Veterinary Nursing Training Manual

For use by Vets beyond Borders

This training manual was developed by Box Hill Institute in Melbourne, Australia free of charge to support the work of Vets beyond Borders. Box Hill Institute is a vocational education and training (VET) provider with a strong track record in the development of skills to meet the workforce needs of students and enterprises in the global arena. The Centre for Biotechnology and Animal Sciences at Box Hill Institute provides specific training at VET and higher education levels for the biotechnology, animal sciences and veterinary nursing industries.

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Animal Housing

Introduction

When discussing animal housing facilities a number of important issues need to be considered. These are general design, materials used, provision of temperature control, ventilation, lighting and drainage, and maintenance routines.

General design of housing facilities

When designing an animal housing facility it is necessary to consider: the purpose for housing the animals, (boarding, research, holding animals for sale or accommodating sick animal) species and the number of animals to be housed, the available space, the area required for housing, and the area required for movement of staff in cleaning and maintenance, the location of the facility and the money available.

In general enclosures may be divided into two (2) types. These are the walk in type or run and the cage/locker type. They may be indoors, outdoors or a combination of both.

The walk in enclosure is a larger area where the animal has the opportunity to move around. Walk in enclosures are more common in an outside setting but may have an indoor sleeping area and an outdoor run or be entirely inside. They have the disadvantage that where restricted room is available they limit the number of animals, which may be accommodated.

Outdoor runs/pens have disadvantages such as little or no climate control, difficulties in servicing during bad weather and problems with controlling vermin and disease carrying insect vectors.

The locker or cage type is more commonly found in veterinary clinics/pet shops and boarding facilities where the animals are only being accommodated for a short amount of time. They have the advantage that they confine the animal and that they may be stacked one on top of the other so that more animals can be accommodated in a small space. Open mesh cages in close proximity however provide an environment where disease spread can be hard to control. The locker type has the disadvantage that it is more difficult to provide adequate drainage than in the case of the walk in type.

Some pet shops have walk in Aviary type caging for housing birds.
Materials used in housing facilities

Apart from the consideration of expense, the materials for use in housing facilities should require a minimum of maintenance, be smooth, strong and corrosion resistant. They should also be easily disinfected and non-toxic.

Materials that may be used include stainless steel, galvanised metal, fibreglass and sealed timber, brick or concrete.

Stainless steel

With the exception of cost, stainless steel is the most desirable material for use in animal housing areas, as it is strong, easily cleaned and disinfected, resists staining and corrosion. In addition it is reflective and gives the kennelling area a brighter appearance.

Galvanised metal

Galvanised metal is often used as a cheap alternative to stainless steel. Despite its strength galvanised steel is less desirable than stainless steel as the zinc which coats the metal may wear off. The exposed metal stains easily and rusts.

Fibreglass

Fibreglass is a smooth material that resists staining and provides good insulation. Fibreglass however is not as strong as stainless steel and wears quickly.

Sealed timber, brick and concrete

Timber, brick and concrete are relatively inexpensive materials that may be used in animal housing areas. Although they are commonly used for floors and walls they may also be used to form kennels.

In any case the timber, brick or concrete should be sealed with a lead free paint so that they are non-pervious to water.

These materials are less desirable than stainless steel for animal housing as they are generally more difficult to maintain.
Environmental control in housing areas

Control of temperature, ventilation, lighting and drainage are important factors in the design and maintenance of animal housing areas. Failure to ensure that these factors are well maintained may contribute to skin, respiratory and gastrointestinal disease. In addition inadequate control of these factors makes the animal housing area difficult and undesirable to work in.

**Temperature**

Although the heating/cooling system may vary, the ambient temperature in animal housing areas should be between 15°C and 21°C and fluctuations should be kept to a minimum. Reptiles, for instance, require their environment to be at a certain temperature to ensure that they can digest their food.

