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Biosecurity and Personal Equipment for Safe Handling and Restraint of Animals

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When handling animals it is important that your own personal safety is top priority, yet at times this can be something that is overlooked. When dealing with large animals, particularly cattle and horses, events can happen that put us at great risk and many people have been injured, or even killed, by complacency as people are in a hurry to get things done. Preparation, suitable equipment and good facilities are key to providing a safe environment, not only for yourself but also the animals that you are handling. A good knowledge and understanding of the principles of biosecurity and disease transmission are also important, in order to prevent disease spreading from animals to humans, and also from animals to animals.

1.1 Transmission of Disease

There are many ways in which disease can be transmitted and this is largely dependent on the pathogen involved. Pathogens need to be able to leave an infected host, survive in the environment, enter a susceptible person or animal and then replicate in the new host. The term '*transmission cycle*' is often used to describe this process and the cycle can either be '*direct*' or '*indirect*' (Table 1.1).

1.1.1 Zoonoses

Many pathogens are specific to humans and some specific to animals; however, there are pathogens that are capable of transmitting disease to both humans and animals. A pathogen capable of causing disease from an animal to a human is known as a zoonosis. Knowledge of these pathogens and the diseases that they cause is essential in order to prevent the transmission of disease between the animals we look after and ourselves.

Ringworm is one example of a zoonotic disease. The disease is caused by a fungus and is common in many species, including dogs, cats, horses and cattle. Many animals that are infected show no clinical signs of the disease. People will become exposed by direct contact with the infected areas on the animal and will then show clinical signs (e.g. small

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Table 1.1 Transmission routes.

Direct transmission	Indirect transmission
Direct contact	Food or water
Secretions	Aerosol
Blood	Animal vectors
Urine or faeces	Fomites
Droplets	Medical devices and treatments

circular areas of reddened, inflamed skin that itch) on exposed areas (i.e. hands, neck, lower arms and face). This is prevented by careful observation of the animals that you are in direct contact with and also good personal hygiene.

There are many other examples of zoonotic diseases but it is not the intention of this chapter to provide details on these. What is important is that handlers of animals have a good basic knowledge of some of the more common zoonotic diseases that they are at risk of being exposed to when working with different species. Some of the common zoonotic diseases that handlers should be aware of are outlined in Table 1.2.

In all cases, the risk of disease transmission can be reduced by using a good handwashing technique with soap and water after handling any animal. Wearing the correct personal protective equipment (PPE) is also important.

Table 1.2 Examples of zoonotic diseases (Hiber and Darling, 2011. Reproduced with permission of John Wiley & Sons.).

Disease	Route of transmission	Prevention
Brucellosis	Direct contact; aerosol	Vaccines for sheep, cattle and goats; PPE; good hand hygiene
Campylobacter	Faeces; bodily discharges; contaminated food and water; swimming in lakes; flies can be a mechanical vector	Good hand hygiene and disinfection protocols; control of flies and rodents; prevention of faecal contamination into water and feed sources
Leptospirosis	Contaminated food, water, equipment and surfaces; spread in aerosolized urine or water; direct contact with contaminated urine	PPE; face shields should be worn if there is a risk of urine splashing; good hand hygiene; vaccines for some species, e.g. dogs and cattle
Toxoplasmosis	Ingestion of infected animal tissues or contaminated water and food; direct contact with infected faeces and soil; inhalation of aerosols	Disinfection; pregnant women should be careful when handling raw meat and avoid contact with cat faeces; wear gloves when cleaning out cat litter trays; good hand hygiene

1.1.2 Carriers

With some pathogens the host does not always show obvious clinical signs of disease. In these cases, the host acts as a '*carrier*' for the pathogen and will be capable of spreading the disease to susceptible animals.

Strangles is one example of a disease that has a 'carrier' status. The disease is caused by bacteria and is common in horses. It is important to note that with this disease there is no risk to humans becoming infected. However, strangles easily transmitted to other horses and, therefore, if you are in contact with an infected horse you must ensure that all necessary precautions are taken with regards to reducing the transmission of the disease. This will include isolation of the horse and putting biosecurity and barrier nursing protocols in place.

