BAT FIRST AID AND CARE COURSE

2026

BY

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BAT CARE COURSE 2025

INTRODUCTION TO BATS

- Flight – thin delicate bones
- Echolocation – sensitive hearing
- Nocturnal – sensitive eyes
- Heterothermy – torpor, hibernation

These are key features of bats and handling and housing must take these into account. Bats are special mammals, microbats (Yangochiroptera) are closely related to insectivores like shrews, and megabats (flying foxes, Yinpterochiroptera) are thought to be related to lemurs and other primates.

REASONS FOR DECLINE

- Shortage of insects (Catastrophic decline in last 3 decades, eg 75% down in Germany Nature reserves, 98% in Puerto Rican rainforest, Asian hornet soon UK?)
- Heavy metal (lead) building up in insects; (21% bats tested have kidney damage)
- Urbanisation (lighting and loss of habitat)
- Roads (collisions up to 2.5 per km per month, and barrier to movement, lighting)
- Loss of habitat
- Agricultural intensification (habitat loss and pesticides)
- Climate change
- Loss of roosts
- Lighting deters from roosts and foraging
- Glass faced buildings collision risk
- Wind turbines (40% mortality globally, 250,000 bats die in Germany/yr)
- Cat predation (11% of annual mortality)

HEALTH AND SAFETY

- Rabies Vaccinations required if regularly handling bats. Trainees do not require jabs if wearing gloves and closely supervised
- Gloves should be worn
- Cloths make bats feel safer
- Advice to bitten householder – see GP; we don't give medical advice
- Ladders etc. consider your personal safety when rescuing
- To prevent bats contracting Covid virus from us, BCT recommend wearing mask, see ref at end

BEFORE BECOMING A BAT CARER - basic

- Must have rabies vaccination course, only if handling bats regularly
- Wear gloves when handling bats
- Register with Bat Conservation Trust and local bat group
- Get handling practice with bat carer

THE LAW

Laws dealing with bat and roost protection:

- Wildlife and Countryside Act 1981
- Countryside and Rights of Way Act 2000
- Habitat Regulations 1994 amended 2007
- EU Habitats Directive

Laws relating to bat care

- Animal Welfare Act 2006
- Veterinary Surgeons Act 1966

It is an offence to deliberately capture, injure or kill a bat, or deliberately disturb in a way that would affect its ability to survive, breed or rear young or hibernate, or migrate or significantly affect the local distribution or abundance of the species. It is an absolute offence to damage or destroy a roost, to possess, control, transport, sell or exchange any live or dead bat or part of bat. It is also (in England) an offence to intentionally or recklessly disturb a bat or obstruct access to a roost. Horseshoe bats are Schedule II annex species and foraging habitats are also protected.

According to the law (2006 Animal Welfare Act) people are allowed to take a bat 'for the sole purpose of tending it and releasing it when no longer disabled' and can euthanize a bat humanely 'if they can show that the bat was so seriously disabled, other than by their own unlawful act, that there was no reasonable chance of its recovery'.

This act also puts the onus on the 'owner' or person 'responsible' (who is the person who found the bat) to demonstrate that they are preventing the animal from coming to harm and promoting its welfare. The carer also has to show that they have a bat in their possession legally; therefore it is essential to collect a signature from the finder of the bat passing it over to the carer and to keep records of the bat.

Veterinary Surgeons Act 1966 – it is illegal to diagnose disease or injuries or give professional advice or surgical treatment to bats unless you are registered with the Royal College of Veterinary Surgeons. Prescription medicines eg antibiotics are only available by Veterinary prescription, however it is permissible for a lay person to administer small daily doses of, for example, antibiotic in a life saving situation under supervision of a vet. Medicines should not be administered to animals other than the animal specified. As many bat casualties come in at weekends and evenings this could lead to delay with medication unless you can register with a 24hour or 7 day vet practice. We are not allowed to carry out any treatment on sensitive tissue or bone that should be carried out under anaesthetic.

You need to find a vet who is prepared to work on wild animals, not charge for their time and is prepared to prescribe antibiotics for you to use under their supervision. You will be expected to pay for any medication, X-ray and consumables etc. but many do not charge for time for wild animals.

LICENCES

No licence is required to rescue and give first aid to bat with a view to releasing it. If it cannot be released or needs to be kept more than 6 months then a possession licence is required. No licence required to photograph bats in care.

LICENCE (General) GL03

To temporarily possess and transport dead bats so that they may be submitted for testing as part of the Passive Surveillance for Bat Rabies project. No need to register, download from:
https://www.gov.uk/government/publications/bats-licence-to-transport-and-possess-dead-bats-for-rabies-testing (May need to paste into browser)

LICENCE (Class) A37
To possess live and dead specimens of animal species listed on Annex IV of the Habitats Directive for scientific or educational purposes only.
Need to register with NE.
https://www.gov.uk/government/publications/european-protected-species-apply-for-a-licence-to-possess-them (May need to paste into browser)
Various Roost Visitor and Scientific Bat Licences with different levels. Check on Natural England website for most recent advice

INITIAL TELEPHONE CALL

- Give advice to caller on safe containment, no large holes in box, cloth
- History, time first seen
- Has anyone been bitten?
- Is there a threat to the rest of colony?
- Consider whether a crime has been committed?
- Is there roost in the house?
- Visit ASAP or have bat brought to you?
- Speed is essential, it could be starving or in pain from injuries

Health & Safety advice to finder on safe containment of bat - don't handle, but wear gloves or use cloth, a tea towel is ideal. Put the bat in a box with very small air holes and soft cloth for it to cling to. Ensure lid is secure or tape down; they often escape. If finder has been bitten or scratched refer them to Doctor. **We are not allowed to give medical advice**. Keep bat in quarantine if a person has been bitten. Consider your own safety if bat is in high or hazardous place. It may be safer to gently knock bat down and catch with blanket or net rather than wobble on top of ladder. Do they have bats/roost in the house? Ask if it is a long-eared bat and if so and the bat is torpid, are the ears erect; this usually signifies bat on its last legs and urgent help is required. When on the phone, judge the competence of the finder to contain the bat, and give water in small lid or milk bottle lid and possibly feed bat until help available. Hungry bats have been known to eat mashed wet cat or dog food.

Can they bring bat to carer or must bat be collected? If they deliver bat there is less time and petrol cost to carer but the roost or situation where bat was found cannot be seen. If carer collects you may get to the bat quicker, and less risk of householder being bitten, but make sure bat is contained so it does not escape before you arrive. Act ASAP especially if cat has caught it; it needs antibiotics the same day if injured. If it has been trapped indoors it may be starving and dehydrated, in which case take a pot of water with dash of honey, and small paintbrush for immediate relief. Do not delay getting it food/water, a few hours can make all the difference between rapid recover and organ failure/death. If found in log burner will need taking into care to clean and rehydrate, monitor in case ill from grooming off toxic soot/ash. Above all try to rescue the bat first, before suggesting they may have committed a crime and put the phone down on you.

If a bat is not in its roost, but grounded during daylight hours, it is not behaving normally; something is wrong and it is at risk and needs help. If hanging up in daylight in an exposed place in August-October, it could have got confused or lost the night before, or could be an inexperienced juvenile, or could it have climbed up there with cat or other injuries from the ground? Bats in the open can be attacked by gulls, crows, jackdaws etc. It is NOT acceptable to tell the householder to hang the bat up and see if it flies away.

Always thank the householder for contacting you, even though the bat may be seriously injured and as soon as you get it home you need to put it down (but don't necessarily tell the householder that!). A large part of the work of a carer is dealing with the public, including those terrified of bats (try to reassure) those who think they have committed a crime, those who have committed a crime (try to secure the bat first then deal with the crime aspect) those who have tried to feed the bat with grapes (!) or disturbed it (give advice on minimising disturbance) - try to educate them all as to how wonderful and important they are to the ecosystem, are endangered, eating pest insects, mosquitoes etc.

RECORDS REQUIRED

- Date
- Name and address of finder
- Health and safety: finder handled or bitten?
- Get signature of finder (legal transfer of ownership)
- Local roost? (record it) Other bats in danger? – refer to Bat Conservation Trust (BCT) for licensed roost visitor to visit
- Possible crime, other bats at risk? Record location found – contact BCT, Police
- History/circumstances
- Possible migrant? (Special care with handling)
- Previous treatment if any? (to avoid overdose)

Keep a record book or some other system; there is a legal requirement to do so, and a possession licence requires reports to be submitted, local biodiversity records. Send records to iRecord anyway; essential data to help protect roosts and habitat from development.

CAUSES OF GROUNDING - NATURAL

- Poor condition after hibernation, especially young males in March
- Insect shortage; starvation (eg 2007, 2012, 2021, 2024)
- Extreme weather; exhaustion
- Migration; exhaustion
- Lost/orphaned babies
- Lost juveniles
- Pregnancy problems
- Illness
- Caught on vegetation
- Attacked by birds (magpies, crows, owls etc, accounts for 11% annual mortality)

CAUSES OF GROUNDING – HUMAN RELATED CAUSES

- Caught by cats
- Building work, often illegal
- Disturbance
- Trapped in buildings
- Collisions with cars, powerlines, glass faced buildings
- Windturbine pressure effects
- Contamination by oil, flypaper, adhesive etc.
- Poisoning, eg heavy metals (21%) sufficient to cause kidney damage
- Caught in breathable roofing membrane
- Trapped in water butts/ponds
- 76-82% decline in flying insects in Nature reserves (Oct 2017)

IN CASE OF CRIME

Is there more than one bat? Any obvious damage? Try to get evidence if crime suspected. Get photo or any other evidence, note address, time, date, description of suspects, vehicle description and equipment, write down what the suspect says, all in ink, sign and date notes, get witness signature. Contact BCT and Police Wildlife Liaison Officer.

If bat cannot return to roost because of damage or disturbance to the roost, deliberate or accidental, it needs to be released at an alternative roost or provided with a bat box nearby. Contact BCT for advice, and/or local bat group. May need to look after it until weather improves if roost destroyed.