**Ventilation**

Efficient ventilation of animal housing areas may be achieved with the use of extractor fans or air conditioning units. In general it is desirable to keep doors and windows closed to minimise the risk of escapes and to prevent environmental variation that will occur with changes in the weather. It is important to make sure birds are not housed in draughty areas.

**Lighting**

Lighting should be provided at a comfortable level so that animals can easily be observed and maintenance routines can be carried out. Special UV lighting is required for reptile cages.

**Drainage**

Ideally drainage should be provided so that urine and faeces are removed from the cage immediately and so that refuse does not pass from one cage to another.

Both drainage and cleaning are made easier if corners are rounded and so that floors slope towards a drainage point.
General housing

Trays and grids
The use of trays and grids, especially in small cages, can reduce the amount of urine and faecal soiling on animals.

Bedding
In cages, newspapers, towels or blankets may be used for added warmth and comfort. These should be of a material that is machine washable.

Hay, straw, sawdust and fibrecycle are commonly used in rodent and rabbit cages/boxes. The latter two are absorbent and reduce urine dampness in cages

Feed and water bowls
Water should be provided on a permanent basis in non-spill, fully washable bowls made of stainless steel or plastic. Animals may occasionally chew plastic bowls. Automatic water supply may also be used although regular checks to ensure proper operation is essential. Hoppers of food are also utilised for rabbits, rodents and ferrets to enable them to ‘graze’ at will.

Locks and catches
Locks and catches must be well designed, as some animals will work out how to lift a simple latch or slide a bolt.

Cleaning
All sections of cages in use should be cleaned and disinfected daily. Animal housing area floors should be swept and mopped, litter trays emptied, washed and refilled and water bowls likewise. Food bowls should be cleaned between each feed. Avoid the use of ammonia cleaners as the smell may deter some species from feeding.

Maintenance of housing facilities
If there are any problems encountered with the animal housing facility such as broken catches, flickering light bulbs, water nozzles not working etc they should be repaired under instruction as soon as possible or if not possible to repair it yourself it should be reported.
Maintain Hygiene in an Animal Housing Facility

What is hygiene?

Hygiene is a set of principles that are followed to minimise the risk of infectious disease. Disease (which is defined as an abnormality of structure or function) can be caused by many different factors and is generally categorised into infectious and non infectious causes. In many instances there is interplay between infectious and non infectious causes.

Non-infectious causes of disease include:
- nutritional
- physical (trauma)
- degenerative or aging
- metabolic
- genetic.

Infectious disease is disease caused by living organisms including:
- bacteria
- virus
- fungi and yeasts
- protozoa
- parasites (worms and insects)
- Most of these causes are not visible to the naked eye, which makes control of infectious diseases very difficult.

Why hygiene is important?

- Regular and thorough cleaning will prevent the build up of potentially infectious organisms in the environment
- Sick, very young and older animals are more vulnerable to infection as their immune system may be compromised.
- Personal hygiene is important to prevent transmission of infectious agents from something you contact. This can be from one part of your body to another part, or another body (animal or human) or bodily secretions.
What is involved with hygiene?

- Hygiene involves constant, effective and thorough cleaning and washing – there is no easy way out of elbow grease! Infectious agents lurk on dust and secretions and any surface or object with which an animal has contact.
- Disinfection involves the use of chemicals to assist in the destruction of microorganisms.
- Sterilisation includes the use of heat to kill microorganisms.
- Waste disposal practices minimise levels of contamination in the clinic.
- Protocols to handle suspected infectious animals, including isolation.
- Wearing appropriate protective clothing when working in particular areas.

Disposal of biological wastes

Biological wastes are a potential occupational risk as:

- sharp materials such as scalpels, glass and needles may cut or injure
- tissue, excreta and other biological wastes have the potential to carry zoonotic diseases
- tissue, excreta and other biological wastes have the potential to contaminate the environment.