1.2 Infection Control

The majority of the time that people spend working with animals is with those that are healthy. However, as previously mentioned, it is not always possible to detect that the animals we are working with are ill. Therefore, it is important that handlers are aware of the methods by which the spread of disease can be prevented and controlled.

1.2.1 Biosecurity

Whereas biocontainment aims to reduce/prevent the movement of infectious diseases within a facility, biosecurity aims to reduce/prevent the introduction of new diseases into a facility from an outside source.

There are four basic principles to biosecurity:

1) selection of animals from known sources with a known health status – of particular relevance to farm animals;
2) isolation of new animals on arrival at the facility;
3) movement control within the facility;
4) sanitation using disinfection of materials and equipment and good personal hygiene.

It should be remembered that biosecurity is not just about protecting the health of the animals in your care but also about protecting your own personal health. It must also be noted that disease in animals does not always show obvious clinical signs, for example animals in the early stage of a disease or carrier animals.

1.2.2 Effective Cleaning and Disinfection

It is important when working with animals that we do so in as clean an environment as possible. Obviously, the degree to which this is done will depend to some extent on the species that we are working with and also the environment in which we are handling the animal. There are some general points to note (Dvorak and Petersen, 2009).

- *Faeces*: try to limit the amount of faecal contamination that surrounds the animal you are working with, for example always pick up faeces as soon as the dog defecates (if on a walk) or if noted in the kennels. Obviously, in a farm environment this is much harder to achieve; however, cleaning protocols should be in place and heavily soiled bedding should be removed on a regular basis.
- *Physical cleaning*: the physical removal of visible organic debris in the environment or on surfaces that you are handling an animal on is important. This may involve sweeping, brushing and scraping, depending on the organic material that you are dealing with. For example, sweeping the floor of the area where you are going to examine a horse if in a yard.
- *Sanitation*: this involves the use of hot water and some kind of detergent. These help to remove organic debris that can prevent disinfectants being effective. This has been shown to remove over 90% of bacteria from surfaces. Particular attention should be paid to floor drains and corners, as these are where debris can accumulate. A mop and bucket or bucket and washcloth with hot soapy water can be used for small areas and it is important that the water is changed several times during the process. For larger areas, mechanical washers that will remove organic debris can be used. Some of these work under high pressure to physically remove debris, whilst others produce steam to aid with removal. Care needs to be taken with high pressure machines as this method can aerosolize, and thus potentially spread pathogens. All surfaces should be rinsed with clean water, as some disinfectants will be inactivated by detergents. Personnel should also ensure that they are wearing the correct PPE when undertaking cleaning; what is worn will depend, to some extent, on the environment in which you are working.
- *Disinfection*: which disinfectant to use will very much depend on the microorganism involved, as each varies in its ability to persist in the environment as well as in its susceptibility to a particular disinfectant (Table 1.3)

When working with any kind of chemicals you will need to ensure that relevant legislation is followed. In the United Kingdom, the Control of Substances Hazardous to Health (COSHH) 2002 is the law that requires employers to control substances that are hazardous to health (HSE, 2016a). Many of the disinfectants that are available fall under COSHH guidance and it is important that risk assessments and disinfection protocols are produced. The legislation also governs that staff are provided with training and instruction on their use and that staff health is monitored.

1.3 Assessing the Risk

Whenever you are working with animals it is important to assess the risk. Risk is defined as 'a situation involving exposure to danger'. Under the Health and Safety at Work Act (1974) in the United Kingdom, an employer is responsible for ensuring that all reasonable steps are in place to provide the employee with a safe working environment. The employee also has the responsibility to ensure that all procedures that are in place are followed.

Therefore, a risk assessment needs to be carried out to ensure that all measures have been taken to prevent an incident from occurring. In order to write a risk assessment the

Table 1.3 Physical and chemical disinfection (Dvorak and Petersen, 2009. Reproduced with permission of John Wiley & Sons.).