EQUIPMENT FOR RESCUE

- Secure box, with cloth (eg teatowel) to pick up and give comfort in box)
- Towel to keep box in dark
- Jar of water and small paintbrush
- Thin wooden coffee stirrer to unhook toes if backed into hole

EQUIPMENT FOR CARING

- Boxes, cages, kitchen towels, old teatowels, towels to keep cages dark
- Gloves, Soft cloths,
- Mealworms
- Weighing Scales
- Illuminated magnifier
- Warming pad
- Antiseptic solution, eg Pevidene or Hibisol (from Vet), salt solution, neat honey
- Antibiotic; Baytril, Synulox (from Vet when required)
- Painkiller; Metacam or Loxicom (from Vet when required)
- Paintbrush, pastette, shallow bowls (eg furniture feet cups) max 2.5cm high, plastic lids (1cm), plastic tweezers, Teepee, cotton buds, Micropore tape,
- Long nose pliers for euthanasia

POSSIBLE OUTCOMES

- Release soon
- Possible release after treatment and rehabilitation
- Permanent captive
- Euthanasia

MIGRANTS

- Increased risk of rabies – take care when handling
- Get help/advice from Bat Group, experienced carers
- Quarantine
    - Keep separate from all other animals, pets and humans
    - Wear nitrile gloves when cleaning out cages
    - Dispose of soiled bedding hygienically, eg burning
    - Wash cloths 60 or 90ºC wash
    - Separate bowls, cages, disinfect regularly
    - Observe behaviour etc closely
    - Usually minimum 30 days under supervision of vet

INITIAL ASSESSMENT

- Is rescue necessary? Consider personal safety.
- If caught by cat, it needs to be checked
- Handling, bites, gloves – personal safety
- Grounded or flying
- Is it alive or hanging up dead? Be aware of deep torpor if cold
- History (gives idea of possible injuries) When first seen?
- Visual assessment first, symmetry
- Swollen joints, especially at wrist or elbow
- Lens, light, part fur, look for bruising
- Bleeding?
- Parasites?
- Contaminants on fur? (Oil, adhesive, soot, paint)
- Weight/starvation
- Age – baby? (May-July)
- Sex – female pregnant, (winter/spring)? Lactating? (May-July)
- Toenails
- Teeth, jaw
- State of droppings
- Species ID – especially if Daubenton or Serotine (rabies risk)

Is it definitely a bat? If bat is flying indoors at night – advise to open window, let it fly out, watch it go though in case it just hides in the curtains. Sexing bats; Males have obvious penis but sizes and shapes vary – check in books. If sexually active in autumn, swollen testes can be seen at base of tail. Female bats lactating have bare skin around nipples near armpits, May/June/July.
Initially – be sympathetic to how it might feel, handle very gently to reduce stress and minimise risk of bites. Keep it calm by keeping it dark, cover with cloth it feels secure and safe, warm it, offer water and food to reassure it before assessment.

SPECIAL CONSIDERATIONS

- Lactating females - If possible release within 24 hrs
- Very young babies (less than 1 week old) - If possible return to roost
- Females in winter/early spring - Risk of young born in captivity
- Torpid long-eared bats with ears erect - need urgent attention

NO OBVIOUS INJURY

- Exhaustion
- Bad weather
- Migrant
- Starvation
- Trapped in building
- Disturbed during building work
- Lost baby
- Illness
- Poison

May just need TLC, rest and food if in poor condition after hibernation, exhaustion due to weather or migration, or a lost juvenile, or trapped indoors.
Bat may be weak and undernourished. Weigh bat. Or with experience, easier to run finger down back from neck to tail feeling for shoulder bones and vertebrae, if easily felt then

underweight, well fed bat has pad of fat over shoulders. See if sunken at waist, indicating not eaten for days.
If dehydrated, or starved, take into care.
For weights take into account the time of year and age; for example juveniles will be at the lighter end of the weight range and in autumn they should be at the heavier end.

Approximate measures for British bats		Forearm (mm)	Wingspan (mm)	Weight (gms)
Common Pipistrelle	*Pipistrellus pipistrellus*	28 - 35	180 - 240	3.5 - 8.5
Soprano Pipistrelle	*Pipistrellus pygmaeus*	28 - 35	180 - 240	3.5 - 8.5
Nathusius Pipistrelle	*Pipistrellus nathusii*	32 - 37	220 - 250	6 - 15.5
Brown Long Eared	*Plecotus auritus*	34 - 42	240 - 285	5 - 12
Grey Long Eared	*Plecotus austriacus*	37 - 45	255 - 300	7 - 14
Whiskered	*Myotis mystacinus*	32 - 36	190 - 225	4 - 8
Brandt's	*Myotis brandtii*	31 - 39	190 - 240	4.3 - 9.5
Daubenton's	*Myotis daubentonii*	35 - 41.7	240 - 275	7 - 15
Natterer's	*Myotis nattereri*	36 - 43	245 - 300	5 - 12
Noctule	*Nyctalus noctula*	47 - 58	320 - 400	19 - 40
Leisler's	*Nyctalus leisleri*	38 - 47	260 - 320	11 - 20
Serotine	*Eptesicus serotinus*	48 - 57	315 - 380	14 - 33
Bechstein's	*Myotis bechsteinii*	38 - 47	250 - 300	7 - 14
Barbastelle	*Barbastella barbastellus*	36 - 44	260 - 290	6 - 13.5
Greater Horseshoe	*Rhinolophus ferrumequinum*	54 - 61	350 - 400	17 - 34
Lesser Horseshoe	*Rhinolophus hipposideros*	37 - 42.5	192 - 254	5 - 9

If bat has simply been trapped inside for a few hours and can fly well (not brought in by cat) - advise householder to close internal doors and open windows in room where bat is and allow bat to make its escape at dusk. They will need to watch to ensure that bat does release itself and not hide away or become trapped in vase or glass lampshade – can happen. Bat may settle on curtain. Advise householder to unhook (lift up to unhook) bat from curtains with gloves, or using towel and put in safe place outside at dusk. Give water prior to release if possible by putting a shallow lid or dish of water in box or offering it on tip of paintbrush. Bats can be trapped inside for days but not seen as they hide.

If bat is not very lively, or you suspect it has been trapped for more than 24 hours it may be dehydrated and/or starving, or caught by cat. Put in box with kitchen towel or cloth eg teatowel, for bat to crawl into, and take into care. Give water asap by paintbrush or fold pad of kitchen towel, moisten and put in shallow lid, so bat can't spill it or fall in, for journey.

EXAMINATION
Is bat injured? Look at symmetry, watch when bat moves - is anything obviously broken or different on one side to the other? Both wings close normally? Leaning on one side? Holes in wings? Is there any bleeding? Blood on cloth or tissues or in urine/droppings indicates internal injury. Some injuries do not show until swelling appears later or next day eg burns, bruising, crush injuries. May die of head injury a day or two later, if suspected keep for a few days to assess, even if appears normal.

Wash hands before and after in antiseptic soap or gel. Use clean gloves to avoid passing germs to the bat or from the bat to you. When examining bat a lens and light source is

useful, sometimes extra pair of hands helpful. Comb through fur, look for bruising, parasites, hidden wounds, blow fur round nipples; lactating? Look for Blowfly eggs.

If it is a possible migrant, seek advice from an experienced bat worker. It may need quarantine and extra care with handling and hygiene.

Injuries on half the adult bats brought in are caused by cats. Minor perforations to wings are typical but often broken bones and serious internal injuries occur. There is a risk of lethal infection contacted from cat saliva. Give advice to householder to prevent cat catching more. (See BCT website)

If you are in any doubt seek advice from a more experienced bat carer. Assess when a vet might be helpful. Investigate policy of any interested vets locally, most will only charge for medicine, x-ray etc for wild animals. Many not very knowledgeable and they need pointing in direction of further info eg Amanda Lollar's book, BCT website.

UNTREATABLE INJURIES

Euthanasia always if

- Both wings broken
- Broken spine
- Severe crushing
- Exposed organs
- Head injury, (eye damage)
- Broken jaw
- Compound fracture (eg humerus bone sticking out through skin)
- Break at wrist (usually)

Try to assess and decide quickly if there is no hope, to avoid unnecessary stress and pain for bat.

EUTHANASIA

- If severe injury or deterioration of current condition
- Anaesthetic overdose by vet
- Cervical dislocation using long nosed pliers
- Disposal of body

A vet can use overdose of anaesthetic or injectable barbiturate. Physical method – dislocate cervical vertebrae – various methods but not for the squeamish. Best method at home is to use long nosed pliers round neck, or less satisfactory with pencil on neck on hard surface. Do not freeze to death. If needed for rabies testing must keep head in good condition. Forms and packing for sending to VLA (government Veterinary Laboratory Agency) obtainable from Bat Conservation Trust, have general licence for transport, see earlier. If it is a rare species, consider offering body to bat worker or museum. Need possession licence to keep body.

TREATABLE INJURIES

Injuries that can be treated, depending upon severity, with rest and possible vet assistance:

- Holes, rips or tears in wings
- Broken finger bones, radius, tail
- Dislocation
- Surface wounds

- Cat bites
- Shoulder damage
- Burns and sores
- Inflation

TREATING BATS

- Warmth,
- Rehydration, Water
- Food
- Shelter
- Cleaning wounds
- Splint broken fingers
- Antibiotics, pain killers
- Any surgery – by vet

A bat will not/cannot take water or food if cold and immobile, may choke or aspirate. Warm in hand or warming mat. While stressed, starving and until injuries are healing well it is best to keep bat warm. It will speed up its recovery and if hand feeding it takes less time if the bat is already warm.
What carers mainly offer is nursing and support to the bat while it heals.

MEDICATION
Antibiotic Baytril (2.5% oral cat) diluted 1:10 drops water (**1** drop **twice** a day for 7 days for pipistrelle sized bat (2 drops at double this concentration for serotine or noctule), can store in fridge made up, will last ~ 6-7 days ie one course of treatment (better, and more accurate to make up 4:40 drops water to last the course). Then give bat a rest from medication, or change to different type if problem continues.
Synulox: divide bottle into 15 equal portions of powder, store in fridge, add 1ml water to a portion, **1** drop **twice** a day. Or if you can get 50mg tablets, crush one in 1ml water. Better than Baytril if bat is young, pregnant or lactating.

Painkillers – Metacam (0.5mg/ml oral suspension for cats) or Loxicom, 1:18 drops water for a 9g bat, **1** drop **once** a day, adjust dilution to weight of bat. Store made up solutions in fridge, OK for up to a week. If bat is dopey due to painkiller it may not regulate its temperature so best to keep on warming mat. If injury bad enough for painkillers it should be on warming mat anyway. EG for 4.5g pipistrelle use 1 drop to 36 drops water. 20g serotine - 2:18, 7g long-eared 1:22.
Antiseptic solution Pevidine; diluted to the colour of pale straw can be used on cotton buds to gently cleanse open wound. Or Hibisol which is a pink solution, again dilute. Salt solution worth trying, especially for fungal/yeast infection on wing membrane, dry surplus off. Try fresh honey, sticky but harmless.
Antibiotic ointment, Dermisol cream -use very small amount as bat can ingest. For this reason I no longer use this.
All the above must be obtained from vet (except salt and honey of course!).

TREATMENT

- **Starvation and dehydration, exhaustion**

Dehydration – easily treated with water, little and often. ‘Lectade’ or ‘Oralade Advanced RF+’ can be used, but water sufficient in most cases. Water with small amount of honey (or sugar) is easily digested and taken readily. This is particularly useful when bat too weak to eat, and keeps it alive until it arrives at bat care centre.

Signs of dehydration – dry faeces, little urine, dull, dry, inelastic skin, sunken eyes, dry mouth, weak and lethargic, cool, shallow, fast pulse. If very dehydrated may develop organ failure. WARM bat first. Make sure bat can swallow & put water on lower lip. Use clean, very small artist's paintbrush and ensure it does not go up nose, have soft tissues ready to dry nose and chin. A pastette can also be used. May use largish shallow dish for healthy long-term bats. Small dishes, eg plastic milkbottle top, better for short term as they may be active trying to escape small box, and spill it, get wet and chilled. Not too deep; ~5mm and only use small lid if bat is weak or it may fall in and be unable to right itself in which case use with wet kitchen towel in lid as well. Keep offering water for several days especially if not very mobile, don't assume it has found the water it its box, until it is clearly not interested in more water and looks more hydrated.