Therefore all biological wastes should be disposed of in an acceptable manner. Some local authorities have specific rules in regard to wastes and these should be followed. However, there are some general rules that are applicable.

- All sharps (needles, scalpels and glass) should be disposed of using approved sharps containers.
- All animal tissue should be disposed of in a manner that conforms to local regulations and the regulations of appropriate health authorities.

Disinfectants and antiseptics

Disinfectants and antiseptics are chemical agents used for the destruction of microorganisms such as bacteria, viruses, fungi and spores. The aims of using these products are to minimise the spread of disease by reducing the numbers of disease causing organisms.

Although there are some inherent differences in the process of disinfection and antisepsis many chemicals may be used for both purposes. Sterilisation is a third technique that is used to destroy microorganisms.
Rules for effective use of chemicals

For chemicals to be effective in the destruction of microorganisms several rules should be followed:

(a) The surface being treated should be as clean as possible. Many chemical products are inactivated by the presence of foreign materials such as blood, pus or oil.

(b) The chemical must contact every surface of the article. For example scissors that are being soaked must be left open to ensure that the chemical comes in contact with all surfaces.

The solution must be used at the correct concentration. Many chemical products lose their effectiveness if the concentration of the solution is either too high or too low. It is therefore important to firstly, make up the solution to the manufacturer’s specifications, and secondly, maintain the concentration of the solution as the active ingredient is either leached out or inactivated during use.

Chemical groups commonly used for disinfection and antisepsis

Chemical agents for antisepsis and disinfection are broadly allocated into groups depending on their characteristics and uses. These are alcohols, aldehydes, chlorhexidines, chlorines, iodines, quaternary ammonium products (QUATS), phenols and combination products.

Important features of chemicals used for disinfection and antisepsis

Features, which are of importance in relation to chemicals used in the destruction of microorganisms are:

(a) Tissue toxicity
   This, refers to the degree of damage which the chemical causes to healthy tissue at its correct concentration for use.

(b) In the case of antiseptics it is important that tissue toxicity is negligible whereas in the case of disinfectants this feature is less important.

(c) Effectiveness in the presence of foreign material
   This, refers to how well the activity of the chemical is maintained in the presence of dirt, blood, pus, etc.
   This feature is important in both antiseptics and disinfectants. However, it is most important that disinfectants which are to be used on surfaces such as concrete should be highly effective in the presence of foreign materials.

(d) Spectrum of activity
   This, refers to the range of microorganisms which the chemical is effective in destroying. Microorganisms with which we are mostly concerned are bacteria, viruses and fungi. In addition, some chemicals are active against spores.

(e) Residual effect
   This, refers to a lasting or ongoing effect after application. This feature is particularly useful in that it ensures continued activity against microorganisms.
Handling and Restraint of Dogs and Cats

Introduction

A major role of veterinary nurses in practice is to handle and restrain patients. The aim of handling and restraint is to allow procedures to be carried out on patients in a manner that is safe to the operators and the patient with a minimum of stress to both parties.

When placed in a clinical situation patients are stressed. Their response to this stress varies. On approaching the patient the handler should be able to assess the patient’s response to this stress and decide on the best way to approach without causing a confrontation which may cause injury to either the patient or the handler.

In general you should approach the patient with confidence while talking in a reassuring tone. If possible you should avoid cornering the patient as their fear will be greater if they cannot see a way to escape. Of course this is difficult when patients are in cages or pens. At all times you should assume that the patient is at least capable of inflicting injury and you should never trust any patient completely.

Removing a dog from a cage or pen

Once inside a cage or pen even frightened patients may feel that they are in a secure area. For this reason removing patients from their enclosure is often the most dangerous aspect of handling. The patient has no means of escape and may feel trapped. Their response may either be to cringe at the back of the enclosure or rush at the opening. In either case the initial behaviour may change suddenly as the patient may be unsure of how to behave.

