submission process.

Blood samples can only be collected by a veterinary surgeon, or by a RVN working under the direction and supervision of a veterinary surgeon.

Ideally blood should be taken from the jugular vein, but the cephalic or saphenous veins may also be used. For reasons of health and safety, general anaesthetic or sedation is always required for sample collection even in small cubs.

6.4.2 Sample volume

1-2 ml of blood should be collected to give 0.5-1.0 ml of serum. Samples should be collected into 'plain' serum tubes. Tubes must be correctly labelled and correspond with laboratory submission forms.

6.4.3 Storage of blood sample

Blood can be held in a fridge for a short period (overnight). Serum should ideally be separated for transportation to the laboratory, this is carried out by allowing a blood clot to form and then removing the serum. It is best if a sample is taken and sent for testing at the beginning of the week to arrive at the APHA laboratory (see 6.4.5) by Thursday so that the sample is not held up in the post or not processed before the weekend.

6.4.4 Available commercial tests

Currently the only commercially available test for bTB in badgers is the DPP® test. At the moment only one laboratory offers this test.

6.4.5 Laboratory for testing

Serum samples should be sent for the DPP® test to the APHA laboratory at Starcross (see Appendix 1). Submission forms are available from APHA Starcross and these should be completed in full. The badger cub's microchip number should be used as identification and this MUST appear on the laboratory submission forms. The submission form is part of the laboratory results form and consequently micro-chip numbers will then appear on this document. The results document should be saved as evidence of testing.

It is beneficial to telephone the laboratory before sending large numbers of samples as a courtesy and to co-ordinate a preferred day for sampling.

6.4.6 Testing regime

Badger cubs should be tested three times with ideally not less than 4 weeks between tests (see 6.3 and below including Figure 6.1)

6.4.7 Advice on blood testing

For further advice on blood testing cubs please contact the RSCPA, SWWR or APHA Starcross (see Appendix 1).

6.5 Protocol for testing adult badgers

An adult badger should be treated for injuries and returned in good health, as soon as possible, to the EXACT location that it was found (see Chapter 7).

6.5.1 bTB testing

Adult badgers are NOT routinely blood tested for bTB for the following reasons:

- Adult badgers should always be released at the EXACT location from which they were recovered (or as close to where found as possible for example, in situations where access may no longer be possible). This is for social and territorial reasons, as well as eliminating the opportunity for the spread of disease to new areas
- A single bTB blood test is unlikely to be 'accurate' (sensitive) enough to be of any benefit (see 6.3)
- It is unlikely that an adult badger will be held in captivity for medical reasons long enough to conduct three blood tests. To keep adult badgers in captivity for protracted periods of time simple for further testing is contrary to their best welfare needs and will do little to reduce the risk of disease spread.

Badgers with clinical tuberculosis should be easily recognised by a veterinary surgeon on clinical examination[10] (see Chapter 7). As the sensitivity of serological tests for bTB in badgers is increased in infected badgers with more severe disease, using a single test may be of some benefit where disease is suspected.

6.5.2 Euthanasia

An adult badger should be euthanased if any of the following statements apply:

- It needs complicated treatment involving prolonged veterinary care
- It is showing poor adaptation to captivity while recovering
- It has evidence of chronic disease (including bTB) or is showing signs of reaching the end of its natural life span
- It cannot be released due to permanent injuries or long-term disability.

Government guidance on the legality of euthanasia of badgers is given in Appendix 5. For information on caring for adult badgers in captivity see Chapters 7 and 9. For information on releasing adult badgers see Chapters 10 and 11.

6.6 Protocol for testing badger cubs

If a badger cub cannot be returned to its natal sett using MNR (see Chapter 4; 4.7.1), then it needs to be treated differently to adult badgers for a number of reasons. Cubs need to be mixed with other badgers because they are social animals (see Chapter 2; 2.2) and need to be held in captivity for some months before being old enough to survive in the wild. The construction of such 'release groups' means that individual cubs cannot be released back to the location where they were found and instead the group is released at a new site (see Chapter 8).

6.6.1 Retrieving badger cubs

Careful assessment should be made as to if a badger cub needs to be brought into captivity (see Chapter 4 and Figure 4.3). The exact location of where a cub is found should be obtained (six figure grid reference), as well as basic information such as the sex and approximate age of the cub (see Chapter 8).

All cubs should receive a full veterinary health examination within 24hrs of arrival.

Cubs should be registered and microchipped (see Chapter 5). The microchip's unique number should be used to identify the animal and any samples taken from it and appear in all blood test reports.

6.6.2 bTB testing (see also Figure 6.1)

The first blood test for bTB should be carried out from 6-8 weeks old, as tests taken before 8 weeks old may be influenced by the presence of maternal antibodies. For cubs that are old enough blood tests should be carried out as soon as the animal is taken into care and before mixing with other cubs.

For cubs under 8 weeks old mixing with another young cub (or cubs) will need to occur prior to testing. Badgers are sociable and cubs need to be kept together in order to prevent the formation of irreversible behaviours (imprinting and habituation) with humans. This may mean that very young badger cubs have to be moved some distance to a suitable rehabilitation centre, although the aim should always be to keep cubs in an area of similar

bTB status in cattle (see Chapter 10 and 6.7). Cubs under 8 weeks old should ideally only be mixed into 'mini groups', pairs or groups of three. Mixing of untested cubs must be kept to a minimum, as the consequences for cubs in-contact with a test positive animal will usually be poor.

On receiving the first negative bTB test results (see below regarding test positive cubs), all cubs should be mixed to form 'mini groups' and allowed time for social interaction to take place (Figure 6.1). Each 'mini group' of cubs should then be blood tested for a second time, at least four weeks after the last cub in the group was first tested. On receiving the second negative bTB test results (see below regarding test positive cubs), two or more 'mini groups' may be mixed together to form a suitable 'release group' (Figure 6.1). The sex-ratio of a release group should be taken into account to ensure the group is viable, typically one male to every two or three females, with at least two males in each group.

All cubs in a release group should be tested for a third time as near as possible to the time of release and at least 4 weeks after the second test. Anaesthesia for the third blood test allows full health inspection of the animal prior to release.

Badger cubs can only be released following three consecutive negative blood test results (Figure 6.1).

For information on caring for badger cubs see Chapters 8 and 9. For further information on releasing badger cubs see Chapters, 11 and 12.

6.6.3 Cubs testing bTB positive

Cubs testing positive to ANY of the three bTB blood tests must be immediately euthanased. A licence is required from NE (or the relevant devolved body) for euthanasia of badger cubs in these circumstances (see Appendices 1 and 5).

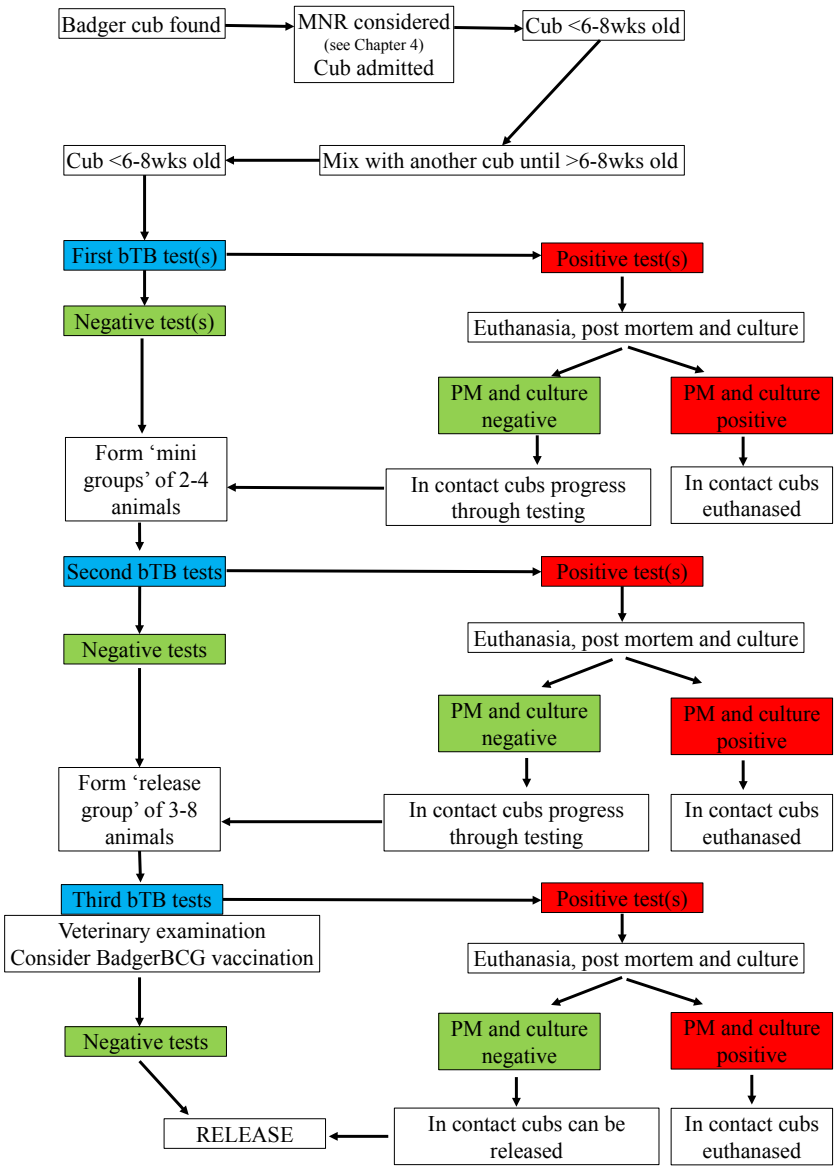
All contact animals must be euthanased, UNLESS no evidence of *M. bovis* can be found when the test positive cub is examined post-mortem and culture of tissue samples takes place. This involves a full post mortem examination and the culture of multiple lymph node samples for *Mycobacterium bovis*. This process remains the 'gold standard' for bTB diagnosis[34] although more detailed post-mortem techniques may increase the sensitivity of detection of *M. bovis*[33] (see 6.3). This should be discussed with laboratories carrying out post-mortem examinations. SWWR are happy to offer advice as necessary (see Appendix 1). No post-mortems should take place in any establishment that does not have facilities as

required by Health and Safety guidelines for this purpose. Veterinary surgeons in general practice should NOT be asked to carry out such procedures.

Culture of *M. bovis* takes around twelve weeks. During this time, the remaining badger cubs in the group should be held in captivity, without further testing, pending the results of the culture findings. There are two possible outcomes of the post mortem and culture result:

- If the euthanased animal is post mortem and culture negative, the remaining group can continue the release protocol.
- If the euthanased badger is positive on post mortem and/or culture examination, the remaining animals in the group must be euthanased (see also Appendix 5).