Starving, dehydrated long-eared bats often have erect ears, a sign of near death, needs warmth, quiet, minimum handling and careful giving of warm Lectade or honey-water, may be too weak to swallow; risk of choking. Pastettes is useful in these cases.

Blood in urine may be due to injury, infection, blood parasites, shock, dehydration. Monitor, but often clears in day or two unless serious internal injury.

To encourage dehydrated/starving bat to eat, - mix mealworm insides with water and offer on brush. A healthy Brown Long-eared can take 40 mins to overcome fright paralysis, so be very patient. I find injured bats less likely to show fright paralysis and sometimes take food and water very quickly. If persistently reluctant to eat, examine carefully for head injury, jaw or teeth problems, using magnification. Tiny pastette may be cleaner/easier than brush if bat reluctant or very weak, but ensure it can swallow or may aspirate and drown.

If the shoulder blades and spine can be felt when a finger is gently run down their back or they are sunken in at the waist they are likely starved. Mealworm innards should be offered little and often, maybe one or two an hour. Try from mealworm, brush or diluted from pastette. Emeraid for Carnivores is a powder mixed with water very palatable, nourishing, 30% protein and easy for weak bats to lick.It has saved the lives of several bats. For first few days may have diarrhoea, especially if on innards and if not eating skins. Don't leave live mealworms with weak bat, they can eat the bat.
If bat is injured they have often been grounded for a day or more before being found and are therefore also dehydrated and hungry. After brief initial assessment, I prefer to warm bat, give it water and food before attempting to treat or examine in detail, so the bat feels more relaxed and builds up trust. If it has been manhandled and is defensive it may not so readily accept food etc.

A starved bat may find it difficult to maintain body warmth. To keep bats warm – use heat pad. Temp. maximum 35ºC. In an emergency you can hold it in your gloved or cloth covered hand or fill a plastic bottle, or hot water bottle with warm water and cover with sock but take care it does not roll onto bat.

- **Obvious injury, perforations, cat involved?**
- **Swollen wrist or elbow, dislocation**
- **Broken bones, fingers, joints, shoulder, pelvis, tail, feet, legs, humerus**
- **Holes in wing membrane**

If a cat has brought it in, give owner advice on how to prevent cat catching bats. Cat bites and broken bones will need antibiotics ASAP, as cat bite infections can kill a bat in 24-48 hours. Cats may account for 11% of annual mortality and about 50% of adults I get into care.

Bats can fly with quite large holes in wing, so check whether holes or rips/tears are serious and affecting the bat's ability to fly. Holes greater than 1cm diameter may require extra energy to fly so will probably need looking after until at least repair is starting, before release. Usually heal slowly or not at all over winter. Holes can heal up completely in 1-3 months depending on size. Tears down to the trailing edge of the wing; often the edges heal but the tear will not reduce or only very slowly and scar tissue causes membrane to tighten and adversely affect flying. It can take 6 months or more for a tear from the wrist to trailing edge to heal, especially as healing slows down over winter. After a few weeks allow the bat to have short flights if it wishes so the scar tissue does not become too tight, and give it space to exercise the wing eg in a small flight cage. Vets may be able to use skin adhesive, but don't release bat until fully healed as some bats may groom off glue or edges may pull apart. On wounds Vetbond may inhibit repair. I think it is best to let the bat heal naturally.

Look first for swelling of wrist or elbow or imperfect folding of wing, indicating injury or fracture and avoid opening wing if possible or will cause bat great pain and possibly further injury. Could have dislocation, needs X-ray to confirm and vet assistance to reduce dislocation, lengthy rehabilitation.
Injury to wing - fingers and radius/ulna can be splinted together, the one acting as a splint for the other. Splint, using closed fingers or cotton bud stem. Use thin strips of micropore tape for easy removal, be careful not to have the tape too tight or circulation may be restricted. If the joint is affected splinting may not be a good idea as there is often swelling associated with joint injury and taping up the wing could cause great pain to the bat and cut circulation.

Broken wings (fingers) – splint as described. Taped up wings can get 'sticky wing' caused by build up of yeasts on membrane as the bat is unable to wash the membrane. If seen, remove tape and bath wing with a simple 5-10% salt solution I have found works well; dab on affected membrane and then remove surplus with soft tissue. Bat can bite at dressings and even at wing if it is uncomfortable or numb from nerve damage. Humerus bones cannot be splinted satisfactorily so only hope is for a vet to pin it internally, if not too close to a joint and the break is uncomplicated. If vet can pin, use fine hypodermic needle or human dental pin or stainless steel insect mount pin. If a small bat; humerus pinning is problematic and without a pin is unlikely to heal properly so best to put to sleep, similarly if a compound fracture.

Anaesthetic for operations is complicated by the bats' use of torpor. See BSAVA Manual of Wildlife Casualties and Amanda Lollar book (see refs). Anaesthetics - Halothane & Isoflurane, Oxygen & nitrous oxide/oxygen mixtures, by vet only.
Baby bat with broken forearm; strap wing to naked baby with micropore tape. It may heal in a week.

Some breaks can cause a bat to lose sensation and bat will bite off affected parts in self amputation. If on the fingers it will usually heal and bat can become useful education bat. However, if the wrist is involved or it appears at all distressed and seriously resents being

handled then consider putting it down. If thumb is unuseable bat may be unable to climb which causes it distress and a feeling of insecurity.

Broken feet and legs can heal without too much intervention as supported by membrane. It is difficult to splint satisfactorily anyway. It is known that bats can survive without one foot in the wild. But may not be able to climb, hang up or groom if it is a bad break, so assess each one individually.
Injured shoulder - quite common injury – can see this by bat 'giving' on one side or being unable to get lift when flying or refuses to fly. May be a fracture, muscle strain or related to bruised ribs etc. Give rest and food and wait and see if it improves after a few weeks. X-ray may determine if fracture present.

A strained or weak joint at the wrist, elbow or shoulder sometimes results in the fingers being flipped over the humerus when the bat cleans its wing membrane. Once there the bat is unable to flip them back and may strain the joint further. Hold bat securely, hold wrist and move nearly 90 degrees away from the body; gently hold fingers and push back over shoulder. Once strained this may happen again so check the bat at least twice a day and return fingers to correct position. If left there sticky wing likely to occur as bat will be unable to groom wing.

Broken pelvis - can sometimes heal but in females can be problematic in any future pregnancies. Judgement is required and consultation with Vet. X-ray will confirm.

Broken tail – can cause complications with flight – keep and observe when test flying.

Fracture and infection – difficult to recognise sometimes owing to bats' ability to thermo-regulate. If it becomes lethargic and immobile or the site of injury is swollen then consider the possibility of infection and give antibiotics for a week.

Breaks at joints might heal with large amount of scar tissue 'callus' – fibrous callus will then change to bony callus which will make flight impossible but could be education bat. But often injuries at wrist or elbow are subject to repeated infections and the stiff joint prevents wing from opening and being cleaned by the bat so susceptible to further infection, 'sticky wing', self amputation and may have to put bat down in the end anyway. A wing fixed open may be repeatedly knocked and bat may not be able to clean it properly.

Bone sticking out – compound fracture – quite common. Can try to splint but it can become infected or wing might quickly die back to break point. Carer's judgement based on individual bat – often euthanasia is kinder and some carers routinely do this for compound fractures. Compound fractures of fingers usually heal up (but do not mend). If finger die back they can be painlessly snipped off once completely dead, bat will sometimes self-amputate fingers. For fractures elsewhere consult vet or put to sleep. Painkillers are essential for fractures.

Some vets will amputate wings at break and use spare skin to cover stump. The stump can heal nicely but needs to be watched in case of infection especially if the bat walks on it. Smaller bats do not take kindly to amputation; they are normally too active, best to put them to sleep.

If you suspect a deliberate injury, ask the vet to do a report in case police need to be involved. Vet's opinion, even verbal, helps. Contact local Police Wildlife Liaison Officer.

With breaks, often better to wait to stabilise bat's condition a day (feed, rehydrate) before asking vet to intervene –other injuries may come to light in this time. Vets may know little about bats.

Finger breaks usually take about 6 weeks to heal; do not attempt to fly a bat until after then. Then if it looks 'right' give it the opportunity to fly if it wishes, warm it first in the hand (may take 10-20 mins) then open hand and let it fly in a room with doors and windows closed and preferably with no wall furniture it can hide behind. Watch it the whole time or it will dive behind something like a curtain and you can spend hours trying to find it. If it is managing to fly, exercise it regularly eg every day or other day gradually increasing the time you encourage it to fly. Do not 'launch' a bat, if it is ready it will fly of its own accord, evenings are the natural time it would become active, otherwise draw the curtains to shield from sun etc. If you hold it in your warm gloved hand for a few minutes to warm up it will often pee and this will save your furnishings! When it can manage a sustained continuous flight of minimum 15 minutes (and meets the other criteria see later, under Release of adult bats) it is probably ready. It may take a couple of weeks or more of flying to get it fit after an injury.

- **Adhesives, oil, tar, fly paper, cobwebs, expanding foam filler, soot, paint.**

Bat will be dehydrated so offer water first. Stuck to flypaper (often long-eared bats) - get householder to remove remaining strips to avoid future bats sticking, probably illegal if put in known roost. Put flour on the flypaper and adhesive to prevent bat getting stuck further, snip off surplus fly paper strip and worst affected fur (great care, see below). Then use olive oil, baby oil, soaked cotton buds to dissolve adhesive, test effectiveness in small patch first. Then rub in neat gentle wash-up liquid to lift oil, rinse off with warm water, ensure nothing gets on bat's eyes, mouth or nose or it could suffocate. Have a soft tissue to protect head from splashes. Blot dry with soft tissue. Best to do part of bat at a time eg one wing then the other, then body or could chill or go into shock if whole body wet, but need to work quickly before it gets contamination on the face and ingests it when trying to groom itself. I often clean wings first as they are very distressed if they cannot open them. It usually takes me a couple of hours to clean a contaminated bat up, using magnifier or binocular microscope. Warm bat to dry further and keep on warming mat as it may be in shock, until fur is fluffy and insulating again. May need more baths, feed as usual. Once all contaminant off, just a bit of spikiness of fur due to olive oil remains. At this stage probably less stress for bat to let it groom off olive oil itself rather than another detergent wash. May take 2-3 weeks for fur to be fluffy enough to release, or longer if you had to clip fur, until it has mostly regrown. Soot is water resistant. Use neat detergent on fur then rinse off.

Sometimes they come in with unknown lumps matted in clumps of fur. The fur gets pulled in and the skin pulled, must be very uncomfortable, the bat may be distressed and active so wrap securely in a cloth to snip the clumps of fur off. Take care not to snip thin skin underneath which gets pulled up into a pyramid– use lens or binocular microscope and small surgical scissors, I have sometimes had to cut a couple of hairs at a time under the microscope, to avoid damaging the skin, but the relief to the bat is tangible as the pain is relieved and it calms down.