When opening the cage or pen door you should make sure that the patient cannot slip past you and escape and at the same time you should coax them to the front of the enclosure rather than placing your hand inside. Once at the entrance a lead and/or correction collar can be applied.

A diagram of the correct use of a correction collar is depicted in figure 5.1.

![Figure 5.1 – Correct application of a correction collar](image)
In difficult patients it may be advisable to leave a lead on the patient whilst they are in the enclosure. Although the lead may be destroyed by chewing it allows the patient to be more easily removed from the enclosure.

In some cases it may be necessary to apply a muzzle to guard against being bitten. Muzzles may be made of material such as gauze or they may be constructed of leather. These are depicted in figures 5.2 and 5.3.
Lifting dogs

Once removed from their enclosure many patients will need to be lifted onto a table. When lifting the patient it should be done in a way that they feel secure and that they cannot injure you by biting or scratching. It should also be done in a way which protects your back from occupational injury.

Larger patients should be lifted by two (2) people. In addition you should follow the rules of bending at the knees and keeping a straight back to minimise the risk of injuring yourself.

Lifting smaller patients

Smaller patients may simply be lifted by a number of methods.

Method 1

Simply place one arm over the rump and the other under the patient’s chest and lift them whilst restraining the head. This is depicted in figure 5.4.

![Figure 5.4 – A method of lifting a smaller patient](image)
Method
Place one arm around the front of the chest and the other around the rump.

Although this lift gives the patient a feeling of security it should be noted that the head is not restrained and that the lifters face is close to the patient’s face. This is depicted in figure 5.5.

In cases where you are unsure of the patient’s reaction you should either apply a muzzle or ask for an assistant to restrain the patient’s head.

Figure 5.5 – Another method of lifting a smaller patient

Lifting larger patients

Where possible larger patients may be treated on the floor. If however they must be lifted it should be done by two (2) people. In general one (1) person lifts the front of the patient by holding them around the head and chest whilst the second person lifts the rear of the patient by holding around the rump.

Care should be taken not to lift patient’s around the abdomen as this may be painful and/or aggravate the patient’s condition.
Lifting an injured patient

Lifting patients which are injured adds the problem that we do not want to aggravate the patients condition and that pain may cause the patient to bite.

In most cases it is wise to apply a muzzle. The patient should be examined to determine the sites of major injury and then the patient may be lifted.

In many cases the patient can be lifted using modifications of the techniques already described. In other cases it may be wise to use a stretcher. These are commercially available but a blanket or board will often do the job.

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Figure 5.6 – A method of restraining an injured dog in a standing position
Holding a dog for general examination

Once on the table the patient may require restraint for examination. The patient may be restrained in a standing, sitting or lying position as depicted in figures 5.6, 5.7 and 5.8.
Restraining a patient for intravenous injection

A commonly performed procedure in clinical practice is the administration of medication by intravenous injection into the cephalic vein which is located in the front leg.

The patient may be in a standing or sitting position. The head will need to be restrained and the front limb extended by placing a hand behind the patient’s elbow. The thumb is placed over the anterior (front) aspect of the extended limb which causes the vein to fill with blood. This is called ‘raising the vein’.

An example of this type of restraint is depicted in figure 5.9.

![Figure 5.9 – Restraining a patient for intravenous injection](image)

Placing a patient into a cage or pen

Once the patient has been treated it may be necessary to place them into a cage or pen. In many cases the patient will be reluctant to enter the enclosure. In these cases it may be necessary to place the patient in backwards so that they cannot see the back of the enclosure.

In difficult cases it may be wise to leave a lead attached so that removal is easier. In the case of patients liable to bite a warning sign should be placed onto the front of the enclosure.
Handling and restraint of cats in veterinary practice

Introduction
A similar approach should be taken for the handling and restraint of cats as applies to dogs and other pets in the workplace. You should approach the patient with confidence, whilst talking in a reassuring tone. If possible, you should avoid cornering the patient, as their fear will be greater if they cannot see a way to escape. Of course this is difficult when patients are in cages or pens. At all times you should assume that the patient is at least capable of inflicting injury and you should never trust any patient completely.