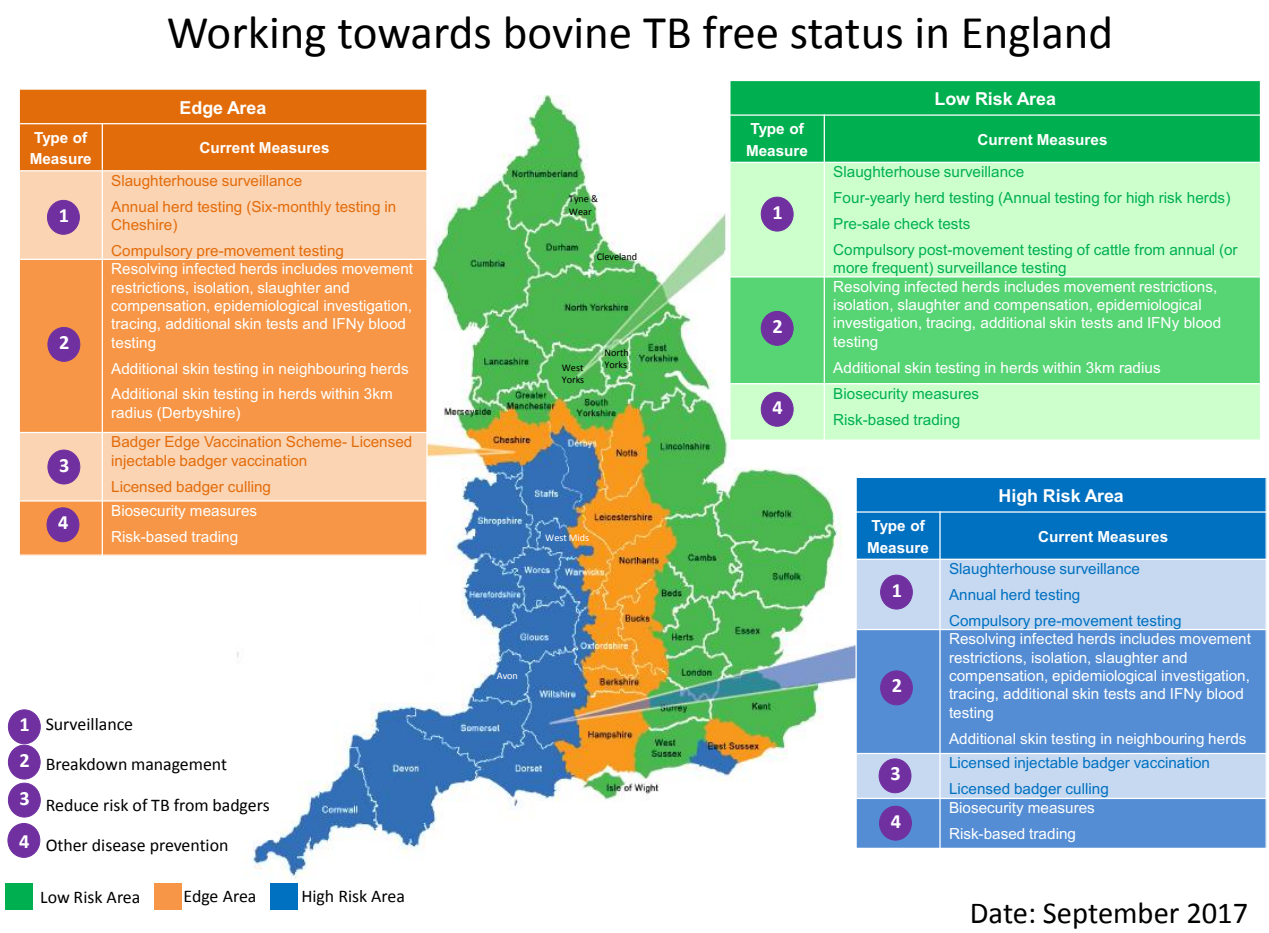
Figure 6.1 Flow chart illustrating the protocol for testing badger cubs



6.7 Consideration of bTB areas in cattle

Since the publication of the Defra 25-year *Strategy for achieving Officially Bovine Tuberculosis Free status for England*[4], England has been split into three risk areas, 'High', 'Edge' and 'Low', for bTB in cattle, reflecting regional variations in the epidemiology of the disease[40] (Figure 6.2). Whilst it could be argued that these areas reflect the status of bTB in cattle rather than badgers, the absence of badger RTC surveys, at the time of writing, across the country mean that cattle statistics are the only method available for assessing the risk of infection in badger cubs from different areas.

Figure 6.2 Representation of the three bTB management areas in England: High Risk Area (HRA); the Edge Area; and the Low Risk Area (LRA), and control measures in each area[40]



As part of the registration process for each badger cub, the person responsible for the cub should classify it according to its area of origin as in Figure 6.2. Ideally cubs should remain

in the area type they originate in ('High', 'Edge' or 'Low), be mixed with cubs from the same classification of area, and be released in that area ('High', 'Edge' or 'Low).

As explained above (6.6.2) however, ensuring the welfare of the cub and avoiding abnormal behaviour is key to the rehabilitation process and may mean that cubs need to be moved to the nearest appropriate rehabilitation centre. As the badger population is highest in the south west of England[41] most cubs originate here and most rehabilitation centres able to rear cubs are in this area.

Once cubs have successfully passed through the triple testing regime (Figure 6.1), they should be released in groups at sites as close as possible to where they were found, ideally in an area of equal or higher risk (e.g. 'Edge' area cubs should be released in 'Edge' or 'High' risk areas). The availability of release sites however, is a limiting factor as discussed in Chapter 10.

6.8 Cubs not suitable for release

As described above (6.6), cubs testing positive for bTB and those in-contact with a confirmed infected animal must be euthanased (see Appendix 5). Additionally, cubs failing to rehabilitate successfully for other reasons (e.g. imprinting, habituation) should be euthanased on the first attempt of the rehabilitation process; a licence will be required to do this (see Appendices 1 and 5). In exceptional circumstances, un-releasable badger cubs may be of conservation or educational value and can be kept in captivity, provided facilities that allow normal behaviour, including social interaction with other badgers, can be provided. A licence may be required to keep badgers in captivity in this way (see Appendix 1). The ethical and legal (see Chapter 3) views of individual rescue centres and captive animal centres on this practice vary considerably.

Chapter 7: Guidance on caring for adult badgers

7.1 Introduction

Full details of all adult badger casualties should be recorded on admission (see Chapter 4 and Appendix 3.2).

Adult badgers coming into captivity should be examined by a veterinary surgeon within 24hrs of admission. For specific information on badgers, vets should refer to the BSAVA Manual of Wildlife Casualties[9]. The most common reasons for adult badger admissions are RTC and 'territorial' bite wounds[9]. The information below offers advice on supportive care in addition to veterinary care, not instead of it. Those in possession of an injured badger and not seeking appropriate care for it may be putting themselves at risk of prosecution (see Chapter 3).

Most badgers will need a period of recuperation once they have been to the vets. Adult badgers must be returned to the EXACT location where they were found, for social and territorial reasons, and therefore do not need to be bTB tested (see Chapter 6). Equally, whilst in captivity they should not come in contact with any other badger or other animals. Every effort must be taken to prevent the badger from getting used to people or human sounds (habituation), by minimising human contact.

Badger convalescence should be as short as possible to avoid social and territorial disruption and animals should be returned to the wild as soon as they are fully fit (see Chapter 11).

Facilities to hold a sick or injured badger must be secure (see Chapter 8), badgers are capable of breaking through a wooden door in one night. The health and safety of all those involved, including staff or volunteers, should be a priority when dealing with all wild animals (see Appendix 4).

7.2 Initial care

7.2.1 Warmth

Most badger casualties will have a low body temperature (hypothermia) on presentation and be clinically 'shocked'. The first aim of first aid care is to prevent loss of further heat and this can be provided initially by covering the animal with blankets. Once in a rehabilitation facility additional heat may be provided using a heat lamp to slowly warm the casualty. This will aid

recuperation and indeed, can be life-saving. Ruby infra-red lamps provide heat and allow the animal to be observed easily without providing unnecessary visible light. Badgers should only be actively warmed up at the same time as receiving fluids and food (see below).

7.2.2 Bedding

The badger should be placed on a blanket or incontinence pad initially, as it will make it easier to monitor any urine or faeces that are passed. Ensure blankets are kept especially clean if the badger has any weeping wounds (e.g. 'territorial' bite wounds). More natural bedding, such as straw, hay or shredded newspaper, can be used once the badger is recovering.

On the first day put bedding in either the back left or right corner of the pen. The next day, when it is time to clean out the pen, clean out the opposite corner and put fresh bedding there. Encourage the badger to move over to the clean corner, then clean out the corner that the badger has vacated. If this routine is carried out daily the badger will soon understand the routine and will only have to move once whilst the pen is being cleaned. Metal buckets and shovels should be avoided as these create excessive noise.

Badgers vary tremendously in temperament. Quiet, confident cleaning and sticking to a routine however, tends to minimise anxiety in all animals.

Sick or injured badgers should not be given a box to go in to. Boxes make monitoring impossible and administration of medication difficult and dangerous.

A recovering badger will benefit from logs to claw and chew to stop boredom.

7.3 Feeding

Fresh water should be available at all times in a non-tippable bowl.

Adult badgers should be offered a mixture of dog food, dog biscuits, cat food, fruit, peanuts and fresh carrion. Badgers will leave anything they do not like. Sugary foods used over long periods of time may create dental problems.

Food should be given in the evening to mimic normal foraging behaviour.

Adult badgers that are not feeding can be encouraged using liquid diets such as Complan®, honey and raw egg mixed into a soup, or Hills a/d®. Too much of some of these foods may

cause diarrhoea. Bland solid food such as small amounts of cooked chicken and rice, or veterinary diets such as Hills i/d®, or Royal Canin Sensitivity diet®, may also be used.

It is not unusual for adult badgers to not feed for four or five days. If not feeding after 3 days substitute fresh water with an oral rehydration fluid such as Royal Canin® canine/feline Rehydration Support; once the badger starts to feed, return to fresh water for drinking.

7.4 Administering medication

As a general rule, all medication is best administered by injection, as this does not rely upon the badger eating. Injections can be easily administered by covering the badger's head with a heavy blanket to prevent movement and biting and then injecting in the rump.

Badgers have a very strong sense of smell and will usually find tablet medication hidden in food., Some of the more modern veterinary medications in a palatable base (e.g. Rimadyl palatable tablets®) can however, be successfully hidden in food in an animal that is eating consistently.

Further advice on routes of medication will be obtained from your veterinary surgeon.

7.5 Other issues

Seriously ill badgers that are not moving need to be gently turned (rolled) from side to side every 4-6 hours. Health and safety considerations must be observed when doing this. If the badger does not improve over 24hrs veterinary advice should be sought and most likely the badger will need to be euthanased (see also Appendix 5).

For information on rehabilitation facilities see Chapter 9. For information on releasing adult badgers see Chapters 10 and 11.

Chapter 8: Guidance on badger cub rearing

8.1 Introduction

Badger cubs are usually presented to wildlife rescue groups as uninjured orphans. The possibility of releasing them back to the wild, with appropriate support, using Monitored Natal Return (MNR, see Chapter 4; 4.7.1) must be considered. Cubs may be admitted from a few days old and if MNR is not possible, they need to be held in captivity for some months before being old enough to survive in the wild. Badger cubs kept in captivity for any amount of time (ideally no more than a few days) need to be mixed with other badger cubs because they are social animals and begin to develop abnormal behaviours if kept in isolation. This may mean that very young badger cubs have to be moved some distance to a suitable rehabilitation centre (see Chapter 6).

Cubs can be very difficult to rear and will show very few symptoms when ill. It is important to keep records throughout their time of rearing for reference (see Appendix 3). Rearing is further complicated by the necessity to release cub groups into the wild in areas often away from where they were found (see Chapters 10 and 12) and as a consequence of this the requirement for them to be tested for bTB (see Chapter 6). Cubs must be microchipped on admission to ensure their identification prior to bTB testing (see Chapters 5 and 6).

8.2 Approximating cub age

The average size and weight of a badger cub at birth is given in Figure 8.1. Eyes and ears are totally sealed and the cub is covered with a very fine, almost white hair; the stripe on its head is hardly discernible at this age. Badger cubs scent mark from birth and the pushing out of the sub-caudal (under the tail) scent gland, particularly at feed times, is normal and should not be misconstrued as constipation.

Eyes and ears do not open until 5 weeks of age when the first milk teeth start to erupt (Figure 8.1). Cubs will begin to be fully mobile at this age, although this is shaky and uncoordinated.

Cubs naturally come above ground when they are 8-10 weeks of age (Figure 8.1) and this is when orphans are most likely to be found. At this age, the hair is quite long and they are capable of biting. If the incisor teeth are present it may be possible to wean the cub at this stage, rather than to start on milk feeds.

Trying to approximate the age of cubs based on length and weight can be very difficult as individuals vary greatly in their growth rates, but some approximations can be made (Figure 8.1).

8.2.1 Very young cubs

Any mammal taken from its mother within the first 48 hours of birth may have failed to ingest an adequate amount of colostrum. Colostrum is the mother's first milk, which is rich in energy and proteins, and in many species is an essential source of natural immunity to the young. Colostrum replacers are available from agricultural suppliers for cattle, sheep and goats (or people keeping these species may have stored frozen colostrum) and these may be used for very young badger cubs (those with umbilical cords still present) in an attempt to provide additional nutritional support. After the first 48hrs ordinary milk replacers (see 8.5) can be used.