Might also de-stick with 'Fullers Earth' – it binds glue to form balls. May need to clean it in stages to avoid excessive distress to bat, but must do it before bat ingests any.

Removing oil and oil-based paints – use olive oil as above. If bat is stuck firmly to sticky paint etc. euthanasia may be kindest. Small amounts of paint can be loosened with olive oil or allow to wear off naturally.
Tar – no way to remove large amounts – although Swarfega may work? Can snip off small amounts of contaminated fur.

Cobwebs – Some cobwebs are tough enough when wrapped round to prevent a wing from opening and stick an ear down; grounding a bat. With tweezers pull or snip the cobweb strands and pull gently off bat. Treat for dehydration and hunger.

Quick-dry expanding foam filler. Snip and pick off under microscope. Tiny fragments come away from bare skin/ears probably due to natural oils I skin, but affected fur just has to be snipped away, with great care; a few strands at a time.

- **Fish hooks**

Depends where the hook is, may unhook or put down. Act quickly.

- **Inflation (subcutaneous emphysema)**

Inflation is caused by puncture wounds – air gets between skin and muscle after puncture, air either from lung, nasal cavity or from outside, is drawn in as bat breathes and moves.. Insert sterile hypodermic needle best, under skin at shallow angle to avoid damaging muscle or organs, to release pressure ASAP. May need to puncture several times over a few days. Keep warm and quiet. However if it is a lung puncture it will re-occur unless the hole seals and euthanasia may be best. Bat will be in distress and in pain, will need Metacam painkiller and antibiotic to treat injury causing it.

I have seen some which had punctured nasal passages, they usually die. I had one which may have had a lung puncture, it recovered after repeated deflating during a fortnight but died 3 months later, possibly from complications? Maybe 30% survival rate.

- **Fly strike**

In summer (even as late as November) flies are attracted to any open wound and lay eggs on surrounding fur and body. They can hatch into maggots in 10 to 48 hours depending on temperature. They need to be picked out immediately with tweezers and squashed. A hand lens or microscope is essential; comb fur, inspect ears, all orafices, eggs could be anywhere on the body. If they have already hatched examine wound minutely, preferably under binocular microscope and consult vet for treatment (eg rabbit fly strike treatment suitably diluted?) Applying warm air, eg from hairdryer may drive maggots to surface (protect bat's face from hot air). I have found them deep inside ears and behind eyeball (bat recovered but I had nightmares for days!).

- **Stings and bites**

Bee stings – white lumps in membrane (bumps can also be caused by mites). Normal care until it recovers. Spider bite caused swollen limb.

- **Caught on vegetation, aerials etc**

Gently unhook, treat for dehydration, starvation, disinfect holes in wings etc, do not release until bat strong. There is probably bruising to wing membrane, parts may die and fall out, full extent of damage may not be obvious for days or a week.

- **Poison**

Poisoned bats rarely come in, but a bat may ingest timber treatment spray when grooming. Possible symptoms; erratic, twitchy movements, coma. Can only clean off any surplus poison, give warmth, rest, water and food, may suffer organ failure. Seek advice from vet if poison suspected.
If poison suspected keep dead bat chilled although it is unlikely you'll be able to get effective post mortem. May need to keep body (in deepfreeze) as evidence, if crime committed. If alive seek vet advice with as much info as possible.

- **Road traffic accident**

Often have head damage or internal damage, may die a few days later if skull fracture or bruising and fluid on brain or internal bleeding. Offer water, food, warmth and quiet environment, observe behaviour but avoid handling. Sometimes double humerus fracture from collision with car (put to sleep). I have a noctule, RTA resulted in deafness, not releasable.

- **Burns, other skin problems**

Burns, eg from stoves, chimneys. Antibiotics, apply small amount of soothing antiseptic cream or honey. Keep handling to minimum, be very hygienic with clean bedding, clean hands etc to avoid it getting secondary infection or fluff in moist wound. Use painkillers. Skin infection, could try antibiotics, if fungal/yeast infection (sticky wing); salt solution often works, dab off surplus, will probably need painkillers.

- **Ear/balance problems**

Ear infection, head injury, parasites? Unable to fly properly, or reluctant to fly. Constantly turning in one direction. Observe but do not release until resolved. Try Baytril antibiotic.

- **Toenails**

Can it cling, always found on the floor of cage? If a juvenile has no toenails it may be caused by poor nutrition, they become grounded. Possibly worn down if it was trapped somewhere and scrabbling for a while. With good food, plus Nutrobal on mealworms, they usually re-grow in a month or so. After some time in captivity on soft surfaces claws may grow too long and catch in material. Clip 1mm off, or lay a sheet of fine sandpaper on bottom of flight cage to help wear them down, I don't usually need to clip pips' toenails but the larger bats need them doing perhaps every 6 months.

- **Hair loss**

This occasionally happens after rescue as a result of injury, inflammation or being covered in contaminant and bat grooms off fur. Often fur is groomed off round a wound, this can keep wound cleaner, so no bad thing. If hair loss is under chin, it could be due to inadequate diet, stress, unable to wash itself, baby not having milk washed off, or being hand fed mealworm innards – must wash bat after feeding. Fur loss on tummy - possible urinary problem or abdominal discomfort. Review diet, hygiene, conditions and housing. Bat may be lonely; consider a companion bat. One Serotine who lost his female companion, within days stopped feeding and grooming, got mites, dandruff and scabby ears, lost his fur, needed hand feeding, warmth and mite treatment. He was probably

stressed, lonely and depressed. He recovered after a few months. A Serotine from another carer lost all his fur because he was fed snipped mealworms in large shallow dish. The bat sat in the dish and got corrosive mealworm juice all over him. If the bat can self feed, it should be on live whole mealworms. A weekly pinch of Nutrobal on mealworms in foodbowl often helps. Scaly skin might be due to mites, possibly bat not grooming - change bedding and wash cage regularly. Once cause removed, fur will re-grow but may take some time depending on time of year and moulting stage. May be white fur for a season.

- **Bruising**

Possibly a result of crushing injury, may have broken ribs and internal injuries too, keep bat warm, quiet and under observation for a couple of weeks, avoid handling. It is difficult to see unless fur is parted and skin carefully examined for increased pinkness.

- **Trapped in loft water tank, water butt**

Get householder to cover tanks to prevent more drowning. Drape mesh over water butts or lid. Possible exhaustion, water aspiration, worn toenails from scrabbling. Don't release for a week at least and watch out for breathing difficulties. If bat has inhaled water it may develop pneumonia from germs in the water or inflammation of lung tissue and die a few days later 'secondary drowning'.

- **Teeth**

An old bat can have worn or missing teeth, eventually leading to starvation and grounding. Teeth or jaw injury can make it difficult to feed, needs soft food while assessing outcome. Teeth sometimes seen to be blackened; cause uncertain, possibly immuno-suppression or virus. May develop in captivity if it is only eating innards; needs roughage to clean teeth. Some bats come in with black teeth. I have had a couple of old bats with worn down teeth; a noctule found emaciated with broken canines and worn down teeth was not released as would not be able to grip her normal prey and could not eat whole mealworms, only moulted or white pupae, she enjoyed a further 8 years in captivity before developing an inoperable lump on her neck and was put to sleep. An old Nathusius eventually managed moulted minis and was given the benefit of the doubt as they feeds on midges etc and released.

- **Eyes**

With eye damage or dislocation, it is usually best to put the bat down.

- **Mouth Infections**

Give Baytril, wash face after feeding. Some develop plaque on teeth and one developed lesions in mouth after 2 years captivity, which did not respond to antibiotics. There may be signs of depigmentation on lips as the result of infection, now healing. May have swollen, painful, infected oil glands on face. If one side larger and paler than other side, give antibiotics, may be able to ease pus out with gentle pressure. In 2020 several young pups came in with infected oil glands. Antibiotics undesirable for pups, however slowly, gently rolling a stainless steel rod ~1mm diameter from below the eye towards the nose (under the microscope) eased most of the pus out and they started feeding again and clearly felt much better. Probably affects echolocation, breathing and calls so may not have been recognised by mother.

- **Age**

Could it be lost baby - if late May to early Aug? Is fur long enough to blow apart (juvenile or adult) or short and velvety in the case of pups?
If the bat is a baby and can't fly, it may have been dropped or left when colony has moved, or been disturbed.
It could be orphaned, or may just have wandered from roost. If only grounded since previous night and is in good shape and roost location known; try to reunite with mum but if over a week old, mum cannot pick it up, so needs to be taken it into care. If it has a lot of mites or is thin it has probably been lost and crawling for some time, reuniting with mother unlikely to be successful. If attempting to reunite with mother, leave in high location just before dusk, under the roost, with warmth (warm water bottle) and observe from distance to see if collected. If not rescued after main emergence, take into care. Likely to have low chance of survival if just "put back into roost". Ascertain maternity roost still present and return to roost only if baby is found plump and recently fed.
For long term captive, baby rearing, over wintering, pass on to experienced licensed bat hospital. Get advice at any point. See later section. Ask for extended 'Rearing Bat Pups' leaflet.

- **Brown Long-eared character**

Bats suffer problems similar to humans and other mammals. Bats have different personalities – each species has characteristics eg serotines often grumpy, but individuals differ, just like humans. BLE's often show nervous fright paralysis (they play dead), worse with a healthy bat, injured ones more readily accept food and can be very quick to learn to feed themselves eg within an hour. With Fright Paralysis, they may not relax for 40 mins - need to be very patient.
Brown long-eareds are the most difficult patients, they are very wriggly, slippery and nervous when handled. They are not crevice bats and resent being held in the hand. Unfortunately they are also the most likely to become caught on flypaper, and often caught by cats because of low hovering flight behaviour. They seem to give up more readily than other species; if they are inactive and ears are erect in front they are in a bad way, weak, starved etc or giving up, need very gentle, urgent persuasion to warm up/drink/eat.

- **Whiskered feeding**

Whiskered bats can be slow to learn to feed themselves; one individual had not learned after a year and required hand feeding every evening. They often scold continuously even when you are feeding them. Bats which normally catch insects in flight and are not used to gleaning insects from surfaces as long-eareds commonly do, sometimes have difficulty adapting to eating from a bowl. Horseshoe bats are notoriously difficult to feed from a bowl and do not do well in captivity.

- **Females in winter**

Unless they require warmth to heal wounds, keep cool (ambient to 10°C) to avoid pregnancy advancement. They mate in autumn, store sperm and in the spring the egg is fertilized and pregnancy commences, warmth can trigger this. Baby growth rate is affected by warmth.

- **Attacks by predators other than cats**

Usually fatal. Great tits on the Continent attack bats when helpless in hibernation. Rodents may attack during hibernation. Magpies, crows, jackdaws and gulls will take bats seen

during the day. Rescued bats may have deep peck wounds, broken jaw etc. Bats form part of the diet of owls. Sparrowhawk may take bats in the evening.

- **Wind turbines**

The reduced pressure around the tips of the turbine blades causes haemorrhaging in the lungs of bats and burst eardrums. They are found on the ground dead with no obvious external injury. There is also a risk of collision with the blades and impacts on foraging, possible ultrasound emissions may affect bats. Bats may be attracted to the insects which may be attracted to the heat radiating from turbines. It is estimated 250,000 bats per year killed in Germany alone this way.