Removing a cat from a cage or pen
Once inside a cage or pen even frightened patients may feel that they are in a secure area. For this reason removing patients from their enclosure is often the most dangerous aspect of handling. The patient has no means of escape and may feel trapped. Their response may either be to cringe at the back of the enclosure or rush at the opening. In either case the initial behaviour may change suddenly as the patient may be unsure of how to behave.

When opening the cage or pen door you should make sure that the patient cannot slip past you and escape. At the same time you should coax them to the front of the enclosure rather than placing your hand inside. Once at the entrance the patient can be lifted and restrained.

In difficult patients great care should be taken with cats as they can bite and scratch with all four limbs. In some cases it may be necessary to cover the patient with a blanket to assist with safe handling. In other cases it may be wise to use chemical restraint (tranquillizers, sedatives) to assist with safe handling.

Carrying cats
Once removed from their enclosure many patients will need to be carried.

When carrying the patient it should be done in a way that they feel secure and that they cannot injure you by biting or scratching. An example of a technique is depicted in figure 5.10.

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Figure 5.10 – Carrying a cat
Lifting an injured patient

Lifting patients which are injured adds to the problem. We do not want to aggravate the patient’s condition because pain may cause the patient to bite.

In many cases the patient can be lifted using modifications of the techniques already described. In other cases it may be wise to use a stretcher. These are commercially available but a blanket or board will often do the job.

An example is depicted in figure 5.11.

![Figure 5.11 – A method of lifting an injured cat](image)

Holding a cat for general examination

Once on the table the patient may require restraint for examination. The patient is often restrained in a sitting or standing position as depicted in figure 5.12.

![Figure 5.12 – Restraining a patient in a sitting position](image)
Restraining a patient for intravenous injection

A commonly performed technique in clinical practice is the administration of medication by intravenous injection into the cephalic vein that is located in the front leg.

The patient may be in a standing or sitting position. The head will need to be restrained by cupping the chin in one hand (or by scruffing if the cat does not respond to gentle restraint), and the front limb extended by placing a hand behind the patient’s elbow. The thumb is placed over the anterior (front) aspect of the extended limb which causes the vein to fill with blood. This is called ‘raising the vein’.

An example of this type of restraint is depicted in figure 5.13.

![Figure 5.13 – One method of restraining a patient for intravenous injection](image)

Placing a patient into a cage or pen

Once the patient has been treated it may be necessary to place it into a cage or pen. In many cases the patient will be reluctant to enter the enclosure. In these cases it may be necessary to place the patient in backwards so that it cannot see the back of the enclosure.

In the case of patients liable to bite or scratch a warning sign should be placed onto the front of the enclosure.
Basic Nutrition

Introduction

Nutrition is derived from food that is ingested by an individual. Diets should supply all the essential nutrients required by an animal for growth, repair, energy and reproduction.

Nutrients can be divided into six categories:

1. proteins
2. fats (lipids)
3. carbohydrates
4. vitamins
5. minerals

Water

Water is an essential nutrient, which must be consumed regularly to maintain health. Lack of water intake rapidly leads to dehydration and death.

Water requirements will vary depending on the ambient temperature and humidity, whether or not the animal is pregnant or lactating, the composition of the diet (e.g. moisture and the mineral content), the animal’s stage of growth and the animal’s state of health (e.g. animals with diarrhoea and kidney disease have higher requirements).

As a general guide, dogs and cats, which are not losing excessive amounts of water (e.g. through lactation or diarrhoea), require between 40–60 mls of water/kg/day. Requirements for cats and dogs are greatest at approximately 60mls/kg/day; large dog breeds require about 40 mls/kg/day.
Protein

Proteins are found in every cell of the body. They are present in large amounts in tissues, such as muscles, tendons and connective tissue.