Figure 8.1 Approximate size and weight of cubs of different ages[9]

Age of cub	Appearance	Eyes	Teeth	Size/weight	Notes
At birth	Pink skin, sparse grey fur	Blind	No teeth	Body 120 mm Tail 30–40 mm Total length 150–160 mm 75–132 g	Below ground in sett
5 weeks	Full black and white coat	Eyes open	Milk teeth 4–6 weeks	800 g	Below ground in sett
8 weeks	Full black and white coat	Eyes open	Milk teeth present	1500 g	Seen above ground close to sett
12 weeks	Full black and white coat	Eyes open	Permanent teeth 10–16 weeks	Approx. 3 kg	Weaning begins
15 weeks	Full black and white coat	Eyes open	Permanent teeth present	Approx. 5 kg	Usually independent

8.3 Record keeping

Continuous records of all cubs should be kept in order to follow and reflect upon their progress. Records also provide useful information for veterinary surgeons and other rehabilitators if the cub needs additional care or it is transferred to a specialist centre. Examples of forms are given in Appendix 3.

8.3.1 Admission record (Appendix 3.2)

This form records precise details of the location where the cub was found and details of the person who first found it. The badger is a protected species and cannot be taken into captivity without a licence unless it is for welfare reasons (see Chapter 3), detailed records are essential to protect those with a badger in their care.

Date and time of admission: straightforward.

Treatment prior to admission: It is important to record all treatment prior to admission. If the badger has come from another vet it is especially important to know of any medication administered or tests carried out - this will avoid the risk of another vet administering incompatible drugs or unnecessarily repeating diagnostic tests.

Reason for admission: Include as much detail as possible as to how and why the cub was picked up, as this information may be useful in diagnosing future problems.

Daily treatment: Record all veterinary advice, rather than committing it to memory. It is easy to forget things when caring for a baby animal.

End results: Hopefully a happy ending! Complete this part of the form at the finish of rearing. This will provide useful information for future years.

8.3.2 Cub feeding record (Appendix 3.3)

This form is mainly for badger cubs needing to be bottle-fed. Each day the cub should be weighed at the same time of day to see how it is progressing. Ideally, weigh before the first feed each morning. Fill in each square for each feed with the amount taken plus symbols to record if they have passed urine (u) or faeces (f). The daily total is a useful parameter, as sometimes the amount of milk taken at each feed is erratic, but the total feed should be the same or slightly more each day. ‘Comments’ should be literally anything the feeder feels is significant (e.g. maybe the cubs are more fretful during the feed or sleepy), it is important to keep a record.

8.3.3 Cub care record (Appendix 3.4)

This record is more appropriate for older cubs that are weaned and being given food. The form is used to record the slow increases in feeding that will be being made. The 'amount taken' column provides additional useful information. A food type left at the end of a day on a regular basis may indicate that this badger just does not like that particular food - try something else. When several cubs are mixed together it is still very important to weigh the cubs every few days, as it is impossible (unless you are lucky enough to have remote cameras in your pens), to tell if all the cubs are feeding.

8.4 Process of cub care on arrival

8.4.1 Removal of parasites

Parasites should not be routinely removed from wildlife casualties, as they are an important part of the natural ecosystem. In the case of cubs however, the need for regular handling and the often, large parasite burdens, means that treatment is generally recommended. Cubs for MNR (see Chapter 4) should not be treated in this way as the smell of any product used may result in rejection. Badger cubs frequently carry lice and ticks. Frontline® spray (fipronil spray, available from vets) can be used in cubs over 2 days old. The correctly measured amount of spray (see the product instructions) is most easily applied directly to the cub's skin using a gloved hand. The product should be distributed evenly over the whole of the body of the cub, however only the correctly calculated amount should be used. Once the cub is 8 weeks old and weighs over 2 kg the small dog 'spot- on' version of Frontline® (or an alternative fipronil spot-on, available from vets and pharmacies) may be used, this is applied in one place to the skin of the neck between the shoulder blades, following the product instructions. Other anti-parasitic products can probably be used safely in older cubs but experience of these is limited – veterinary advice should be sought.

Large ticks should be removed with tweezers or tick removers (available from vets and pet stores). Non-toxic products such as Vaseline® or washing up liquid can be used to kill the ticks (by blocking their respiratory system) before removal. Surgical or methylated spirits should be used with extreme caution as these may be flammable.

A more natural way of removing fleas is to work through the fur of the cub with finger and thumbs, squeezing any fleas to be found in the coat. This is similar to maternal grooming

and may cement a relationship between cub and carer. This method does not however, prevent contamination of the cub's bedding and environment with flea eggs and larvae.

8.4.2 Inspection

Check the cub thoroughly working from head to rump methodically without causing too much stress. Weigh the cub and then place it in a box with heat (see below).

Dehydration can be diagnosed using clinical signs such as sunken eyes and 'skin tenting'. If a fold of skin is pinched and remains 'tented' this suggests the cub is significantly dehydrated. If the cub will feed (see below) this will very often correct the dehydration. If the cub will not feed veterinary attention is required in order to administer fluids via other routes. It is recommended that veterinary assessment of all cubs should take place within 24hrs of admission.

8.4.3 Provision of warmth and bedding

An orphaned cub is likely to be suffering from stress, cold and hunger. Ensuring there is no further heat loss is paramount, however care must be taken to ensure that warming the cub is also accompanied by suitable feeding (see below). Warming in an incubator is preferable. If an incubator is not available warming from beneath, using a covered hot water bottle or heat-pad, is preferable to using an overhead heat lamp. The cub needs to be in an environment at around 77-82°F (25-28°C). Newborn cubs (with umbilical cord still present) require a higher temperature range, 82-86°F (28-30°C), as they are unable to retain any body heat for the first few days. Cubs will settle better if covered with a light towel or blanket.

Clean newspaper provides a cheap, warm bedding material. Unfrayed towels can also be used as bedding. Fleece blankets are good (available from vets and pet shops), as these wick any moisture through to bedding keeping the cub dry. Bedding should be washed at 60°C or above.

Single cubs will benefit from a teddy bear or hot water bottle wrapped in a towel as "company". When there are multiple cubs it is advantageous to mark them with correction fluid (e.g. Tipp-Ex®) or nail varnish, so that each individual can be uniquely identified. Microchips should be used for permanent identification as soon as possible and prior to blood sampling for bTB (see Chapters 5 and 6). A licence is required for ALL marking of badgers (see Chapter 5).

8.4.4 Reaction to noise

While the eyes and ears are closed, 'normal' background noise will not usually affect badger cubs. Older cubs may react to household noises, although they are usually very adaptable. All noise should however, be kept to an absolute minimum to prevent the development of abnormal behaviours (imprinting and habituation). If a cub is very vocal and cannot be placated with food or attention, it is likely that the cub is unwell and needs veterinary attention. Older cubs that are unwell may not vocalise but may bite excessively.

8.5 Feeding cubs

8.5.1 General feeding considerations

Small animal rehydration fluids (e.g. Royal Canin® canine/feline Rehydration Support) are available from the vets, or online, and should be used for the first 'feed' after a cub is admitted. Rehydration fluids ensure that dehydration is corrected before the gut is given a new food, however it is important that the cub also receives some calories, in the form of a milk substitute, to provide energy soon after admission.

Human liquid diets (e.g. Complan®) have been used to feed cubs, mixed at a ratio of 1 part Complan® to 3 parts of water, but animal milk replacers are preferred. Esbilac® a milk powder for puppies, available from vets and online, has been used successfully for rearing badger cubs (and other mammals) at SWWR for many years. Esbilac® is usually fed to badger cubs at half strength. Lactol®, goat's milk and lamb milk powder have also been used to rear cubs. Cow's milk is not recommended. Changes in brand of milk should be avoided. If a change is necessary the new and old milk should be mixed for a few feeds, if possible, in order to avoid a sudden diet change.

Vitamin drops (e.g. Abidec drops®, available from chemists) can be added in the first feed of each day. A pinch of a small animal probiotic powder, which aids gut flora (e.g. Pro-soluble®, available from vets and online) can be added at the same time.

8.5.2 Bottle feeding

8.5.2.1 How much and how often to feed

The greatest limiting factor in hand-rearing any neonatal animal is the frequency with which feeding needs to take place. Very young badger cubs, only 1-2 days old, have been very successfully hand-reared, but such young cubs require feeding little and often (hourly) throughout every 24 hours period and this can put a huge strain on carers. As the cub grows the frequency of feeds can be reduced (see Figure 8.2) allowing the carer some sleep.

Volumes of feed are approximately 0.5ml/g/24hrs, but will vary greatly between individual cubs. A rounded tummy (abdomen) is probably the best way of knowing if a cub has taken enough feed. Approximate volumes per feed for badger cubs of varying age are given in Figure 8.2.

Cubs under 400 grams should be fed using a 1ml syringe with a small teat (e.g. from a Cat-Lac® set, available from pet shops or online) attached to it. Although a 1ml syringe requires regular refilling, the small size allows the cub to pull in the plunger through its own sucking action and this avoids the risk of the cub inhaling milk, which can result in aspiration pneumonia. Small cubs will sometimes take a baby's bottle but care must be taken to ensure that sucking action does actually lead to milk consumption. After feeding listen to the cub's back for rattling sounds that may suggest inhalation of milk that could cause pneumonia.

Figure 8.2 Volumes and frequencies of milk feeds for badger cubs of varying approximate age[9]

Approximate age	Weight	Total volume (24h)	No. feeds (24h)
1 week	280g	140ml	9
4 weeks	600g	300ml	5
8 weeks	1500g	750ml	4

8.5.2.2 'Toileting'

The first part of the feeding process should be to "toilet" the cub. The badger mother (sow) would normally lick the cub's bottom (perineal area) to stimulate them to empty their bowels and bladder, this will in turn create a sucking reaction in the cub, which should then go on to feed. Dampened kitchen roll can be used to stimulate the cubs to pass motions and this also absorbs the urine and faeces. During the toileting process the cub will push out its scent gland in order to musk and scent its' mother, this must not be mistaken for constipation. Badger cub faeces are usually dark brown but will turn to a soft yellow with milk feeds, they have been described as of 'toothpaste' consistency. Loose faeces can be corrected by slightly diluting the feed (see 'Diarrhoea' below). There will be a degree of natural constipation in a very small cub that will be overcome with normal feeding, if constipation persists consult your vet who will prescribe a suitable laxative.

8.5.3.3 Feeding

Once toileted, a badger cub will settle to feed. Wash your hands before and after feeding and make sure that your clothes are clean.

All feeding equipment must be kept sterile in much the same way as for a human baby. It is acceptable to use the same bottles and equipment for cubs kept together, as these animals will have been exposed to shared germs or infections. Between feeds all equipment needs to be cleaned and sterilised, using a baby bottle steriliser or a product like Milton® sterilising fluid.

To feed a cub first get it into a comfortable position - cubs usually like to be able to press their front paws against something so that they can paddle, an action that would normally stimulate the mother's milk flow.

Sometimes a cub will clamp on the teat, do not read this as the cub not being hungry. Cubs will also sometimes comfort suck without actually taking any feed down. Feeding is a slow job and must be combined with stroking and comforting to encourage confidence. If the cub really is difficult and stressed, refusing to take the milk, then put it down, give it an hour, and try again. As with babies it is important that the carer, at least to some extent, dictates the feeding routine.

It is easy to worry that the teat size is incorrect. As a general rule, if the cub has taken from the teat once do not change the teat size even if the cub continues to refuse it, since this

just adds to the cub's confusion. Ensure that the first size fast-flow teat for new-born babies or pets (see above) is used, which is nice and soft. The teat hole size will be ample for the milk, DO NOT enlarge it. Once the teat starts to wear, start to soften a new one by soaking in boiling water, as the cubs will find a new teat very different from the old one.

Take time feeding the cub, inhalation of milk by feeding too fast will cause aspiration pneumonia which leads rapidly to death.

Winding of cubs after their feed helps them settle.

6.5.3 Weaning

From the age of 8 to 10 weeks the cubs will show an interest in solid food, now is the real hard work, as cubs do not usually recognise bowls and will be far happier grubbing stuff from the floor. Offer small amounts of the suggested foods at first.

8.5.3.1 First stage weaning foods

From 8-10 weeks old, first stage weaning foods may include; Milupa®, Weetabix®, scrambled eggs, yoghurt, porridge, custard cream biscuits.

8.5.3.2 Second stage weaning foods

From 10 weeks onwards, more solid and meat-based foods can be introduced. These foods can be used in badgers of all ages, including adults; minced meat, minced tripe, puppy food, sausages, cooked chicken (no bones), dead chicks, peanut butter sandwiches, grapes, sunflower seeds.

Dry cereals such as Weetabix®, may be soaked in meat stock rather than milk for weaned badgers in order to prevent sudden dietary change. Sick cubs however, may improve quicker if allowed to return to a milk-based diet. Generally, there is no advantage in delaying the weaning process in orphans of the correct age.