- **Roofing membrane.**

By the time they are found the bats which are trapped by their feet and wing tips in the fibrous membrane are usually dead. The only safe roofing material is Bitumen Type 1F felt. Anything which is non-woven, polypropylene or spun bond is dangerous to bats.

<u>WHITE NOSE SYNDROME (WNS)</u>

- In North America, Canada, estimated nearly 7 million bats died by Jan 2013
- The fungus found in Europe, but not the symptoms
- Now thought to have come from Europe, where bats are resistant to it.
- Thrives in cold, humid conditions, so affects hibernating bats
- Bat skin and membranes damaged, affecting moisture control
- Fly during day and use up fat reserves when they should be hibernating

Some winter colonies had nearly 100% fatalities, affecting 7 species in USA and Canada. Cases of this fungus have been seen in Netherlands, France, Germany and further East, but WNS and mass deaths not reported yet in Europe. Vigilance and hygiene important especially if visiting any roosts. In January 2011 some dead bats found in England with white mould on nose and skin, *Pseudogymnoascus destructans* fungus was found in UK in July 2013. In May 2015 a soil dwelling bacterium was found to produce a volatile organic compound which arrests fungus growth. See refs at end. UV light also kills the fungus.

<u>DISEASE</u>

- Babesia
- Bartonella
- Bat Rabies Lyssavirus EBLV 2 – Daubentons
- Bat Rabies Lyssavirus EBLV 1 – Serotines

Little is known of bat illnesses. Symptoms include erratic movement, unusual behaviour, lethargy, twisted neck.
Babesia is a parasite in blood. Can show blood in urine but this more often can be from injury. Babesia can be carried by ticks and can be treated with antiparasitic drugs.
Mycoplasm is a bacterial blood disease, treat with Baytril.

Bartonella spp. are bacteria (Lyme's, cat scratch fever) transmissible to humans via vector such as bat ectoparasite and ectoparasite faeces, have been found in Daubentons.

Rabies Lyssavirus EBLV2 – found in Daubenton's in the UK – active surveillance found approximately 4% show antibodies which means they have been exposed to the virus. Twenty four Daubenton's (and 1 Soprano Pipistrelle) have been found with active virus in UK, one after 7 months in captivity, one from a frozen bat corpse. One bat worker has died in Scotland although he may have contracted it from bat work abroad. Symptoms are

classic rabies aggression, but it is possible bat may show paralysis, lack of coordination or no symptoms. Take great care with any Daubenton's bat – if suspicious, must act quickly and have bat put down and tested. Alert medics immediately if any bites or scratches and advise finders to get immediate medical advice. Any suspicious dead bats can be sent for testing by VLA, but particularly important for Daubenton's bats. Use special envelopes, forms, test tubes. Form for bat submission for rabies screening obtainable from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/465094/form-bat1.pdf

EBLV1 – found mainly in serotines in Europe. 90% of bats with EBLV 1 have been serotines. 758 cases in Europe since 1977. Found in one stone marten, 2 sheep and possibly implicated in cases in 2 cats. Cases of EBLV-1 in UK, 7 serotines including a Serotine in October 2018 from Dorset and another from Somerset in January 2021. Apparently 1 local Serotine showed antibodies, and 2 Natterers several years ago. Serotines are somewhat bad tempered and very able to inflict nasty bites, so take great care – APHA may want to euthanize Serotines that bite, so it is in the bat's interest to avoid this too. We've had a few battles regarding this in the past, they seem to be a bit more reasonably these days! See refs at end.

Previously the advice was all voluntary batworkers and carers of bats in the UK should have pre-exposure vaccine, free (from Public Health England, PHE) through GP. Three doses of vaccine in arm. Since July 2018 vaccination only required if handling bats 'regularly'. A trainee can do handling practice provided they wear appropriate gloves and are supervised and seek post exposure treatment asap if bitten. Post exposure vaccine is available for others who have not previously been vaccinated. Always successful so far. Booster can also be given to those already protected, currently 3-5 year intervals. Anyone bitten or scratched should wash wound well with soap and water and disinfectant if possible. See Doctor. WE CANNOT GIVE MEDICAL ADVICE. Keep any possible suspect bat well away from other animals, in quarantine. Quarantine procedures include isolation from other animals and people, separate cages, equipment, cloths and gloves. Wash cloths at 60ºC or above, sterilize equipment using bleach 1:30 water, for 20 minutes. Dispose of waste material by incineration.
Important – wear gloves to avoid bites, use cloth or leather gloves. You may prefer to use a cloth as well for larger species. Not just latex gloves (bats dislike feel and dust on latex gloves, cannot grip) bats can bite through latex but it does give protection against body fluids.

PARASITES

- Ectoparasites – mites, ticks, fleas, bat flies, bat bugs
- Endoparasites– worms

Ectoparasites – Mites, which include Spinturnix and insects: bat fleas, bat flies and bat bugs – some extremely rare and worth preserving them in alcohol in tube, with details, entomologists very interested in these rare parasites. Contact local bat group to find who would like them.
Wet cotton bud can remove some mites, or Masking tape wound round cotton bud, but the best control is frequent change of bedding.
Usually a heavy load of mites is a sign of a bat under the weather in some way, healthy bats groom and keep numbers down, but do not eliminate them completely. Infested bat pups mean they have probably been crawling around below a roost for a while. They usually quickly disappear after a few changes of bedding. Heavy mite load may cause

wing mottling or fur loss, pale gums and anaemia. I find long-term serotines particularly prone to mites, probably lazy!

Insecticides – I no longer use - unsafe for bats. Beware of Ivermectin - overdose can lead to coma and death of bat. Consult experienced bat carer.
CAUTION: any external insecticide is likely to be ingested by bat. Safest way of removing parasites is daily bedding change and see if they go naturally when bat starts feeling better and grooming again. In extreme cases, use a cotton bud dipped in methylated spirits on the mites, small areas only, back of neck and rump have most mites, it stuns and kills them, or drives them off bat onto cloth you hold bat in. In bad cases the mite droppings leave skin dirty and sticky, wash with mild detergent and warm water, dry and keep warm. Six baby serotines which came in 2023 were heaving with mites, and needed washing.

Causes loss of pigmentation in skin, mites under skin cause dermatitis.

Fleas – rarely more than 1 or 2 on a bat. I once found nearly 20 on a bat. Of interest to specialists.
Bat flies – look like small (6 legged) spiders (Rare, of interest)
Bat bugs – up to 6mm long. (Very rare, of interest)

Bat ticks (mainly *Argas vespertiliones* or *Ixiodes* sp.) which may carry pathogens such as Babesia, Richettsia (Spotted Fever) and Lyme's disease and Bartonella spp. in southern Britain transmissible to humans, so take great care. Use fine pointed tweezers and grasp tick as close to the head as possible, to remove them. Monitor site that it does not become infected.

Demodex – eczema like. Live in hair follicles. Wash with shampoo & use insecticide Aludex. (Care needed; get advice from vet)

Endoparasites: fairly rare, I have seen roundworms in a bat once (coming out of mouth of dead bat).

HOUSING

- Plastic animal box
- Baskets, shoe boxes
- Tea towels, foodbowls, water trays
- Incubator for pups
- Reptile cages
- Flight cage
- Species, sexes - together or apart?

Shoe boxes and baskets are OK in emergency but difficult to clean and sterilise, plastic boxes and reptile cages best. They have been known to chew through a shoe box and escape. Need to keep them clean, isolate new bats during treatment and for first few weeks and if need to be released, unless you have some way of distinguishing between them, eg fur clip (though strictly speaking need licence to mark).
Need cloth to cling to, tea towels are better than towels as toenails can get caught in loops. Wash and disinfect cages regularly (Method antibacterial spray seems to be animal friendly) and change cloths at least twice a week to avoid build up of mites and urine. Avoid strong smelling detergents and washing powders (I use Ecover) and rinse cages

after cleaning, in fresh water. Kitchen towel on base probably needs changing daily. Wash towels at 60ºC to kill any virus etc. Keep separate gloves/handling cloths for each set of bats to avoid disease spread and smell of strange bat upsetting another one. Boxes need to be at least big enough for bat to stretch out both wings, preferably larger, especially if more than one bat in together.
Housing babies -see pup rearing section.

Bats will usually mix with others of same or other species fairly readily, but give plenty of space to allow them separation if they need it. Different species in a cage often roost together away from other species, but pips will happily muddle in with others. Introduce in clean neutral smelling cage, as the normal resident will scent mark his/her territory, some species are less sociable than others eg Natterer's, Serotine sometimes, but can form close bonds. House large bats separately from small ones. Keep bats away from bright light, radiators or windows where there may be fluctuating temperatures. Keep away from noise and disturbance, especially children. Other pets are source of noise frightening smells and potentially disease (dogs, cats, reptiles etc) and parasites.
Put in a couple of food and water dishes, bats like to get right into food dishes and a dominant one may hog the dish and go to sleep in it. Dishes need to be shallow enough for pips to climb into/out of – and put dishes up against teatowel so they can climb down into them, but straight smooth sides so mealworms cannot climb out, 2.5cm high is about right, any higher and bats might have trouble climbing out.
Hibernation season – keep injured or weak bats warm despite season. Long term captives should be kept in cool room (minimum 10ºC) in winter to semi-hibernate. Provide increased humidity, eg extra trays of water outside cages. In large cages I prefer to leave food/water bowls away from the edges; that is where droppings accumulate and I have known a bat in torpor to drop from height onto the pottery food bowl when cage was opened and injure itself.

ISSUES CONCERNING HOUSING

- Size of cage
- Isolate while treating (and if to be released soon)
- Babies need company
- Social animals
- Together or 6 months isolation?
- Sexes separate versus facilities? (Unwanted babies rare)

Unless confining to reduce movement while injury is healing, give them the largest sized cage possible. Minimum, twice the wingspan. We feel the BCT recommended guidelines on cages are too small, and 6 months in isolation is cruel for social animals.

FEEDING

- Pup or adult
- Mealworms
  - Care of mealworms
  - Method, size of, tweezers
- Supplements, oats, carrots, kitten food
- Nutrobal

Before feeding –

- Bats need to be warm
- Bats need to be rehydrated (water, water/honey, Oralade, Lectade)

Mealworms are available by next day post from Livefoods Direct and other companies. The size of bat dictates size of mealworm offered; Minis best for pips, Regulars for Serotines and Noctules. Having a long shelf-life tray of soft cat food in house or Emeraid for Carnivores (powdered food mixed with water when required) will cover until the mealworms arrive. Emeraid is ideal for a weak or starving bat.

Wild insects have been found to contain different levels of fibre (higher) and certain minerals than cultured mealworms so it is important to fortify the mealworm by giving them a selection of green leaves, sweet potato pieces, apple, oats, carrot and cabbage, preferably organic, also guinea pig pellets (for Calcium) and kitten pellets (for Taurine). Care of mealworms –feed as above; sieve to remove frass and keep dust mites down, if too deep or too much veg will go damp and die. Add calcium /phosphorous via Nutrobal. Can give supplements to mealworms but care needed as over-supplementing can be as dangerous as under-supplementing. See 'Looking after mealworms' and 'Feeding Bats' in appendix.