Method	Type	Examples
Physical disinfection	Heat	May be dry heat (flame, baking) or moist heat (steam, autoclave); generally moist heat is more effective
	Desiccation (drying)	Useful for a number of pathogens; however, some, for example feline calicivirus, may be able to persist in the environment
	Ultraviolet (UV) light	Direct sunlight or UV light can inactivate some viruses, mycoplasma, fungi and bacteria, particularly airborne particles
	Radiation	Infrequently used
Chemical disinfection	Wide number of disinfectants available and the ideal disinfectant should: • have a wide antimicrobial spectrum of action; • have efficacy in the presence of organic material; • work under a number of environmental conditions	No single disinfectant is available that meets all these criteria

first step is to identify the potential hazard, which is anything that could cause harm, for example approaching a horse. The risk is the chance that somebody could be harmed by the hazard, together with an indication of how serious the harm could be (HSE, 2016b). Risk can be designated as low, medium or high; the level is determined by the species or individual animal you are dealing with and the procedure you are carrying out.

1.3.1 Standard Operating Procedures

In addition to risk assessments it is good practice to have a standard operating procedure (SOP). This is a detailed list of written instructions that can be used to satisfy compliance requirements and are recommended for all procedures that pose a potential risk to the health and safety of personnel. They should also be used as the base for everyday training of staff.

1.4 Personal Hygiene

Personal hygiene is important and a high standard should be maintained at all times.

- Fingernails should be kept short (Figure 1.1) and nail polish and jewellery should not be worn.
- Long hair should be tied back above the collar (Figure 1.2).

Figure 1.1 Short fingernails (Source: Courtesy of Bridget Roberts, 2016).

1.4.1 Handwashing

Hands should be washed to prevent spread of disease between animals and to humans. Hot water and soap should always be used and a good handwashing protocol such as the World Health Organisation (WHO) handwashing protocol should ideally be followed. Hands should be washed at the following times:

- before and after handling animals and leaving the facility between different animals or species;
- before and after toilet or lunch break periods;
- after glove removal and handling chemicals.

NB: Hand gel or rub may be used, unless hands are visibly soiled.
Gloves should be worn for the following procedures:

- handling or cleaning any bodily fluids or excreta;
- using chemicals or disinfectants.

Ideally, a glove removal technique should be used and hands should be washed following the removal of gloves.

Figure 1.2 Long hair tied back above the collar (Source: Courtesy of Bridget Roberts, 2016).

1.4.2 Signs

Where possible, signs (Figure 1.3) should be placed in strategic places around animal handling facilities to remind personnel of the procedures and protocols in place. This is also very useful for new staff or visitors to the facility.

1.5 Personal Protective Equipment (PPE)

As handling an animal can be potentially hazardous to the handler, it is important to understand the risks involved, assess these risks and mitigate appropriately. One of the

Figure 1.3 Procedure signs (Courtesy of Reaseheath College).

ways in which the handler can minimize the risk of injury or disease is by wearing the correct PPE.

It is usual for the facility where the handler is working to decide what PPE is appropriate for the species and many animal handling facilities will have a 'uniform' that they will provide to staff. It is, however, the responsibility of the person wearing the PPE to take good care of it and ensure that PPE is clean. It is good practice not to wear PPE to your home and to only wear the uniform when at work. This is not always practical or possible and, therefore, many establishments will have a uniform that can be worn at all times in clean areas, for example reception areas, and then extra PPE that is worn at specific times, such as when cleaning kennels.

All outer garments, that is overalls, should be removed prior to leaving the facility and a sticky roller should be used to remove any animal hair. The outer garments should then be placed into a bag and washed. Some facilities will provide laundry facilities; however, most people will take their PPE home to wash. It is important to ensure that the handler's own animals are not exposed to these clothes and vice versa.