8.6 Cub management indoors

Once cubs can move around they will settle for one or two places that they will use as a dung pit. These can be created with newspaper. Litter trays end up in a horrendous mess as the cub will merely dig everything out. Stringent cleaning with disinfectants (e.g. Virkon®

or Parvocide®) will maintain a healthy environment. Correct dilutions and contact times for disinfectants, according to manufacturer's directions, should be adhered to.

If the cubs are stopped from using their original chosen place for a toilet, they will be concerned and suffer some discomfort before they will concede to using an alternative area. They can be encouraged to use a new site not too far away by putting dung there from the old site and moving them smartly there a few times when they go to the old site.

8.7 Preventative health care in cubs

It is useful to have a period of isolation prior to mixing with other cubs to allow time for any infection that may be incubating in a new cub to be evident. If cubs are over 8 weeks old, this time can be used to obtain a first bTB test result (see Chapter 6). During this period of separation, 'barrier nursing' should be carried out and ideally a different person should care for this cub compared to the main groups.

Hand-reared badger cubs should be protected from environmental infections and unnecessary contact with other animals. Sensible hygiene measures and appropriate disinfection (see above) should take place when indoors. Once in outside enclosures, stand-off wires at the base of fencing must be used to stop contact with any resident badger population and other animals (see Chapter 9).

8.7.1 Screening for parasitic gut infections

Badgers, especially cubs, are susceptible to several parasitic gut infections including coccidiosis (*Eimeria* and *Ispospora* species[42]) and *Giardia*[42]. Although it is impossible to rule out infection with laboratory tests (as the parasites are shed only intermittently in the faeces) it is good practice to screen badger cubs for such infections before mixing. Most veterinary surgeons will carry out these tests in their own laboratories, or quickly obtain results from external veterinary laboratories. Treatments for any diagnosed infections are given in veterinary texts[9].

8.7.2 Parvovirus vaccination

Parvovirus infections are known to have caused the death of badger cubs in captivity on more than one occasion[43]. The source of infection in these cases was unknown, but parvoviruses are carried by many species including domestic dogs and cats. Routine vaccination of badger cubs against parvovirus should therefore be carried out. A commercial

dog vaccine (Nobivac Parvo-C®) has been used in badger cubs from 6 weeks old using a standard puppy protocol. Two doses of vaccine are given with at least a 2 weeks gap between doses and the second dose being given when the cub is over 10 weeks old. The vaccine is a prescription only product (POM-V) and is only available from veterinary surgeons for animals under their care. Parvovirus vaccination is usually carried out at a different time to BCG vaccination (see below).

8.7.3 BCG vaccination

Badger cubs can be vaccinated with the BadgerBCG vaccine from 12 weeks old[44], but are more commonly vaccinated prior to release (see Chapter 11).

8.8 Medical problems in cubs

8.8.1 Puncture wounds

Puncture wounds in badger cubs may result from the cub being attacked by other badgers or being picked up in dogs. In both cases wounds are likely to be much more extensive than the small superficial holes which can be seen and veterinary examination is essential. Wounds should be cleaned and flushed with a syringe twice daily using a dilute wound disinfectant such as chlorhexidine solution (e.g. Hibiscrub® diluted 1 part to 40 parts of water). Antibiotics should be administered as directed by the veterinary surgeon. Where antibiotics are used the cub may benefit from a course of live yoghurt or probiotic (e.g. Pro-soluble®) in their diet to help renew gut flora.

8.8.2 Hair loss

Hair loss in animals, especially juveniles, commonly results from ‘stress’ such as a change in diet or environment. Some cubs will become completely bald soon after arrival or when their surroundings or diet have changed. The problem is not fatal and will soon resolve itself by the cub firstly growing a new, very light coat of fur, which will soon change to the usual colour.

8.8.3 Diarrhoea

If the cub is on a milk diet, withdraw the milk entirely, and put on a small animal electrolyte fluid (e.g. Royal Canin® canine/feline Rehydration Support) for 12-24 hours. A solution of half milk and half electrolyte fluid should be given for a further 24 hours before returning to the usual consistency of milk.

Weaned cubs should be given a more fluid diet, electrolytes and flavoured baby rice (e.g. Milupa®) and bland easily digestible food (e.g. white chicken and rice, or a commercial 'intestinal' diet e.g. Hills i/d®, or Royal Canin Sensitivity diet®). If problems persist, a veterinary surgeon should be consulted.

Probiotics may be used and in cases with diarrhoea combining these with kaolin (e.g. Pro-Kolin+®) can be beneficial. Other 'anti-diarrhoeal' products may be prescribed by a veterinary surgeon.

8.8.4 Inability to feed

If weaned cubs are so ill that they are unable to feed, they can sometimes be tempted with either a mixture of original Complan®, honey and egg, or liquid food such as Hill's a/d® made into a puree. Such foods may also be offered to adult badgers that are very ill. Weaned cubs may be syringe fed to encourage uptake of food.

Older cubs, where syringe feeding would be dangerous, and those that are significantly dehydrated, will require intravenous fluid therapy (a drip) and should be taken to a veterinary surgeon.

8.9 Final thoughts on cub rearing

Remember, the way a cub is reared will affect the viability of the animal. Cubs that become imprinted or habituated will not be releasable and may have to be euthanased (see Chapter 6; 6.8 and Appendix 5). The method of rearing described above, aims to maximise the chances of a successful release of the cub back in to the wild. Badger cubs are social animals and must be kept, wherever possible, with other cubs (see Chapter 6; 6.6). Once weaned, human contact should be kept to an absolute minimum. Further advice on cub rearing is given in the contacts list (see Appendix 1).

Chapter 9: Guidance on wildlife centre rehabilitation facilities for badgers

9.1 Licensing and planning

9.1.1 Licensing

A licence is not required for the general care of a badger that is intended for release back into the wild (see Chapter 3).

9.1.2 Planning permission

Advice must be obtained from the local planning authority as to the need for official planning permission - this will be dependent on the size and design of the pen, the location and various other factors.

9.2 Short-term facilities

9.2.1 Adult badgers

Adult badgers should be kept in captivity for as short a period of time as possible (see Chapter 7), therefore only short-term care facilities are required for these animals.

An injured badger needs an area that is large enough for it to move around safely, but small enough to avoid self-trauma. The pen needs to also have enough space to allow a carer to be present safely for cleaning and the administration of drugs. A minimum size of 2 metres square is recommended.

Short-term pens should be solidly constructed with floors and walls of impervious materials that are easily cleaned. The door should be solid and secure. A viewing window or door that can be darkened or closed is ideal unless webcams are available.

Pen ‘furniture’ may be added (see below) to create a less clinical environment and allow the badger places to hide and use as a latrine.

Additional, ideally adjacent, space (e.g. an enclosed corridor) is required for the purposes of assessing the casualty prior to release (see Chapter 11).

No adult badger should be mixed, or allowed contact, with other badgers, or other animals, whilst in care.

9.2.2 Badger cubs

The size of pen required for an individual badger cub will depend upon the size and age of the cub. Incubators are most appropriate for very small cubs and various sizes of open topped plastic boxes with suitable bedding for older cubs (see Chapter 8).

Where mini groups of cubs are being integrated together (see Chapter 6), a short-term pen a minimum of 4 metres square is recommended.

Cohesive cub release groups (see Chapter 6) should be moved to longer-term, pre-release, pens from 4-5 months old.

9.3 Longer-term facilities (pre-release pens)

9.3.1 Requirements for longer-term facilities

If badger cubs are to be kept at a facility through to the age at which they can be released (6-8 months old) facilities for this longer-term care will be required. Such facilities allow the animals more space to develop normal social interaction and behaviours such as digging and foraging. Such pens should be as large as possible, a minimum of 25 metres square. Ideally grassed enclosures, providing as normal a natural environment as possible, should be provided.

Ensuring the security of such pens can be difficult and will be seriously tested from August onwards. Every effort should be made to ensure that all cub groups are released by November at the very latest (see Chapter 12) because of seasonal influences (see Chapter 2).

9.3.2 Construction of pens

Pens for longer-term care should be situated away from the main facility so as to minimise human contact and habituation to human activities.

Galvanised wire mesh should be used for the construction of pens, having a wire diameter no less than 3mm and hole size of 25mm or 50mm. Mesh of this type can be obtained from a local steel stockist or directly from the manufacturer.

Wooden posts may be used for the pen frame, but these are less durable than metal posts. Wire mesh should be fixed to the inside of the frame posts as this will give a longer pen life - badgers will chew the posts if the mesh is fixed on the outside. Solid fencing to the height of 1 metre (above the eye line of the badger) will often deter attempts to dig out, but gives a less ‘natural’ look and feel to the pen.

The pen needs either a roof, or the walls need an overhang, as badgers will climb and potentially escape. An extra precaution could be electric wire on the inside of the fence.

A floor constructed from concrete or tiles is easiest for cleaning. A soil base is more natural, but can become very muddy and hard to clean out. A concrete base with wood chip or straw on it can achieve a possible half way measure

It is recommended that to prevent escapes through digging, wire mesh walls should extend 1 metre into the ground and 1 metre at a 90° angle back into the pen. There is still a need to monitor. Total security can be obtained by burying mesh under the whole of the floor of the rehabilitation pen.

If a chamber is provided, note that an underground chamber is very difficult to clean and to recapture the cubs. Any chamber should be accessible for easy cleaning, observation and recapture of the animals.

A chamber or other housing should be about 1 metre square. Badgers sleep almost piled on top of each other and a small chamber has the advantage of staying warmer.

In very hot weather badgers like to bathe and will try to get into drinking bowls. Providing large trays of water in warm weather can help avoid drinking water being wasted.

9.3.3 Management of pens

Badger cubs can be grouped together in the same pen according to the criteria previously discussed in Chapter 6. Where more than one group is formed, contact between groups must not be allowed. Contact with other animals, domestic and wild, including other badgers, must also be prevented. Double fencing and use of electric fencing (see Chapter 12) around the badger pen are options to provide this type of essential biosecurity.

The pen and chamber should be cleaned out every day if a concrete or tile floor is used, or otherwise only as necessary. Cleaning and other management tasks should be carried out at irregular intervals, at different times of day, to avoid habituation. Human contact should be kept to an absolute minimum at this stage.

Logs, pipes, water, straw, should be put in the pen to keep the badgers occupied. Cubs will play with empty sturdy cardboard boxes in indoor pens. Badgers are playful and these things make their environment more interesting. These too should be kept clean and replaced as necessary.

At the end of the cub season, after the badgers have been released, the pen should be ‘deep cleaned’ with removal and burning of all possible organic material and cleaning of non-removable hard surfaces. Specialist advice on suitable cleaning agents and methods should be obtained from your veterinary surgeon. For earth or grassed pens a hard frost is probably the most useful form of cleansing. Where several pens are available, a rest year when the pen is not stocked is ideal every third or fourth year. Rotation of species between a given pen year-on-year may also help limit disease spread.

Chapter 10: Selection of badger release sites

10.1 Sites for release of adult badgers

As previously described (Chapters 6 and 7), adult badger casualties must be returned EXACTLY where found.

10.2 Current options for sites for the release of cubs

The process of rehabilitating badger cubs is long and complex. Where possible, every effort should be taken to avoid unnecessary admission of cubs to wildlife centres and Monitored Natal Return (MNR, see Chapter 4 and Figure 4.2) must be considered. Where badger cubs are brought into captivity and cared for through to a point at which they can be released (see chapters 6, 8 and 12), they must be found new permanent release sites.

Historically, badger cub releases always took place in areas without a current badger presence. Such areas are those of low natural badger density, or areas where badgers have been removed as a result of historical persecution or licensed culling operations. Badgers are territorial animals and releasing naïve cubs into an existing active badger territory was felt to risk compromising the welfare of the animals (see Chapter 2). An ideal release site has:

- Low numbers, or no badgers present
- Appropriate badger food availability
- Suitable habitat for digging and ultimately establish a natural sett
- Low risk of persecution.
- Not near any major roads.
- Out of proposed cull areas.
- Landowner consent

Over recent years there has been a rise in badger populations, especially in the south west of England[41], making local release sites more difficult to find. This has led to one of two options being used by badger rescue organisations:

- Cubs continue to be released into new areas as before, although these areas are more difficult to find and may become more remote from the areas in which the cubs originated. This has the advantage that cub group sizes can be reasonably large and establish a new group in the area. The disadvantage of this method is that it has

become increasingly time consuming to find, set up and monitor such releases. Observational anecdotal information suggests that this method of release can be very successful.