Avoid getting mealworm 'juice' into eyes or cuts etc. (both ours and theirs) and try not to get food or water up their noses! Use plastic rather than metal tweezers to feed larger bats or slide plastic tube over metal ends to avoid tooth damage. Wash face and chin after feeding if messy, using damp cotton bud (beware of catching fibres on teeth), damp tissue. Young or infirm bats should be fed mealworms with lightly crushed heads (to reduce activity and fluid loss) in a dish initially, rather than live ones. Live mealworms can eat a disabled bat. Best not to 'snip' mealworms or leave with heads removed or they 'bleed', start to decay and the juice can get on bat fur.

Bats must be warmed up to feed, because of their metabolism. Offer mealworm insides when a bat first comes in, some bats will only eat innards; persevere until bat is stronger. If reluctant to feed, put a little onto lips with paintbrush. Avoid getting up nose! If bat very weak try water with honey (or Lectade or Oralade RF+) to rehydrate first, then Emeraid for Carnivores. Bats with fright paralysis or very nervous will not feed; need to have patience, 40 minutes with a frightened Brown long eared once before he would take a mealworm innard. Another long-eared, not self feeding, was reluctant to take a motionless mealworm from tweezers, but snatched it when it was gently wiggled, responding to movement. When bat starts to 'snatch' at innards, try it with a small deheaded or moulted white mealworm.

Horseshoe bats are unable to eat from bowls on the floor – very difficult in captivity – consult experienced carer.
In times of mealworm shortage (an annual problem in the last few years!), I have tried waxworms, which bats will eat, but they are a very high fat content and escape readily. Standard waxworms for Serotines/Noctules and mini waxworms are correct size for pips but they do not like the silk they spin and ignored them, they escape easily. Buffalo worms are smaller than minis and very active, pips seemed to prefer mealworms to Buffalo, possibly difficult to catch or frightened by activity, they also escape readily. Silkworms were generally refused. Crickets have a strong kick and spiny legs, escape easily, and were not a success with my bats.

The aim is to get them self feeding on mealworms of suitable size, start with shallow small dish and then gradually move up to deeper dish which mealworms cannot escape from. Seee appendix for further information on feeding.

HANDLING

- As little as possible
- Capture, unhooking toes by lifting up
- Gloves or cloth and mask
- Be gentle
- Try not to restrain
- Recognise fear behaviour
- Fright paralysis

Again – wear gloves to avoid bites. Cloth or leather gloves, you may prefer to use a cloth also for larger species. Latex gloves (bats dislike feel and dust on latex gloves, cannot grip) will protect against fluids but not bites. Mask recommended to avoid risk of passing on Covid 19 to them. Most of our bats (except Horseshoe and Brown long-eared to an extent) are crevice bats and feel more secure in dark enclosed space inside a cloth and stop struggling (except Brown long-eared!). They have something to cling to and feel safe. Soft cloth like old cotton teatowel ideal. They can get their nails caught in loops on towelling. Serotine defensive display – wide open mouth, back arched – beware of bite if fingers near head. Bat eyesight (black and white) is not brilliant and their echolocation is fairly focused so approach quietly from behind if trying to catch a lively one. A frightened nervous bat with ears down and wrists either side of head is immobile and will not feed; let it relax before trying again.

Do not hold by wingtips or by scruff of neck, nor by pulling wings behind back; can damage wings and shoulders. Hold with bat sitting on palm of cupped hand, with thumb gently resting on upper back area. To open wing, gently push elbow towards body, which tends to cause wrist to move out. Put gloved forefinger on wrist, slide it between wing and head and use 2nd/3rd and little fingers to unwind wing fingers which are folded under the wing. Support wrist with 1st/2nd fingers and use the thumb and little finger on either side of the wing tip to open the wing. Always support the wrist as the bat may wriggle and injure itself if only held by wingtip, and keep wing in same plane as body, ie don't pull it back. With a large or wriggly bat, in order to safely open wing put it on cloth on flat surface with hand restraining it and gently SLIDE the end of eg a paintbrush, between wrist and head, move wrist out about 45 degrees away from head and then open wing. Do not just insert paintbrush or may poke bat's eye or face.

REARING BAT PUPS

Expanded advice sheet available on request

- Warmth –to digest food and grow
- Food - varies with time
- Weaning
- Cleaning
- Need company – social animals

Some experience is needed before taking on bat pups, best to pass on to experienced carer until confident. Contact me if you want to learn more and I will send a more comprehensive baby care and rehabilitation instructions. They need feeding every 3-4 hours initially, especially if they have been without food for several days, as is usually the case. Need to start weaning on to mealworm innards at about 3 weeks old and it is very important that they are given space to exercise/play and wing stretch from the start. Give them an opportunity to fly from 3 weeks, preferably over soft substrate for initial crash

landings eg duvet, several times a week. Normal bats will have innate instinct to try to fly. A bad fright can put them off. Many come in psychologically disturbed as they may have been traumatically separated from their mothers and been lost for days. They have feelings like other young mammals including us, and need comfort and appreciate gentle handling and company.

On arrival assess the bat's age, from forearm length, whether eyes open (3 days or more) fur length and fur colour (juveniles greyer than adults). See chart from Manual with baby pictures and page 2 of annual bat casualty record. Aging - with juveniles can see if light passes through cartilage where bones are growing at joints. Hold open wing up to light source. Check face for asymmetric white swollen nose glands. In 2020 several young pups came in with infected oil glands. Antibiotics undesirable for pups however, slowly, gently rolling a stainless steel rod ~1mm diameter from below the eye towards the nose (under the microscope) eased most of the pus out and they started feeding and clearly felt much better. Sometimes needed second treatment. Probably affects echolocation and calls so may not have been recognised by mother.

Assess how starved it is and therefore how retarded its development is. Warm it in your hand or in incubator and offer water and then feed.
Feed babies with made up Royal Canin Baby Cat formula best, or goat's milk with 5-10% Philadelphia cheese in an emergency; older ones can have mealworm innards too. Zolcal F may need to be given to prevent rickets but the dosage is minute or will kill the bats painfully - the vet David Holah recommends 0.1ml per 10 ml of water, and only 0.2 to 0.3ml of this mix to be fed twice a week, spread over several feeds. Be careful not to overdose. They will need to be hand fed this to ensure correct dose, even if self feeding. The weekly dose of 0.5ml at this dilution equates to 14 drops from my pastettes so I give them one drop in morning and evening. Check your drop sizes before doing this though Equipment - paintbrush or dropper, but for babies the ends are too big so I use a pastette or extendable glue tips.

Monitor weight and forearm length; should increase daily. Pups less than 4 or 5 days old often develop rickets (Metabolic bone disease MBD) and are then unable to be released, if the nutrition unbalanced. Symptoms of MBD include bent wing bones with swellings, very painful, cry when touched, bones eventually shorter than should be and short lifespan. Essential to use the Vitamin D/Zolcal F supplement The very young are sometimes unable to digest goats milk/Royal Canin Baby Cat especially if they have not had much of their mothers collostrum and milk and although they eat a lot, they do not put on weight; their droppings are white as the milk goes straight through and they slowly and painfully starve to death. Sometimes kinder to put them to sleep if that happens but always accept them from the public and judge each one individually. Sometimes if they fail to digest the milk I try them on innards early and that has saved them. Monitor the dilation of stomach carefully while feeding, if they over-eat and it becomes distended they can suffer from bloat and not digest it quickly enough; it ferments and they die. Better to offer many small meals, and best not to let them self feed for first few days after they come in, in case they overindulge. If you turn a young pup over you can see the white milk in its stomach. If they get cold they fail to digest the milk properly. Use tiny artists paintbrush, with another to replenish it with milk as they bite hold of it. Or try tiny pastette. Wrap in soft tissue while feeding to prevent dribbled milk going on to tummy and hold slightly head-down, for same reason. Illuminated magnifier useful to feed pups. Try not to get any mealworm or milk on nose; they can aspirate and either choke or nose blocked. Listen for sneezing or clicking

Use an incubator for warmth, starting at about 35ºC for very young, gradually declining to ambient for 4-5 week old. They need the company of other pups, species unimportant (but keep serotines and noctules apart from smaller species especially when adult). Need to wash faces, tummies and ears after feeding, with wet cotton bud. They soon take milk themselves. They need small shallow dishes (milk bottle tops, plastic lids, even beer bottle tops or plastic tablet blister caps to prevent them getting milk all over their fur) regularly changed as milk goes sour quickly in the warmth and always make sure they have fresh water available too. They frequently walk or sit in milk container necessitating extensive regular washing. With several pups I found it easier to give milk in beer bottle caps, - too small to sit in! In desperation I also tried the 1cm plastic blisters, which came with tablets. These worked very well, pups stayed clean but I had to refill almost hourly. When I have a lot of pups (eg 20+) I find it easier and quicker to hand feed using a tiny pastette or glue tip extension to syringe, rather than to wash them all after they self feed. Frequent washing damages their fur and results in fur loss. From about 2 weeks old start hand feeding innards, freshly squeezed from the mealworm, having removed the dark gut line, twice a day when weaning in addition to milk still being available to self feed from or given by pastette. Or mix innards with milk and feed with a paintbrush. However, this mix goes off in minutes so do not leave in cage or it may put them off it. They readily take innards squeezed from the mealworm. Ensure no mealworm or milk gets on nose or they can aspirate and choke or the nose becomes blocked making breathing and eating more difficult. Listen for clicking and sneezing. Difficult to remove blockage except with a pin under the microscope! After 4 weeks try them with soft white (freshly moulted) small whole mini mealworms. By this time they will be growing adult teeth and should be able to chew them.

Some pups which were lost and hungry for several days can be a week or more behind in development eg of teeth and take longer to grow and wean etc compared to pups which had no such deprivation, so be patient with them. Insects contain large amounts of fat and protein and are low in carbohydrate.
In an emergency moist dog or cat food, cream cheese or mashed eggs can be tried if they will take it. Hills A/D diet – open and freeze small portions in ice cube tray.

It is important to check their bottoms daily, and if necessary to wash them with a cotton bud with warm water, and dry. Their mothers would wash them normally when she feeds them so if they are not passing droppings gently stimulate the anus with a cotton bud. Starved pups and pups on milk may have pasty droppings or diarrhoea which can stick to fur and toes and go hard preventing further defecation, causing distress and possibly death. It can also lead to fur loss. Clean faces and chins after feeding, also check and clean their thumb and toenails, a build-up of hard droppings or milk which dries as a hard transparent layer, can prevent climbing and can distort the growth and development of toes and nails.
From 3 weeks or so, they will start to do ‘press-ups’ and wing stretches and flapping, especially after feeding. At this stage they can be put on a cloth covered box on something soft such as a duvet or carpeted floor and given the opportunity to flap and jump off if they wish, for short periods each day.
From 6 weeks old try to get them wholly onto mini mealworms as they need to be weaned and self-feeding before rehabilitation. Buffalo worms are slightly smaller than minis and are an option for juveniles, especially when trying to get them to feed themselves. However, they are more lively and escape readily.