1.5.1 General Points

- PPE must be worn to reduce the transfer of hair, allergens and excreta on clothing, to reduce transfer of zoonotic disease and to reduce the risk to the handler from injury.
- An animal that feels threatened is far more likely to attempt to defend itself when handled.
- Long sleeved clothing should be worn to prevent scratches on arms from sharp claws.
- Flat, enclosed toe, non-slip shoes (Figure 1.4) should be worn with companion animals and animals housed indoors to prevent trips and falls during handling or husbandry procedures.
- Stressed animals are more likely to shed potential disease agents in their faeces and other excretions. Therefore, taking steps to keep the animal as calm as possible prior to and during handling can help mitigate any risks to the handler.
- Where animals appear unwell, or are known to be carriers of disease, handlers should consider wearing gloves as extra protection, though this should not be used as a replacement for good hygiene measures and handwashing should always take place regardless after handling an animal.
- Leather gauntlets (Figure 1.5) can provide protection, but often at the expense of dexterity when handling. For large birds of prey, a leather arm guard may also be necessary.
- Steel toe-capped safety boots should be worn when handling horses and donkeys, and steel toe-capped wellington boots should be worn when working with farm animals (especially cattle).
- Eye protection is strongly recommended when handling birds with sharp pointed beaks, or other wading birds with long necks capable of reaching a handler's face.
- There are some diseases that can be transmitted to people through inhalation of small feathers or feather dust. Wearing a suitable facemask when working in aviaries, particularly those with large numbers of birds, or where ventilation is reduced, will help reduce the risk of disease transmission via this route.
- It is important when handling rodents that no perfume or scented hand cream is worn due to their sensitivity to smell.

Figure 1.4 Flat, enclosed toe, non-slip shoes (Source: Courtesy of Bridget Roberts, 2016).

1.5.2 Working with Horses

In recent years, more attention has been focused on the safety of people who are working on the ground with horses. This has been in light of recent studies (BEVA, 2014; Riley *et al.*, 2015) that have looked at the risk of injury to veterinarians in the United Kingdom, and veterinary and animal science students in Australia.

Figure 1.5 Gauntlets (Source: Courtesy of Bridget Roberts, 2016).

Veterinarians are more at risk due to the nature of their work, as they will often be carrying out procedures that are invasive, for example endoscopy of the upper respiratory tract. Also, due to the fact that veterinarians only visit horses to 'do something' to the horse, horses often will react to the presence of the veterinarian and, thus, behavioural issues (i.e. rearing) can occur. In addition, whilst veterinarians can use sedation to try to 'calm' the horse and make it easier to handle, a horse can still bite and kick whilst sedated. A large percentage of horses kept in the United Kingdom are what are known as 'pleasure' horses. They are generally owned by people who will have a varying ability in being able to handle horses, as well as knowledge of behaviour and training of horses. The study conducted by BEVA in 2014 found that a large percentage of injuries to veterinarians occurred when pleasure horses were being treated and the owner of the horse was the handler. It needs to be remembered that it is the responsibility of everyone involved with handling of the horse to ensure that safety is the main priority and to take every possible step to ensure that risk of injury is minimal. To this end, more emphasis has been placed in recent years with the use of PPE by handlers of horses on the ground, in particular with regards to the wearing of steel toe-capped boots, safety helmets and gloves.

Key Points

- When dealing with large animals, particularly cattle and horses, events can happen that put us at great risk and many people have been injured, or even killed, by complacency as people are in a hurry to get things done.
- Preparation, suitable equipment and good facilities are key to providing a safe environment, not only for yourself but also the animals that you are handling.
- A good knowledge and understanding of the principles of biosecurity and disease transmission are also important in order to prevent disease spreading from animals to humans, and also from animals to animals.
- A pathogen capable of causing disease from an animal to a human is known as a zoonosis.
- In all cases, the risk of disease transmission can be reduced by using a good handwashing technique with soap and water after handling any animal.
- Biosecurity aims to reduce/prevent the introduction of new diseases into a facility from an outside source.
- Biocontainment aims to reduce/prevent the movement of infectious diseases within a facility.
- Whenever you are working with animals it is important to assess the risk.
- One of the ways in which the handler can minimize the risk of injury or disease is by wearing the correct PPE.
- An animal that feels threatened is far more likely to attempt to defend itself when handled.

Self-assessment Questions

1 What is a zoonotic disease?
   a A disease transmitted from animal to animal.
   b A disease transmitted from humans to animals.

c A disease transmitted from animal to humans.
d All three of the above.

2 PPE is the abbreviation for?
a Particular Personal Equipment.
b Personal Protective Equipment.
c Personal Particular Equipment.
d Protective Personal Equipment.

3 What are the four basic principles to biosecurity?

4 What are standard operating procedures (SOPs)?

5 Why is good hand hygiene important and when should you ensure that you wash your hands?

Answers can be found in the back of the book.

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