- Cubs are released in small groups of 3 or 4 in areas where badgers are known to be present. The cubs are then expected to disperse and integrate with local groups. This method has been used by badger rescue organisations, although outcomes are currently unclear. In radio-tracking studies carried out by the RSPCA this method was found to be unsuccessful as cubs rapidly dispersed (A. Grogan *pers. comm.*).

Whichever method is to be adopted, finding release sites, takes a lot of very thorough and time-consuming survey work carried out over a long period of time, ideally a full year. Although members of badger groups may have an idea of the active setts in their area, and of areas where badgers may not be present, this information can be used only as a guide and a full survey of any potential sites is always required.

10.3 Finding release sites

The first problem in finding a suitable release site is knowing where to look. There are two ways of approaching this, actively and passively.

10.3.1 Active search for potential sites

10.3.1.1 Initial survey

The members of a local badger group will have information on many setts in their area, but may not be aware of the size of area that these badgers cover as part of their range. Gaps between territories may be potential release sites.

An extensive primary survey should be carried out first to identify setts, entrances and latrines. Latrines will be found in hedgerows, along runs, or near the sett. Start the survey in the vicinity of each sett and move outwards. Mark all significant findings on a large-scale map.

A primary survey only gives an indication of badger numbers in the area. A bait marking survey is needed to determine the boundaries between neighbouring badger groups and spot gaps in the population. Badgers will however, move beyond these boundaries, particularly at different times of year, and this must be taken into account.

10.3.1.2 Bait marking survey

Before conducting a bait marking survey, you need permission from all landowners on whose land you will be surveying, do not trespass. Bait marking surveys are best carried out in spring when the vegetation is low and it is easier to identify latrines. This time of year also coincides with peak badger activity. Bait marking is legal and does not require a license. However, the process should follow recognized good practice such as not interfering with the sett or entrance (which would require a NE licence) and using 'food grade' plastic pellets. The police and NE should be contacted prior to applying the pelleted bait, with details of location, so that they are able to deal swiftly with any phone calls from concerned members of the public.

Bait marking involves mixing plastic pellets, as used by the plastics industry for injection moulding, with palatable sticky foods such as peanuts and treacle. The plastic pellets are harmless to the badgers, and when eaten pass through their digestive system and are excreted at latrines used by that social group. A different pellet colour is chosen for each sett. The treacle, peanuts and pellet mixture is placed around the entrances to the sett with some stones over the bait to prevent it being eaten by other animals. Baiting should be repeated daily for about a week.

After baiting the setts for a week, the latrine areas previously identified should be revisited. The map previously created should be re-marked to show the colour and quantity of pellets found at each site. Any fresh faeces without pellets should be noted too as these could be from neighbouring setts that were previously unidentified. It should now be possible to link setts to latrines on the map using the bait colours. This provides an illustration of how big the territories are and which boundaries are shared by neighbouring badger groups.

Once the survey has been completed it should be possible to identify any areas where badgers are not present. It is then important to ask 'why?' this area is badger free. It may be that a sett has not been identified or that the habitat is unsuitable for badgers. It is important to know why badgers are absent from the site before considering releasing a group into the area.

10.3.2 Passive search for potential sites

The alternative way to identify potential release sites is to wait for people to come forward with offers of suitable sites. It is possible to be proactive in this endeavour, by placing articles in local or national magazines or other media. It is also important to 'network'; talk to people, especially landowners, at conferences or shows.

If a site is offered ask as many questions as possible regarding its suitability (see above) and then, as appropriate, arrange to visit and investigate further.

It may be that interested landowners do not have suitable sites for badger cub releases, but would however provide appropriate sites for other rehabilitated species.

10.4 Checks to be made on potential sites

10.4.1 Presence or absence of badgers

Determining the presence or absence of badgers at a site can be achieved with surveys (see above) and/or discussion with landowners and wildlife groups. Such individuals may also be able to provide some history of badgers at that site, to find out why they may not be there at present.

10.4.2 Suitable local geography and environment

The release site should have a geography that is suitable for badgers, with terrain and soil suitable for digging setts. The proposed sett location should not be part of a flood plain or at risk of local flash flooding. Local knowledge may be of great benefit here in asking if badgers had previously been present in the area and if so iof any know reasons why they had left.

10.4.3 Cattle bTB status ('Low', 'Edge', 'High')

The aim of badger cub rehabilitation is to always to release these animals into areas of equal or higher risk of bTB as classified for cattle (see Chapter 6; 6.7 including Figure 6.2). For this reason, it is very important when considering release sites to know the origins of that year's cubs. As sites should ideally be sought at least a year in advance, it is sensible to assume that most release sites will be required to be in 'High' risk areas, as most badger cubs originate in these areas[41].

10.4.4 Safety from roads and railways

The proposed site must be well away from main roads, which are the main cause of badger deaths. Proximity to railways must also be avoided.

10.4.5 Presence of an adequate food supply

It is fairly easy to make a general assessment of the food value of an area. Ideally a mixed habitat is required that provides food sources throughout the year. Worm counts can also be carried out to be certain.

10.4.6 Presence of a permanent water supply

A source of water reasonably close to the release site should be available all year round, including in times of drought.

10.4.7 Safety from persecution or accidental snaring

Local badger groups and police wildlife liaison officers will be able to advise of known local persecution. Risks include legal use of fox snares, shooting, lamping and digging with dogs. Techniques used will vary geographically and local knowledge is essential. If there is any risk at all, all naturally occurring setts in the area should be well protected before the release, or an alternative site found. All of the surrounding area must be thoroughly checked and all landowners, tenants and gamekeepers attitudes considered.

Further safety from persecution can be obtained by careful site selection. Proximity to a residence or a public footpath can be a bonus as this puts any illegal activities into public view. Alternatively, a site where access is limited or controlled may be even better.

10.4.8 Avoidance of current or potential licensed cull areas

Licensed badger culling operations as part of Defra's Strategy for eradicating bTB in cattle[4], continue to limit the availability of suitable release sites, especially in the south west of England. As much information as possible on potential cull areas should be obtained and these areas clearly avoided.

10.4.9 Landowners and land use

Any potential release should be fully discussed with the landowner. The views of the landowner's neighbours should also be taken into account, especially if the badgers are likely to range onto neighbouring land. It is important that everyone involved is fully behind the proposed release and if this is not the case, then an alternative site must be found.

Current land use and future plans for land use should also be considered. Local planning applications should be included in this.

10.5 Provision of a suitable sett

A suitable sett must be available for the badgers to be released into and must include a suitable release compound to confine the badgers during the initial introduction (see Chapter 12). The use of an artificial sett (see Chapter 12) for this purpose enables better control of the exact release location and is easier to adapt for the initial confinement. When releasing into a natural sett it is necessary to construct a large release pen around the whole sett. The sett whole may need to be fenced, for example with electric rabbit fencing (see Chapter 12). The practicalities of such methods of containment should be fully considered when evaluating the site.

Chapter 11: General considerations for the transportation and release of rehabilitated badgers

11.1 Fitness for release

All badger, cubs and adults, must be fully fit prior to release. To release an animal that is unable to survive back in the wild may be considered to be a legal offence (see Chapter 3). 'Fully fit' means both medically well (all medication courses completed and fully recovered from any medical complains) and also physically fit[31]. Checks for fitness should include measuring weight, ensuring the animal is eating, making sure it is moving around normally (use of a corridor, see Chapter 9). Remote Closed-circuit Television (CCTV) cameras are ideal for this purpose[31]. Physical fitness for badger cub groups means a period of time being reasonably independent in a pre-release pen (see Chapter 9).

11.2 Medical treatments prior to release

Adult badger casualties are returned to the same spot in which they were found (see Chapters 6 and 7) and therefore require no disease screening or medical treatments prior to release.

Badger cubs need to be triple tested for bTB (see Chapter 6) and have appropriate parasitic problems screened for and treated well before release (see Chapter 8).

11.2.1 BCG vaccination

Since 2010 a BCG (Bacillus Calmette-Guérin) vaccine for badgers (BadgerBCG) has been licenced and available to wildlife groups for vaccination of badgers against bTB[44]. This product is available from veterinary surgeons, via their veterinary wholesaler, on completion of a special prescription form[44]. The vaccine is a prescription only product (POM-V) and can therefore only be supplied by a vet for animals that are under his/her care[44]. At the time of writing, recent international shortages of BCG have resulted in lack of availability of the vaccine and although other BCG products have been used in badgers the author is not aware that these have been used in rehabilitated badgers.

The use of BadgerBCG in rehabilitated badgers has been debated by the wildlife groups since it was released. The vaccine has been shown to reduce the severity and progression of bTB in badgers[45] and is therefore of some potential benefit to individual animals. The

benefits of BCG are however best seen on a population basis[46] when large groups of badgers are vaccinated.

In badger cub groups there is a clear argument for vaccination, both to protect the group and to enhance landowner confidence in the release process. BadgerBCG is licenced for use in cubs from 12 weeks old. Onset of immunity is considered to be around 17 weeks[44]. The vaccine is usually given at the end of bTB testing (see Chapter 6), but otherwise as early as possible prior to release. Vaccination at the time of the third bTB test is probably most appropriate.

In badger adults, there is an argument that vaccination of an individual is of limited benefit, unless the other badgers in the area are also vaccinated. The cost of vaccine is also prohibitive for all rescue centres to use in all adult badgers. Where vaccination of adults prior to release is possible however, no disadvantages are evident.

11.3 Transportation

11.3.1 General considerations for transportation

Transportation of all animals, including badgers, is regulated by the Welfare of Animals (Transport) Order, 2006 (see Chapter 3). This order has specific exemptions for 'the transport of animals which does not take place in connection with an economic activity and for the transport of animals directly to or from veterinary practices or clinics, under the advice of a veterinarian' and as such transport to a veterinary surgery would be exempt. Transportation of the casualty to a wildlife rescue centre, or from a centre for release, may however be considered to be controlled by the Order. It is advisable therefore, to consider the general principles of the Order when transporting all badgers, regardless of the situation, not least because the Order was written with animal welfare in mind.

The Welfare of Animals (Transport) Order stipulates; the construction and use of receptacles in which animals are transported in respect of their suitability for the species, the ability of the animal to turn, stand and lie down, the provision of suitable ventilation and bedding, the appropriate provision of food and water, a means of inspection, and that the animal is not transported within sight of a natural predator. During any capture and handling general animal welfare legislation, such as the AWA, must also be adhered to.

The movement of animals, including badgers, any distance from their place of origin also carries with it the possibility of disease translocation and raises issues relating to dilution of

genetic purity. For this reason, as well as territorial reasons (see Chapter 2), adult badgers should not be translocated and should be released back at the exact position in which they were found. Badger cubs should only be translocated when disease prevention measures have been taken (see Chapters 6 and 8).

Badgers, if correctly transported, travel well and settle in cages for long periods of time. However, the length of time badgers are kept in cages and the distances travelled to a release site should be as short as possible. Animals should not be left unattended in a vehicle at any time, for example during stops at service stations. Adequate ventilation must be provided (see below), including when the vehicle is stopped. Two people should be involved in transportation to ensure both human health and safety (see Appendix 4) and animal welfare.

11.3.2 Transportation and release of adult badgers

Adult badgers should always be released at the exact location in which they were found (see Chapters 6 and 7). It is therefore unlikely that adult badgers will need to be transported long distances to release sites, however consideration must still be given to the method of transportation, travelling container and time of day for the release.

The badger should be quietly caught immediately before transportation is due to take place. The use of graspers should be discouraged for all routine handling of badgers (use crush cage) and especially prior to a release. Food and water should NOT be withheld for any period prior to transport. The badger should be contained in a secure, suitably sized, well-ventilated container (e.g. a white wire badger crush cage, see equipment contacts Appendix 1). The cage should always be lightly covered, with a light sheet or blanket, to reduce stress, without occluding ventilation.

The badger should be transported as quickly and quietly as possible to its release site. Vehicles used for transportation should be well maintained, to prevent unnecessary breakdown. Temperature in the vehicle should ideally be maintained between 10-20°C and this is best achieved with air conditioning.