REHABILITATION OF ORPHANS

Expanded advice sheet available on request

- Flight cage essential, minimum of 3 weeks
- Need to practice flying skills,
- Development of echolocation,
- Need to learn to socialise,
- Need to find safe roosts
- Need to be well grown and of good weight
- Release in suitable environment, suitable weather, at dusk

Do not attempt to release hand reared pups or juveniles without facilities for achieving the above, or they will die. Pass on to someone with the facilities and experience as soon as weaned and self feeding on mealworms. They will need to have perfect wing bones, no metabolic bone disease, self feeding and able to fly to some extent first. They need to be in the flight cage for a minimum of 3 weeks, constantly monitored and weighed daily and flying skills assessed and released by beginning September so they have time to practice life skills and find roosts. Ideally they need to be installed into flight cage (my 'Batzebo') end July or beginning August latest. See RSPCA paper 'Post release survival of Pipistrelle bats' in refs. I leave them in the 'Batzebo' for the whole period, only bringing in if excessively hot, very wet or windy weather is forecast. Every morning I round them up, assess their condition and returned them to their bat cage in there to access mealworms, unzipping this cage shortly after dusk. If underweight I bring them indoor for a day or so to fatten up. Sussex Bat Group rehabilitation with 'Batzebo'; further information available on request.

MUMS WITH PUPS

Sometimes grounded females coming in winter or spring and put on a warming mat to help heal their injuries, give birth in captivity before they can be released. They are excellent mums, give them extra warmth and good quality, well fed (veg etc) mealworms dusted with Nutrobal three times a week and a regular (alternate days) dusting of Babycat milk powder on them as the mother bat's calcium requirement is high. Inadequate calcium could lead to eclampsia and death. If mum is releasable keep her fit and practice flying daily, letting baby see her, let baby fly from ~20 days old. Fly both daily, there is a short window of possible release when baby is between 4-6 weeks old when it is strong enough to fly with her and totally dependent still and will follow her back to the roost. Any later and the pup will be more independent but not self-feeding and likely to be lost on release. If mum is not releasable then baby needs to be weaned off her at 5-6 weeks and taught to self-feed before adding it to other orphans for rehabilitation.

OVERWINTERING BATS

If bats come into care from November onwards it may be necessary to overwinter, for release in spring as the weather is often poor and they should already be in hibernation. If they are perfectly healthy and their hibernation roost is known to be safe and intact they can be released nearby if the weather is OK. But if roost has been damaged or destroyed, I wait until March to release them. In recent years early winter has been mild and if there is a window of several days of calm, mild weather they can be released. Generally I do not release in January or February. If the bat has injuries or is weak or starved, it will need

warmth to help heal and feed and should not be released over winter. If it is healthy and not injured then keep it cool once self feeding (unheated room, see hibernation section). If it is female keep her cool (unless injured) or pregnancy may be brought forward and out of season pups will result. They will need extra flight exercise in spring to get fit again before release. Try to fly them about once a week (except in deep hibernation which is unlikely in the domestic home) to keep them reasonably fit. When exercising them they need to warm up, may sit for 10+ mins shivering before looking around and flying, don't rush them. They will fly when ready, if very reluctant they may have something wrong still.

RELEASE OF ADULT BATS

- Where they came from, some exceptions (Migrants, roost loss, location unknown, or rehabilitated orphans)
- Must be fit and able to fly strongly for 15 mins minimum
- Must be able to take off from ground
- Must be of good weight for that species
- Condition good ie healthy, well furred
- In good weather conditions, at dusk
- Time of year (not winter)
- Outside roost if known or where found if suitable

Release lactating females ASAP. Release all bats as close as safely possible to where found.
Before release, check for sustained flight, but large bats and fast flyers will not fly well indoors as rooms rarely large enough, eg Leisler, Noctule, Serotine, use long landing or friend with larger area.
Check their condition will not affect feeding, echolocation, roosting etc.
Release at good weight but not too heavy – bats can over-eat, especially Noctules and Serotines, sometime Brown Long-eareds. Consider weight in light of time of year (need to be heavier prior to hibernation) possible pregnancy (heavier), females often slightly heavier than males.
Taking groups of bats into care – for instance because of roost destruction - provide alternative roost nearby if possible as bats faithful and familiar with their known territory. Get useful information by sexing and weighing bats first.
Release migrants/vagrants and those from unknown roosts in suitable habitat.
If bats come into care in winter I prefer to keep until spring unless the roost still exists and the bat is unharmed and weather is mild. If roost lost or bat recovering from injury best keep until spring.

PERMANENT CAPTIVITY – QUALITY OF LIFE

- Can it feed itself?
- Groom itself?
- Normal Bat activity?
- Resources available
- Education/PR bat
- Companion bat
- Need possession licence
- Research

Problems encountered with long term captive bats include toe nails, hair loss and ‘sticky wing’ (a build up of yeasts on wing membrane) – seek advice from more experienced bat

workers, hair loss can indicate stress, or nutritional imbalance or inadequate housing. Ear tip swelling and infection of bacterial origin and possibly stress related – keep cage and bedding clean, disinfect containers, try bathing affected area in salt water, or honey, or Pevidene or applying Dermisol cream. Sometimes rather stubborn to clear up, check diet is adequate, housing is clean, free of stress, give companion, toys etc.

Mating – does occur and some very rare births. Some carers keep sexes apart to avoid unwanted pups.

Monitor the fur condition of long-term or permanent bats. It should be shiny and thick indicating the diet is OK. Also check their teeth – they need fibre to keep them clean. If toenails become short one possibility is dietary deficiency. If getting fat then reduce the number of mealworms offered.

After time in captivity on soft materials their toenails can grow long and if they appear to be having trouble moving around the mesh and difficulty unhooking their feet then clip their toenails, under a lens or microscope only 1mm needs to go and avoid damaging the quick. Try bricks or sandpaper on floor of cage. If they spend a lot of time on floor and have difficulty climbing, the claws may be worn or stunted, or they may be overweight; look to mealworm diet and Nutrobal supplement.

Many carers suggest it is important to give them a routine to avoid stress, such as always feeding and cleaning in the evening when they would become more active normally. Some also suggest having a low light on during the day to maintain body clock rhythm although I have not found any 'drifting' in my bats even after years in captivity and it may be more important with fruit bats which are active during the day.

Mine have also been very useful to assist research, for example DNA analysis for serotine population structure, collecting droppings for DNA/covid analysis, urine to test for corrosion chemicals when roosting in churches among many projects.

ENVIRONMENTAL ENRICHMENT

- Social enrichment – bats need company
- Toys! Toilet rolls, half coconut, small rubber balls
- Dietary and foraging – suspended mealworms, food variation
- Furnishings- branches, washable/disposable
- Acoustic? Talk to them
- Olfactory? Probably not in case it offends their acute sense of smell and scent marking. I use low-scent Ecover washing powder on their towels etc.

It is important to avoid boredom, especially intelligent active Noctules and Leislers. Try the cardboard roll inside toilet rolls or kitchen towel for larger bats, half a coconut shell with 'door' cut out, small silicon rubber balls, fir cones. Whatever is used needs to be washable or replaceable. They need company – and space to escape from bullies. A choice of roosts and variation in food; put some small moths or Crane flies in for extra stimulation sometimes. I have seen some of my bats play with small silicon balls (hedgehog balls) especially a Leisler. My Noctules sometimes squeak with excitement or pleasure as they take a proffered mealworm and greet me at the entrance at feeding time.

PUBLIC RELATIONS BATS

- Long term care and housing important

- Avoid using bats with fur loss or stressed
- Avoid using bats due for release, or undergoing treatment
- Possession Licence required
- Bats for talks, education, but not in winter
- Public not to handle
- Wear gloves in public
- Never leave untended (theft and children)
- Avoid noisy events and limit time bats exposed to view
- Current recommendations: don't take out of cage, have mask material over mesh

Education bats do a massive amount of good, visiting homeowners, builders, schools, groups and events. Long-term captive bats are very useful for education, taking to talks, used for handling training and species recognition. Bats for release should not be used for these functions, however long-term bats are more accustomed to being handled and being around humans so will be less stressed. It is best not to handle bats for these events but show in plastic pet homes with towel over when not being shown. If holding in the hand for small group, (not recommended since Covid 19) always wear gloves and don't let the public touch them, avoid lots of noise and bright lights, photographs should be without flash, don't open wings –causes extra stress to the bat and it might escape or bite and give a bad impression.
Only take long-term bats to educational events, not those to be released and avoid winter (Dec, Jan, Feb) when they are hibernating or semi-hibernating, to reinforce message about not disturbing hibernating bats. It is stressful for them. Don't have them on show in the box for long at a time; 15 minutes is plenty long enough then cover them up again and be sensitive to signs of distress. Take two boxes of bats to long events so one can rest. When showing to children, I prefer small groups of children at a time, and ensure they know the importance of being quiet round bats and not tap the box. When showing in the hand, wear masks to avoid passing Covid 19 on to bats, but recommendation now is to keep them in box with cover over the vents to avoid passing virus to the bats.

<u>HIBERNATION</u>

In the wild
- Body temp down to 6ºC
- Breathing 100-600/min down to 1/min
- Periods of apnoea 2-20 mins
- Heart rate 400/min to 20/min
- 37,000 in Polish underground WII tunnels

In captivity:
- Temperature (10ºC)
- Extra water to increase humidity
- Not if injured or weak
- Minimum disturbance, but still need regular cleaning
- Always food and water available

Provide appropriate temperature, ideally around 10ºC. Always have fresh water and mealworms available, extra water bowls either in or outside cages to increase humidity. Leave relatively undisturbed apart from checking food, water and occasional changes of kitchen towel and cloths. If cold may not eat for days or week. It can take 20-30 minutes for a bat to warm up from hibernation and using a week's worth of fat stores in the process

so important not to disturb wild bats in hibernation. Don't put a weak or injured bat into hibernation until healed and well. If they are not self-feeding they will need to be woken and warmed every 2 days and given a feed. Sometimes bats disturbed in the wild in winter and taken into care just want to go back to sleep before learning to self feed. Weigh these regularly and if weight falling, feed more regularly or bring into room temp and hand feed daily.