Adult badger releases should take place from dusk onwards. In built-up locations, or near busy roads, it is recommended that the release should be timed for nights that are likely to be less busy and between midnight and dawn. On arrival at the release site the cage should be placed on the ground, still covered, to allow the badger time to adjust after the

journey. The cage cover should then be removed and the badger allowed more time to take in sights and smells. Often the badger's reaction to this is to try and get out of the cage. Resist the temptation to talk to the animal, leave it for a period to acclimatise to the surroundings. When you feel happy that there is sufficient cover of darkness to release, open up the end of the cage and let the badger leave of its own free will, in its own time. Do not up-end the cage, the badger will leave when it feels safe to do so.

A badger should never be emptied from a cage into a sett entrance, even if it is known to belong to that sett. Equally, where setts are present on both sides of a road the badger should be released so it is able to choose to go in either direction.

11.3.3 Transportation and release of badger cub groups

As described in earlier chapters badger cubs must be released into new sites remote from where they originated. Cubs are therefore likely to be transported larger distances than adult badgers.

Badger cub groups should be transported to their final release sites once they have received their third clear blood bTB test (see Chapter 6) and are considered to be fully fit (6.1). This may mean that they have been captured from enclosures and held in pens prior to movement. This process should be carried out with as few disturbed sleep patterns as possible.

It is recommended that badger cubs are transported in containers usually holding only two animals (depending on size). As with adult casualties, white wire cages may be used, although ventilated wooden boxes, which may have already been used as nest boxes, may be preferred. If containers have mesh rather than solid sides they should be lightly covered.

Unlike adult badgers, cubs should ideally be transported so as to arrive at their release site early in the morning. By placing the badgers into their new site in the morning they will have time to sleep at their new location and settle before their first new forays in the evening.

Vehicles used for transportation of cubs should be well maintained, to prevent unnecessary breakdown. Temperature in the vehicle should be maintained between 10-20°C. With several boxes containing cubs, a ventilated vehicle is essential. Transportation very early in the morning also helps prevent the risk of high temperatures.

Further information on the release of badger cubs is given in Chapter 12.

Chapter 12: Release of badger cub groups

12.1 General principles

Badger cub groups of 3-8 animals, with a suitable sex ratio (more females than males) should have been formed over the early summer months as described in Chapters 6 and 8.

A suitable release site should have been found several months prior to a release being organised, typically sites will have been surveyed 12-18 months in advance (Chapter 10). Sites must satisfy the requirements listed in Chapter 10 and prior landowner consent must be agreed.

The transportation of badgers to the release site and the release of adult badgers is discussed in chapter 11.

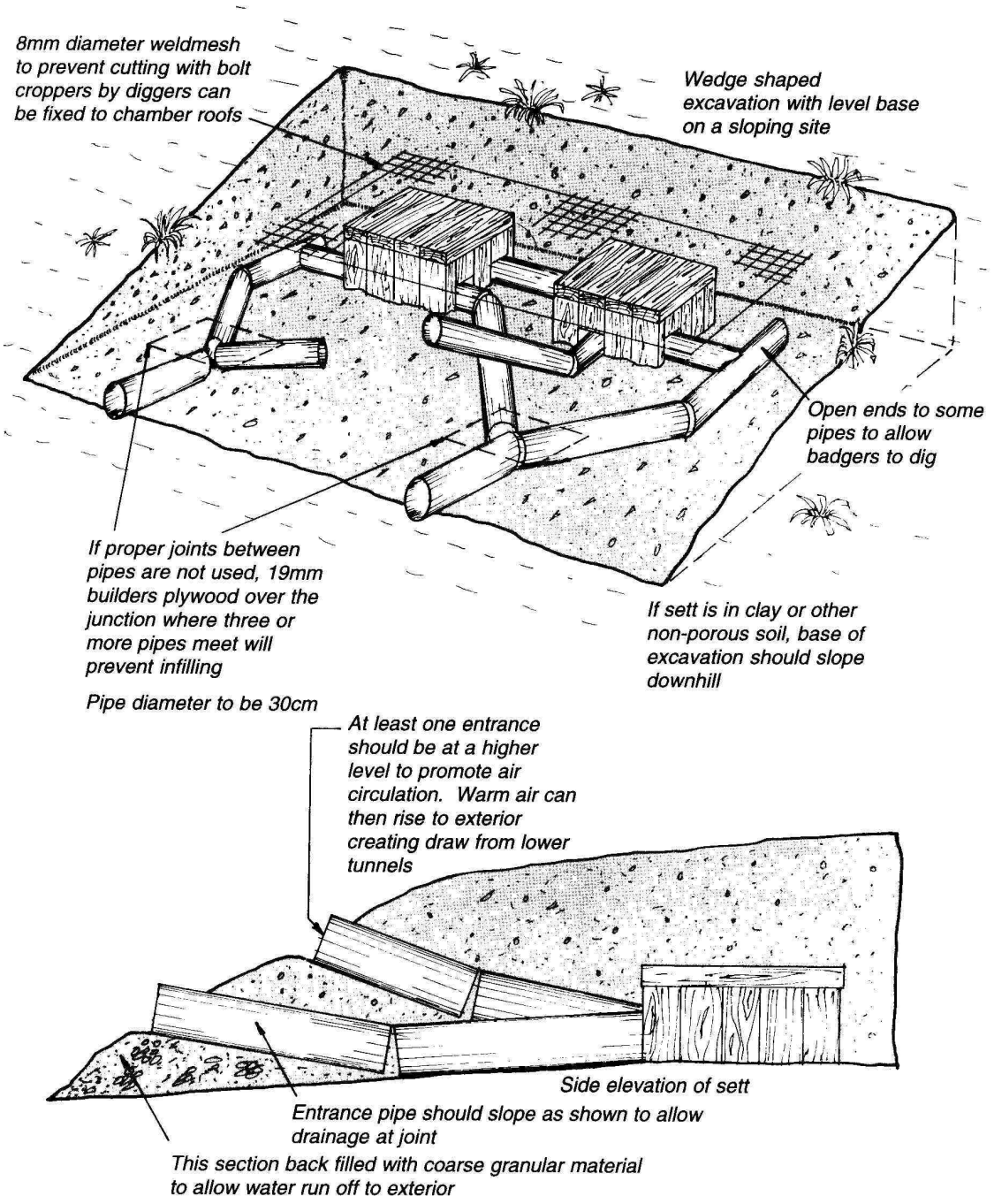
12.2 Sett construction

As described in chapter 10, following an intensive survey process, the options for a release sett are the use of an old uninhabited ‘natural’ sett or the construction of a new ‘artificial’ sett.

An artificial sett should be constructed of plastic pipes and/or timber and cement. An example sett is illustrated in Figure 12.1. If railway sleepers are used as part of the construction, these must NOT be ones that have been treated or impregnated with toxic chemicals such as creosote.

The tradition of building artificial setts using straw bales has largely been superseded. Straw bale setts provide poor accommodation and are suitable only for use over a previously abandoned sett, or exceptionally on ground shown to be easily digable, where alternative accommodation will be quickly established by the badgers. Straw bale setts are especially unsuitable in areas of persecution or where the public have easy access as they offer little protection to unwarranted attention.

Figure 12.1 Example artificial badger sett



12.3 Release site enclosure

The whole of the release site, including the sett area must be securely enclosed. This may be achieved in the following way:

- Two rolls of electrified rabbit netting are used to provide approximately 100m of enclosure. Avoid an enclosure with narrow points or corridors, for example when avoiding natural features. This creates a free open space for the badgers to explore without the risk of becoming trapped. If the site will allow a circular enclosure works well, as this enables badgers to work along the fence line without becoming caught in a corner

- The outer rabbit netting is supplied with its own integral stakes. Two extra electric fencing stakes are inserted at even intervals and attached to the net with their built-in clips, this strengthens the netting. The bottom horizontal line of the netting (usually black in colour) is non-conductive and should fit closely to the ground. The remaining horizontal lines of the net (above the base line) are conductive and no part of the netting above this line should come into contact with the ground or vegetation.

- An internal electric cord fence is erected inside the enclosure approximately 75-100mm adjacent to the rabbit fence. This is staked at 1-1.5m intervals depending upon the ground conditions; soft or loose ground may need extra stakes. Traditional electric fencing posts should be utilised with the facility to attach electric cord at low levels to the ground

- Both the inner and outer fence should be connected to create “one” electric fence working off the energiser (see Figure 12.2).

- Corners of the enclosure can be braced and tightened up with wooden stakes driven into the ground at a right angle. Strainers from the fence to the post should be of a non-conductible material such as bale twine.

- The inner cord fence consists of 3 strands of cord, all approximately 50mm apart. The lower cord is positioned approx. 50mm from the ground with the second cord 50mm above the first and the third cord 50mm above the second. At no point should the cords come into contact with the ground or vegetation. Earthing out of the fence will result in reduced efficiency or complete failure of the electric fence.

The fencing used should conform to British Standard 2632. This includes having yellow warning notices on the fence to indicate that it is live - this is the case, even if the fence is on private

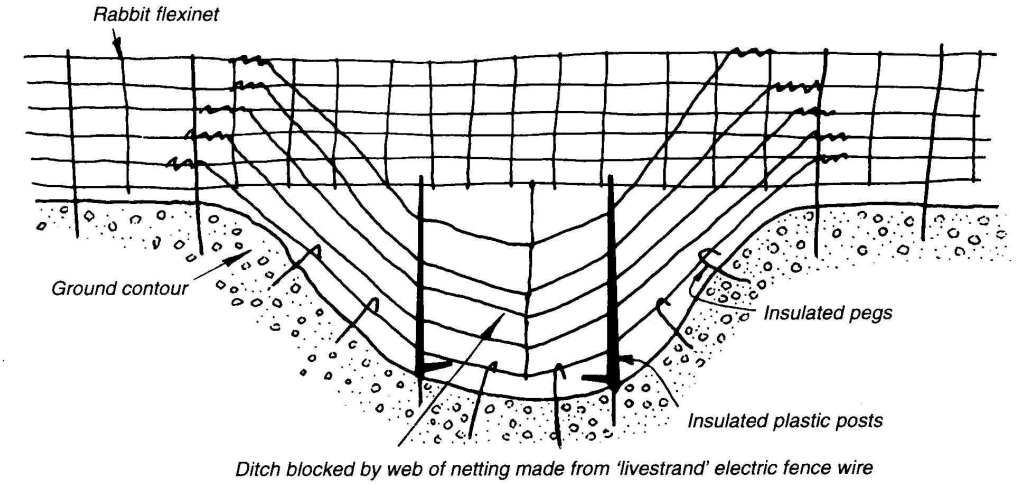
Figure 12.2 Electrification of the release pen perimeter fence (©Andy Parr)

property. Fences should be set back from paths and ideally avoid all public rights of way. If it is necessary for the fence to cross a public right of way, it should not obstruct it or must provide a means for people to climb over it safely.

If the fence needs to span a ditch, then stretch it taut over the ditch and use stakes and wire strands to make a net in the ditch below (Figure 12.3).

There are many units available to energise the fence, which may use batteries or mains power. The batteries for powering fences should be leisure batteries (used for caravans and boats) rather than standard car batteries. Leisure batteries are designed to discharge current over a long period of time compared with car batteries and as a result require recharging at less frequent intervals. There are obvious advantages to using mains power units, but these are restricted to situations where mains power is readily accessible. Electric fencing equipment is readily available at agricultural or specialist suppliers (see Appendix 1).

Figure 12.3 Electrified flexinet adapted for spanning a ditch



In order to generate an effective pulse, ensure that the energiser is well earthed. This can most easily be achieved using a long copper rod or plate that is driven into the soil. Many energisers come set on metal stands, which are designed to provide the earth. Some soils may require the area around the conductor to be wet, especially on dry soils and during dry periods of weather. In addition, it is essential to ensure that vegetation is not earthing the wire, or there may not be enough current to deter the badgers from escaping.

To test the fence, testers are commercially available. Alternatively, walk the length of the fence either during the day, listening for faint clicks, or during darkness to look for sparks, where the fence is shorting. The energiser will also click when generating a pulse. It is advisable to have two batteries, one in use and a second battery, fully charged on standby. The first battery can then be recharged when the second one is fitted. A 75ah leisure battery in good condition should last for at least a month, depending on conditions such as length of fence, vegetation and weather, providing it is not earthing out. A second fully charged battery should always be available on site in-case of battery failure, Solar panels may also be used to top up the battery in the field.

12.4 Release of badger cubs into the artificial sett

The following procedure has been successfully used for releasing cubs into an artificial sett:

- Ensure fence is turned on and working
- Soft block all sett entrances with hay or straw except the entrance the badgers are to be released into.
- Keep all people not directly involved with carrying cages at a distance that will not disturb the badgers. During the actual release keep calm and keep noise to a minimum.
- Briefly inspect badgers for condition following the journey (see Chapter 11), especially their claws which may have been damaged in transit. On the whole badger cubs travel well, but occasionally one will become anxious and chew or dig at the cage. Any with serious injuries may require veterinary treatment.
- Ensure cages are covered.
- Carry all the cages containing the badgers and place down quietly near to the appropriate sett entrance.
- Offer the cage up to the unblocked entrance, open the cage remove the cover and allow badger(s) to enter the sett system. Ensure that there are no gaps that could allow the badger to push past the entrance and into the enclosure. The sheet or cover that has been placed over the cage is often very useful for plugging gaps. Once the badger(s) have entered the sett, temporarily block the entrance and place the next cage up to the entrance and remove blocking. Repeat the procedure until all badgers have been entered into the system. Once all badgers are in the sett soft block the entrance and retreat from the enclosure with all equipment.
- Position people at the blocked entrances and view from a distance. It is perfectly acceptable for a badger to explore the sett system and poke a nose out. What you do not want is a mass dispersal from the sett with badgers in a potentially nervous state wandering around the enclosure. If a badger does exit the sett immediately it is entered into the system do not panic. Allow the animal to explore, any attempt to try and persuade it back into the sett may result in it panicking and running into the electric fence. Be patient and observe at a distance until the animal retreats back into the sett.

- Monitor the sett for approximately 45-60 minutes following release to ensure the badgers are settled and they do not exit prematurely. Slightly loosen any over-zealous soft blocking and vacate the site. The badgers will push their way out of the sett when settled

- Sometimes a badger will not enter the sett and will turn and “challenge” the people undertaking the release. Do not provoke or aggravate the situation, a simple solution is often to step back away from the cage and “lessen the perceived threat” or cover the cage and the badger will invariably enter the sett.

- It is always a good policy to provide straw or hay within the enclosure for bedding. A useful tip is to place a sheet of ply on an angle along one long side. The raised side can be supported by two small stakes. Into the wedge-shaped gap push a full bale of straw, remove the string. This provides clean dry straw when the cubs need it.

- Always release badger cubs directly into the sett never allow them to wander around the enclosure.

- Always have a grasper or thick blanket to hand in-case a badger exits the sett prematurely and becomes entangled in the fence.

- Monitor the site for at least one hour after release of the cubs into the artificial sett.

12.5 Care and monitoring in the enclosure

Food is provided regularly as it would have been in “normal” captivity and a shallow water container is provided with fresh water every day. Food should be placed covered, within the enclosure and prior to anticipated emergence to prevent badger/human interaction. If, whilst placing food at the release site badger(s) emerge they should be verbally rebuffed. If this does not work or it continues to be a problem leave the site as quickly as possible and alternate feed times to prevent habitual feeding association with humans. If this continues to be an issue check that the food supplied is correct in quantity and the intended recipients are actually getting the food.

A daily check is made on the perimeter fencing and to ensure that the battery is adequately charged to maintain its integrity.

12.6 Release from the enclosure

The optimum time of year for releases is September, when natural food availability is generally high. At this time of year badgers need only to be confined for 2-3 weeks. After this time, the fence is switched off and removed. Although concerns have been expressed that removing the fence straight away may disturb the badgers, in reality this does not seem to be the case and rapid removal prevents entanglement of either the badgers or other wildlife.

Once the fence is removed feeding continues in the enclosure area whilst at the same time natural foraging activity takes place. Cubs start to forage whist contained in the enclosure and will continue to supplement their food naturally, once the electric fence has been removed. Support food is however, absolutely vital in the establishment of cubs at a release site and benefits the animals if continued over longer periods of time. Cubs will invariably require support food initially, especially during adverse periods of weather such as hard frosts or dry weather. Cubs released will not have the benefit of adults within their social group to learn from or have established foraging trails leading to new feeding patches. Cubs will have to learn a new territory and establish which feeding patches provide food during certain weather conditions and seasons. Schemes that provide consistent support food over a longer period generally result in less dispersal. Support feeding should take into consideration the following:

- Where a number of people are feeding the badgers over a long period it is good practice to produce a feed record sheet. Information recorded on the sheet should include:
    - Name and contact details of key individuals responsible for release
    - Food requirements and procedure for placing down the food (covered)
    - Who is feeding and on what dates
    - A comments section which allows details on up-take of food to be recorded and any concerns issues
- All food placed into the enclosure should be covered with a board to prevent non-target species benefiting from the food prior to the badgers emerging.
- First two - three weeks full rations.
- Then reduce food by 25% for one month.

- Then reduce food by a further 25% for the following month.

- Feeding can then be reduced further and phased out over the next month or at the discretion of the release manager.

Excessive feeding beyond one or two months may create a dependency on supplementary food and should be discouraged. All support food should have ceased by spring.

12.7 Post release monitoring

Some form of post release monitoring is to be encouraged for all releases of rehabilitated wildlife. It is only through such monitoring that successes and failures can be gauged.

Radio-tracking and satellite tagging have huge benefits over other methods of monitoring, but are costly and often time consuming. Some simpler options are available and can produce useful information.

- Food record sheets are very useful in recording up-take of food and may pinpoint early dispersal from the release site.

- Trail cameras are useful at recording activity at the sett and it may be possible to identify individual badgers in the group in video clips.

- RFID microchips have been successfully used around feeding tubes and on badger paths[29].

Chapter 13: Conclusion

This revised Badger Rehabilitation Protocol aims to describe best practice for badger care, rehabilitation and release.

As a result of the importance and controversy attached to the issue of bovine tuberculosis, the Protocol has a strong emphasis on testing for and preventing any possible transmission of this disease to badgers, cattle and other animals during the rehabilitation process. In reality, the relatively small numbers of badgers involved and the low incidence of disease recorded in these animals[10b], mean that the real risk is low. Since our wish however is that all interested parties have confidence in the process we will continue to review and update the policy as new scientific information and new tests become available.

Acknowledgements

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Ele Brown (Veterinary Head of TB Policy Advice, APHA)

Adam Grogan (Head of wildlife, RSPCA)

Pauline Kidner (Founder and Advisor to SWWR)

Sandrine Lesellier (Head of Unit for Badger Research on Vaccines and Immunology, APHA)

Andy Parr (Badger rehabilitator and former Release Manager SWWR)

Jess Phoenix (Policy Advisor, Bovine TB Programme, Defra)

Janet Talling (Senior Scientific Advisor (TB Policy), APHA)

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Appendices

Appendix 1: Contacts list

Badger rehabilitation contacts

Badger Trust

Badger Trust

PO Box 708

East Grinsted

RH19 2WN

Tel: 0845 8287878

Email: enquiries@badgertrust.org.uk

www.badger.org.uk

RSPCA

RSPCA Stapeley Grange Wildlife Centre

Stapeley Grange

London Road

Nantwich, CW5 7JW

Tel: 0300 123 0722

RSPCA East Winch Wildlife Centre

Gayton Road

East Winch

King's Lynn

Norfolk, PE32 1LG

Tel: 0300 123 0709

RSPCA Mallydams Wood

Mallydams Wood

Peter James Lane, Fairlight

Hastings, TN35 4AH

Tel: 0300 123 0723

RSPCA West Hatch Animal Centre

Cold Road

Taunton

TA3 5RT

Tel: 0300 123 0747

Secret World Wildlife Rescue

Secret World Wildlife Rescue

New Rd

East Huntspill

Highbridge

TA9 3PZ

Tel:01278 783250

Email: info@secretworld.org

Scottish Badgers

Scottish Badgers

13 Eddie Ave

Brechin

DD9 6YD

Tel: 07866 844232

Email: speciesprotection@scottishbadgers.org.uk

Email: info@scottishbadgers.org.uk

Scottish SPCA

Scottish SPCA

Fishcross

Clackmannanshire

FK10 3AN

Tel: 03000 999 999

Government bodies

***Department of Agriculture, Environment and Rural Affairs Northern Ireland (DRERA)* (Including badger licences)**

Dundonald House

Upper Newtownards Road

Ballymiscaw

Belfast BT4 3SB

Department for Environment, Food and Rural Affairs (Defra)

Cromwell House

Andover Road

Winchester, SO23 7EN

Tel: 0345 933 5577

https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/services-information

Health and Safety Executive (HSE)

Redgrave Court

Merton Road

Bootle

Merseyside, L20 7HS

Tel: 0345 300 9923 (for reporting major and fatal incidents only)

Tel: 0300 003 1747 (Advisory team)

www.hse.gov.uk

Health and Safety Executive Northern Ireland (HSENI)

83 Ladas Drive

Belfast, BT6 9FR

Tel: 0800 0320 121

Email: mail@hseni.gov.uk

www.hseni.gov.uk

Natural Resources Wales (NRW) **(Including licences)**

Customer Care Centre

Ty Cambria

29 Newport Road

Cardiff, CF24 0TP

Tel: 0300 065 3000

Email: enquiries@naturalresourceswales.gov.uk

https://naturalresources.wales

Natural England (NE) **(Including licences)**

County Hall

Spetchley Road

Worcester, WR5 2NP

Tel: 0300 060 3900

Email: enquiries@naturalengland.org.ul

www.gov.uk/government/organisations/natural-england

Badger licences:

https://www.gov.uk/government/collections/badger-licences

Partnership for Action against Wildlife Crime UK (PAW UK)

PAW Secretariat

Zone 1/14, Temple Quay House

2 The Square, Temple Quay

Bristol BS1 6EB, UK

Email: paw.secretariat@defra.gsi.gov.uk

www.gov.uk/government/groups/partnership-for-action-against-wildlife-crime

Partnership for Action against Wildlife Crime (PAW) Scotland

PAW Scotland Co-ordinator

Natural Resources Division

Scottish Government

1-C North, Victoria Quay

Edinburgh, EH6 6QQ, UK

Tel: 0131 244 7140

Email: PAWScotland@scotland.gsi.gov.uk

www.gov.scot/Topics/Environment/Wildlife-Habitats/paw-scotland

Scottish Government

St. Andrew's House

Regent Road

Edinburgh, EH1 3DG

Tel: 0300 244 4000

www.gov.scot

Scottish National Heritage (SNH) **(Including licences)**

Great Glen House

Leachkin Road

Inverness, IV3 8NW

Tel: 01463 725000
www.snh.gov.uk

Wildlife Incident Investigation Scheme (WIIS) **(For suspect poisoning)**

Freephone: 0800 321600

Also in Scotland see:

www.sasa.gov.uk/wildlife-environment/wildlife-incident-investigation-scheme-wiis

Reporting wildlife crime

***National Wildlife Crime Unit* (also see Figure 4.1)**

http://www.nwcu.police.uk

Laboratory services

For bTB testing of badgers

Animal and Plant Health Agency (APHA)

Staplake Mount, Starcross

Exeter, Devon

EX6 8PE

Tel: 01626 891121

Email: starcross@vla.defra.gsi.gov.uk

Veterinary surgeons

All veterinary surgeons in the UK are required by the Royal College of Veterinary Surgeons (RCVS) to provide emergency care for all species of animals at all times, so ALL vets must provide care for badgers. Additionally, most vets subscribe to the BVA/RSPCA Memorandum of Understanding, which provides for the emergency care of wildlife casualties free of charge during normal hours (see Chapter 3, 3.3).