BEFORE UNDERTAKING CARE - summary

- Check valid rabies jab if necessary
- Must wear gloves when handling bats
- Locate nearby experienced carer for advice if necessary
- Get handling experience with bat carer
- Locate cooperative vet
- Learn behaviour and appearance of healthy bat
- Understand roost requirements and biology of each species
- Sign up with BCT and local bat group care coordinator
- Gain experience before taking on pups or long-term bats
-

REFERENCES

Might need to copy and paste link into browser

Bat Care News: Bat Rescue Manual, Maggie and Bryan Brown

BCT Bat Care Guidelines 2nd edition (Please Note: we have reservations on housing and 6 months isolation recommended in this publication)

Captive care and Medical Reference for the Rehabilitation of Insectivorous Bats, Amanda Lollar and Barbara Schmidt-French, 2002 – Out of Print

Bats in Captivity, Volume 1 Biological and Medical Aspects

- Susan M. Barnard (Author)
- Publisher: Logos Press; 1 edition (16 May 2007)
- ISBN-13: 978-1934899038
- Online http://www.basicallybats.org/onlinebook/COVER.htm

Bats in Captivity, Volume 2 Aspects of Rehabilitation

- Susan M. Barnard (Author)
- Publisher: Logos Press (1 April 2010)
- ISBN-13: 978-1934899052

Bats in Captivity, Update on Diagnosis and Treatment: https://batworld.org/wp-content/uploads/2011/06/DifferentialDiagnosticChart.pdf

A Guide to British Bats [Wall Chart]

- Kate Jones (Author), Jon Russ (Illustrator)
- Publisher: Field Studies Council (20 Dec 2001)
- ISBN-13: 978-1851538751

The Bats of Europe & North America,

- W. Schober & E Grimmberger
- Publisher: TFH Publications; Expanded edition (8 Jan 1998)
- ISBN-13: 978-0793804900

British Bats - Collins New Naturalist Library (93) - [Paperback]

- John D. Altringham
- Publisher: Collins (3 Mar 2003)
- ISBN-13: 978-0002201476

Handbook of the Bats of Europe and Northwest Africa

- Christian Dietz (Author), Dietmar Nill (Author), Otto Von Helversen (Author)
- Publisher: A & C Black Publishers Ltd (15 Sep 2009)
- ISBN-13: 978-1408105313

The Bat Workers' Manual [Paperback]

- Tony Mitchell-Jones (Editor), A.P. McLeish (Editor)
- Publisher: Joint Nature Conservation Committee;
- 3rd Revised edition (Jan 2004)
- ISBN-13: 978-1861075581
- http://jncc.defra.gov.uk/pdf/batwork_manualpt1.pdf

WWW Addresses and Publications

- Bat Conservation Trust www.bats.org.uk

- Sussex Bat Group www.sussexbatgroup.org.uk
- www.bio.bris.ac.uk/research/bats/britishbats/virtualkey/intro.htm
- www.basicallybats.org/
- http://www.batcon.org/
- http://www.bats.org.uk/pages/about_bats-white-nose_syndrome-586.html
- Post release survival of pipistrelle bats:
- I have pdf of Post release survival of hand-reared Pipistrelle bats, just ask, see also
- http://www.ufaw.org.uk/downloads/awj-abstracts/v21-1-serangeli.pdf
  http://www.ufaw.org.uk/downloads/awj-abstracts/v21-1-kelly.pdf
- http://wildpro.twycrosszoo.org/S/00Man/MammalHusbandryTechniques/UKMHusbIndTech/Cas_Accom_M_Bats.htm
- Illustrated identification key of the bats of Europe, Dietz & Helversen:
  https://www.chiroptera.se/documents/Illustrated_Key_to_European_Bats.pdf
  https://www.researchgate.net/publication/274838308_Illustrated_Identification_key_to_the_Bats_of_Europe_-_complete_pdf

- https://cdn.bats.org.uk/uploads/pdf/Resources/Rabies-documents/Supplement-to-GPG-for-Bat-Rehabilitators_August2020.pdf?v=1596809717 - bat rabies advice from Bat Conservation trust

- Recommendations to reduce the risk of transmission of SARS-CoV-2 from humans to bats in bat rescue and rehabilitation centres
  https://www.iucnbsg.org/bsg-publications.html

General Wildlife Care References

Practical Wildlife Care
- Les Stocker MBE
- Publisher: Wiley-Blackwell; 2nd Revised edition (26 July 2005)
- ISBN-13: 978-1405127493

BSVA Manual of British Wildlife Casualties
- Elizabeth Mullineaux (Author), Richard Best (Author), John E. Cooper (Author)
- Publisher: British Small Animal Veterinary Association (1 April 2003)
- ISBN-13: 978-0905214634

Other Information
- www.livefoodsdirect.co.uk - for mealworms
- https://www.batbox.com - Bat Detectors and Software
- www.nhbs.com/ - Wildlife books
- www.alanaecology.com/index.html - Wildlife Equipment

Contact information
- Sussex Bat Group Bat Rescue Coordinator: Amanda Millar
  chair@sussexbatgroup.org.uk
- Bat Conservation Trust UK Care Network Coordinator

Appendix 1. Feeding Bats by Amanda Millar

It is a bit difficult to be categorical about how much they eat as it depends on species, age, size of mealworm, and degree of starvation, time of year. etc. but what I normally do is this:
When an adult bat comes in, once it has been warmed on a warming mat or in the hand, I usually feed and water before treating; offering water first. If in a starved or weak condition (see section on starved bats pg 11), Emeraid is perfect they only need to lick it and seems to have a very attractive smell to bats. Starving bats probably cannot or should not, take many mealworms at a sitting so I may offer it mealworm innards every couple of hours for the first day limited to 2-3 regular mealworms a session in the first half day to avoid over-eating, gradually increasing quantity. Then 3 or 4 sessions the next day increasing the number of innards, then dropping to 2 feeds, by which time hopefully it will be feeding itself, in which case I replenish a bowl full of mealworms in the late afternoon to eat ad lib. Feed at regular times to reduce stress which can lead to immune system reduction. You soon get to know how much they eat, if the bowl is empty in the morning then give them a bit more next time, ideally so there are just a few left, then you know the bat has had enough. This also applies to a cage full of bats I am overwintering or juveniles I am rearing.

The injured ones, and ones just in for a few weeks, I house separately and I give minis to most of the species. Noctules and Serotines would appreciate regular mealworms. When hand feeding (not starved), feed them as much as they will take, then they might have a rest for a few minutes and then may take some more. If I am still feeding by hand and it is a bat over its initial problems and in reasonably good condition and I am a bit busy or out first thing in the morning, then I will sometimes give them just the one evening feed (when they are usually warm and receptive) but make sure they can take as much as possible. The problem with feeding in the morning is that they are usually cold and sleepy and you have to sit for 15 minutes or more waiting for it to warm up enough to feed. Injured ones on a warming mat are much quicker to feed.

For a pipistrelle, a daily consumption might be in the order of 20 to 30 minis, middle sized species a bit more and serotines perhaps 20 or so regular m/w. Serotines and Brown Long-eareds can sometimes eat so much and put on so much fat that they cannot fly (more of a problem in autumn/winter). I have some BLE that I need to exercise rigorously to get them back into shape for release; they don't get much exercise over winter, as I don't fly them when they are normally hibernating.
Some bats are clean eaters and will polish off the whole mealworm, some are messy and eat half a mealworm and then waste the rest, so they will need more. Some will go to sleep in their food bowl and urinate on the remaining mealworms.

Best rule of thumb is when hand feeding offer them as much as they will take in say 20 minutes, (except pups which can overeat and die or starving bats) they will make it clear when they have had enough, but give them a chance to let it settle and then offer more, and if feeding themselves, enough so there are just a few left over. It is my impression if a bat is taking less than 8-10 minis a day it cannot maintain its weight. In the wild they will take a small insect every few minutes perhaps spread over several hours, with gaps between, rather than the whole lot at one sitting and potentially consume a third of their body weight. My long term ones seem to have snacks in the day too, I go in and find one in the food bowl. Best if they can feed themselves asap. Prolonged feeding with innards requires face washing, possible fur loss on chin and they will not get the necessary fibre

and roughage to clean teeth and pass normal droppings. I had one whiskered for a year and he never learnt to feed himself! Others will pick it up in half an hour, I start with squeezed regular innards and as soon as they start grabbing the body, I offer them whole (head crushed) minis, sometimes the white soft moulted ones, all the while holding them over the bowl, so they can see them and see where their food is coming from, and often by morning I find they have helped themselves. I initially put the bowl up against the hanging cloth so that they can crawl down and feed while still confidently clinging to the cloth. Add a pinch of Nutrobal onto their mealworms once a week, for the calcium and minerals. A wild bat could eat a third of its body weight a night which for a pip would be about 1.75g or 40 mini mealworms. A flightless pip would probably eat 25-30 mini mealworms.

Sometimes if I get one in winter eg disturbed during building work, and unharmed but probably needs overwintering it is in hibernation mode and if its weight is normal for that species and has a healthy pad of fat on its back between its shoulder blades, then do not be unduly concerned if it refuses to feed but just hangs up in the same place and sleeps, put it in a cool quiet place with a bowl of mealworms available (and water of course) and just check it once a day. When there is evidence that it has been active during the night, try warming it up and offering it innards and get it feeding itself. In winter the m/w consumption is sometime half to a third the summer intake. When we had a cold spell of minus 7 outside and about 10 degrees in my bat room they were very quiet for over a week.

For variety, waxworms could be offered sometime but they can be rather large for pips and high fat content. I have tried crickets but they have tougher skins and the spiny legs make them potential dangerous. I found most of my bats ignored them, they escaped and were found round the house for weeks after and had one chirping in the garage for several months. Buffalo worms are smaller, hyperactive relatives of mealworms, sometimes taken but escape readily, and I think pips much prefer mealworms to them. They all disliked silkworms.

Appendix 2 Looking after mealworms by Amanda Millar

I order my mealworm from Livefoods Direct who deliver the next day. I prefer to keep them on my food for a week to clean out their guts from whatever material they were reared on before feeding them to the bats.

I get minis for pips, Natterers, and Whiskereds. Brown long-eareds will take minis or small regulars and Serotines and Noctules get regular mealworms. In warm weather I keep the regulars in a fridge on its warmest setting (5-6 degrees?) to delay the development of the mealworm larvae into pupae, but bring them out every couple of weeks for a feed and sieve. Remove any beetles which hatch as they produce unpleasant smelling hydroquinones which may be absorbed and be toxic to bats.

I keep them in cat litter trays no more than 1” deep and on a regular basis I sieve them. The ones that I am currently using to feed the bats live in sieve trays obtainable from insect suppliers. If not sieved regularly, dust mites build up in the tray which can crawl out to surrounding surfaces leaving an unpleasant sticky grey crawling dust, which can cause sneezing and allergies.

The mealworms need to be fortified by gut-loading with vitamins and minerals before they are given to the bats. The mealworms are given oats, organic carrot slices, an occasional slice of apple, sweet potato or organic green cabbage, broccoli stalks in their trays, taking care not to have too much moist vegetable at any one time because if the mealworms and their frass gets damp the mealworms can die. The tray I am using to feed the bats also gets a handful of kitten pellets to provide the amino acid taurine which cats and bats need to get from their food and some indoor guinea pig pellets for vitamin C, and Vitamin D. This tray also gets only enough oats and veg which the mealworms can eat in a day as I like to feed clean mealworms to the bats. If the bats encounter a bit of carrot they fling it across the cage in disgust. Another Sussex carer feeds her mealworms on crushed wheatabix and dried rabbit food. I suppose some people might say if they have to rummage around looking for mealworms it gives them some activity. But I think it makes it more difficult to pick out dead mealworms etc.

When putting the mealworms in the bowls for the bats, once a week I put a pinch of Nutrobal on the mealworms (per two bats) to provide calcium and minerals. Too much Nutrobal causes diarrhoea in the bats.

The remains of mealworms, bat droppings and frass left in a bowl in the morning, I put aside for sieving and sorting to rescue the live mealworms.