Contact details for veterinary surgeons and practices can be found at:

https://findavet.rcvs.org.uk/home

Veterinary information on badgers is available in the:

BSAVA Manual of Wildlife Casualties, BSAVA Publications, Gloucester

Equipment suppliers

A wide range of agricultural, pet and veterinary suppliers provide equipment suitable for badgers. Below are some examples used by the authors:

Electrical fencing

https://www.electricfencing.co.uk

https://www.gallagher.eu

Traps and graspers

http://www.mdcexports.co.uk/Home.html

Incubators

http://www.brinsea.co.uk

Approved disinfectants list

http://disinfectants.defra.gov.uk

Appendix 2: Equipment checklist

The following provides guidance to those rescuing badgers on a regular basis as to the equipment they should carry:

- Grasper with a quick release mechanism
- Badger cage (type with small square holes 25mm^2, top opening ideally with crush facility)
- Badger board
- Baskerville® muzzle
- Large landing net
- Torch (head torches are best)
- A good quality pair of wire cutters that have been tested on suitable wire prior to a call out
- Bolt crops
- Scissors
- Hazard triangle
- High Visibility bib or jacket
- Thick Blankets
- Long thick stick (gives the badger something to bite on while you slip the grasper over the stick and slide it down and on to the badger's neck!)
- Camera
- Gloves (the thicker the better)
- Note book and pen
- Mobile phone
- Road map
- First aid kit
- Disinfectants for hands and for equipment (active against bTB e.g. Safe4®)
- Black waste bags and appropriate (infectious clinical) waste bags

Appendix 3: Example forms

3.1 Assessment for Monitored Natal Return (MNR)

(see Chapter 4) (Andy Parr, 2017)

Badger: "Orphaned" Badger Cub Rescue Protocol & Information Form

Recorder details: …… Time:……..
Date……..

EXACT Location details:……

Finder details:……
……

Telephone……... Approximate age of cub:…….
Sex:……..

Vet:…….. Wildlife Rescue Centre:…….

This form must be completed by the Person taking the call regarding the CUB and completed to the best of their ability

1) Initial assessment

Is the cub showing any of the following signs?

- Injured
- Very underweight
- Very quiet (not wickering/keckering)
- Showing signs of dehydration, loose skin sunken eyes
- Cold to touch
- Lethargic
- In immediate danger, very public place, on a road etc.
- Are there any factual indications that the sow may be dead or an injury prevents the sow from attending the cub(s)

Any ticked boxes in the above section, action: Admit to (wildlife center/vet) for assessment:

Must have fully accurate location and contact details in case of return to sett

Inform person responsible for orphaned cubs of this action immediately

No ticked boxes, consider MNR. Please continue with rest of form

2) Development of cub

Has the cub any of the following features:

- Pink colour to most of body
- Little or no fur present
- Eyes closed
- Cub fits easily in palm of your hand

Any ticked boxes in the above section, action: Cub vulnerable, Consult with Experienced badger cub rehabilitator/rescuer

3) Is the cub:

- Small, head/body approx. 6"- 8" (150-200mm) long (not including tail)
- Partly mobile but unsteady on legs due to lack of development rather than weakness or injury
- Found on or very near to a sett
- Cub looks healthy chubby appearance
- Fur present with distinctive black and white face markings (unless albino!)

The more ticked boxes the better for MNR. Action: Contact experienced rehabilitator. Consider monitored return to sett.

4) The cub is:

- Mobile strong, fluid movement
- Size: "bag of sugar" or larger
- Not necessarily found near a known sett

Action: Contact experienced rehabilitator. Consider monitored return. Consider support feed return. Consider hard release (area found) for larger cubs later in season (following possible examination/treatment at Wildlife Centre)

Action taken to resolve rescue…….....

3.2 Admission record

(see Chapter 8 for advice on completion)

PATIENT DETAILS

Log No:	**Admission date:**	**Species:**
Age:	**Sex:**	**RSPCA Log No:**
Finder's Name:		
Finder's Address:		
	Post code:	
Phone number:		
Exact area found:		
Reason for admission		
Treatment prior to admission		
Condition		
Diet		
Veterinary advice & supervisor comments		
ID Number:		
End Result:		

3.3 Cub feeding record

(see Chapter 8 for advice on completion)

Species **Area Found**

Date

Reason for admission

Age **Sex** **Identification**

Date	Weight	Time & Amount of Feed							Daily Tl.	Comments

3.4 Cub care record

(see Chapter 8 for advice on completion)

Pen/cage No:			Species:			Log number(s):	
Sheet No:							
Date	Weight	Time Feed & Content	Amount Taken	Urine	Faeces	Medication	Comments
		AM:					
		PM:					
		AM:					
		PM:					
		AM:					
		PM:					
		AM:					
		PM:					
		AM:					
		PM:					
		AM:					
		PM:					
		AM:					
		PM:					

Appendix 4: Health and Safety responsibilities

These notes were included in the original version of the Badger rehabilitation protocol published in 2003. The original version was produced by members of the Health and Safety Executive to explain health and safety risks associated with wildlife rescue centres and in particular those involved in badger rehabilitation. These notes remain unchanged from the 2003 edition of the Protocol.

Introduction

In common with other employers, organisations involved in the rehabilitation and release of badgers have legal responsibilities to ensure the health and safety of their employees, and others (e.g. visitors or volunteers) who may be exposed to risks from their work activities. These general duties are outlined in the Health and Safety at Work etc Act 1974. The Management of Health and Safety at Work Regulations outlines in further detail the duties in respect of setting up the structures necessary to manage risks to health and safety resulting from work activities.

There is also some additional risk specific legislation (e.g. the Control of Substances Hazardous to Health Regulations, the Manual Handling Regulations etc), which duty holders must adopt when appropriate.

This comprehensive legal framework is in place to require employers to assess all the risks to health and safety (trips and falls, lifting, biting and scratching wounds, exposure to chemical and biological agents etc) and when appropriate introduce suitable and sufficient control measures. Other duties include the need to inform employees of the results of any risk assessments and provide instruction and training when appropriate.

Zoonotic risks

Most animals, including badgers, carry a range of diseases which can also affect humans. These diseases are known as *zoonoses*, and if you work with animals your health may be at risk from them. Although some of these diseases (e.g. anthrax, brucellosis and rabies) are no longer common in the UK, good occupational hygiene practices will protect against them, as well as other more common zoonoses such as leptospirosis, orf, or ringworm.

Diseases transmitted from animals to humans can also affect visitors to your centres - especially children or the elderly, who may suffer more than other people. These illnesses

include those resulting from infection with the *E coli O157* and *cryptosporidium* organisms. If you open your centre to the public you need to assess all the risks associated with zoonotic infections.

Legal requirements

Zoonoses are caused by micro-organisms, which are subject to the Control of Substances Hazardous to Health Regulations (COSHH) 1999. COSHH requires employers and self-employed people to:

- assess the risks to health from work activities which involve a hazardous substance (e.g. a micro-organism);
- prevent or, where this is not reasonably practicable, adequately control exposure to the hazardous substances;
- introduce and maintain control measures;
- inform, instruct and train employees about the risks and precautions to be taken.

It is good practice to involve employees, and their representatives, in an assessment: they often have personal experience of the work and the risk and may be able to offer common-sense ways of controlling it.

If you are an employer, you should ask potential or new employees about any existing health or other conditions they have which may worsen the effects of contracting a zoonosis, or which may mean that they are more likely to contract one. For example, people without a spleen are very vulnerable to infection, and employers should consider carefully whether they ask such people to work with animals; pregnant women risk abortion if they are infected with the organism causing enzootic abortion of ewes.

Precautions

This section advises on simple, general precautions to reduce the risk of contracting zoonoses. As well as taking these steps, make sure, if you are an employer, that staff understand the importance of taking the precautions, and check that they do so.

When producing safe working practices for your activities, consider the following:

Personal protective equipment (PPE)

Your COSHH assessment will inform your decision on whether PPE is needed. Remember that you should only consider using PPE after you have considered other steps such as not doing the task or using controls such as avoiding contact with infected animals. Make sure that whatever PPE you use is suitable, properly maintained, cleaned after use, stored in a clean area and that new PPE is CE marked.

Personal hygiene

The nature of your work with animals means that you will inevitably contact dung and urine, which contain disease-causing organisms. Personal hygiene is therefore vitally important. If you are an employer, provide washing facilities where staff work with animals (at least, clean running water and paper towels). Make sure that you and your staff:

- wash cuts and grazes immediately with soap and running water and cover the wound with a waterproof dressing - some organisms enter the body through open wounds;
- consider whether you or your staff need first-aid training;
- cover existing cuts and abrasions on exposed skin with waterproof dressings before beginning work;
- whenever you contact animals, or work in areas in which they may have defecated, make sure you wash your hands and arms before you eat, drink or smoke.

Badgers and bovine tuberculosis

Bovine TB is carried by cattle, badgers and deer, and can be passed to humans. People handling infected animals are at risk, especially if they become contaminated with mucus from the respiratory tract and then do not follow the basic rules of good personal hygiene. Although many people will have been immunised against TB in childhood (the 'BCG' immunisation) they may still be at risk. If you are in an area where infection in badgers is common, consider whether you should contact your GP to check your immunisation status. Do not rely on the BCG immunisation to prevent infection - always follow good practice.

Diagnostic, post-mortem, and research laboratory work with the organism are key risk areas. It is important that you follow the guidance in this document and get the correct professionals to perform this work. These professionals will follow the agreed safe systems of work for

these activities. Other areas of work where there may be contact with the organism include veterinarians who perform TB testing and those involved in carrying out badger culling or trapping for study purposes. It is important that all the risks to health and safety from such activities are assessed and suitable controls put in place.

Useful further reading

The Control of Substances hazardous to Health Regulations – Approved Code of Practice (HSE Books – 01787 881165).

HSE information sheet – Common zoonoses in agriculture. See HSE website for details (www.hse.gov.uk/pubns/agindex.htm).

HSE information sheet – Avoiding ill health at open farms – Advice to farmers. (www.hse.gov.uk/pubns/agindex.htm).

Appendix 5: Government advice on the euthanasia of badgers

Advice has been sought from government (Defra and Natural England) as to their views on the euthanasia of badgers in some difficult rehabilitation situations that might require licencing of euthanasia, or indeed fall outside the Protection of Badgers Act where euthanasia is considered. Their responses are tabulated below.

The reader is also directed to the following Acts, which should be read in conjunction with the advice below:

Protection of Badgers Act 1992 (PoBA)

Animal Welfare Act 2006

Rehabilitation cenario requiring possible euthanasia of a badger	**Government advice**
1. Adult badger, two broken legs.	Euthanasia as an act of mercy (no licence required) s. 6(a) of PoBA.
2. Adult badger, thin, large lymph nodes, clinical signs of tuberculosis.	Euthanase under licence to prevent disease spread s. 10(2)(a) of the PoBA, or euthanasia as an act of mercy if in extremis (no licence required) s. 6(b) of PoBA.
3. Badger cub, thin, collapsed, enteritis (diarrhoea).	Euthanasia as an act of mercy (no licence required).
4. Badger cub, clinically well on examination but serologically positive on a bTB test.	Euthanase under licence to prevent disease spread, s. 10(2)(a) of the PoBA.

5. Adult badger, female, slightly underweight, old healed fractured pelvis which is not in itself a huge problem to the animal, but has created significant pelvic narrowing such that the animal would not be able to give birth.	If a veterinary surgeon is of the opinion that not being able to give birth to cubs would constitute 'such a condition that to kill it would be an act of mercy', then reliance on s. 6(b) of the PoBA would be appropriate.
6. Badger cub clinically well, negative for bTB, behaviour abnormal due to imprinting/habituation, potentially a human risk if released.	The animal in this situation is healthy and not suffering, so far from clear that s. 6(b) of the PoBA applies here. Difficult to justify euthanasia if the veterinary advice is that the imprinting could be overcome. If it cannot, need to consider the effect of the imprinting with Natural England. If the effects are such that independent life in the wild is not viable so that the only option in the light of welfare concerns is life-long captivity unless the animal is euthanised, and life-long captivity is not a practically feasible option, there is a possible argument that euthanasia in reliance on s. 6(b) of the PoBA is a reasonable approach. If the animal is being kept (so not living in the wild), the Animal Welfare Act 2006 needs to be considered: it is likely to be an offence under that Act to release a wild animal in circumstances where it is known that the animal is likely to suffer and perish.
7. Abandoned badger cub, clinically well but dependent, 12 weeks old, no release sites available.	If the expert opinion is that leaving the dependent cub in the wild would result in its suffering and death from starvation and rearing and keeping the cub in captivity is

	not a practically feasible option, euthanasia in reliance on s. 6(b) of the PoBA is likely to be a reasonable approach. This is particularly the case where the animal is not already in captivity.
8. Adult badger, site of origin unknown, or not possible to release back where found for other reasons.	If it not practicable to return the badger to the location from which it was recovered (or as close as possible to that location), consideration should be given to whether the badger would pose a risk of spreading disease if it were released elsewhere. Where the badger would pose a risk of spreading disease, a licence (PoBA s.10(2)(a)) would need to be granted to enable the badger to be killed to avert that risk.