The basic unit of proteins is the amino acid. Twenty (20) amino acids have been identified, eleven (11) of which are identified as essential in the cat. This means that they must be provided in the diet if the individual is to remain healthy. Requirements for essential amino acids vary between species and physiological status, but the commonly accepted list of essential amino acids, include: arginine, histidine, isoleucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine. The other amino acids are not essential because the body can manufacture them.

Proteins in the body serve four (4) functions. They are used as a source of energy, to build and repair tissue, regulate body processes, as is the case with enzymes and hormones and protect the body from infection, as is the case with antibodies.

Proteins in the diet are available from meats, eggs, dairy products and plant proteins.

Fats

Fats are found in every cell of the body, especially in the cellular membranes. Fats are also important in the transport of fat soluble vitamins. In addition, fat is accumulated as a stored form of energy in the adipose tissue.

The basic unit of fats is the fatty acid. As is the case with amino acids, some are considered essential fatty acids, which must be supplied in the diet whilst others can be manufactured by the body.

Fats in the body are an important energy source. Fats in the diet are available from both animal and plant sources.

Carbohydrates

Carbohydrates are probably not an essential nutrient for dogs or cats but are a useful and economic energy source. Carbohydrates are commonly found in commercial dog foods.

Carbohydrates in the diet are available from sugars or starches and are commonly provided in the form of cereals, potato or rice.

Vitamins

Vitamins are chemicals, which are required by the body in small quantities to assist with the regulation of body processes.

Vitamins, A, D, E and K are fat-soluble and can be stored in the body if ingested in quantities greater than required. All other vitamins are water-soluble. These water-soluble vitamins cannot be stored by the body and are excreted in the urine if ingested in excessive quantities.

Vitamins are available in the diet through ingestion of various foods. Deficiency or excess of vitamins may result in disease. Sources and functions of vitamins are summarised in table 8.1.
Minerals

Minerals are inorganic chemicals that serve a number of structural, metabolic and osmotic functions within the body, particularly during growth and reproduction.

A summary of mineral sources and functions is summarised in table 8.2
Table 8.1: Sources and functions of vitamins

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Source</th>
<th>Function</th>
<th>Deficiency</th>
<th>Excess</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Liver, kidney, milk, vegetables; can be converted by dogs but not cats * meat does not contain vitamin A</td>
<td>- Visual pigments, skin, epithelia - Growth of bone and teeth - Normal kidney functions</td>
<td>- Stored in liver, kidney and fat - Usually in low fat diet - Poor growth, skin and bone problems - Eye lesions</td>
<td>- * Cats fed on fresh liver - Fusion of spinal vertebrae</td>
<td>Dog: 500 IU, Cat: 1000 IU.</td>
</tr>
<tr>
<td>D</td>
<td>- Formed in sunlight - Fish liver oil, egg yolk, milk, cheese</td>
<td>Absorption and maintenance of normal level of Ca &amp; P</td>
<td>- Rare - Rickets</td>
<td>- Feeding excess fish oil - Poor growth - Malformation of bones and teeth</td>
<td>Dog: 50 IU, Cat: 100 IU.</td>
</tr>
<tr>
<td>E</td>
<td>Egg yolk, cereal, milk, vegetable, oil</td>
<td>Antioxidant effect especially fats and stops destruction of vitamin A</td>
<td>- Muscular dystrophy - Impaired reproduction Cats: Myositis, Sterilised Related to tuna fish</td>
<td>Not reported</td>
<td>Directly related to intake of polyunsaturated oil Dog: 5 IU, Cat: 8 IU.</td>
</tr>
<tr>
<td>K</td>
<td>Synthesized by intestinal bacteria</td>
<td>Blood clotting</td>
<td>Impaired clotting</td>
<td>Not reported</td>
<td>N/A</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td>Skeletal scurvy</td>
<td>No dietary requirements</td>
</tr>
</tbody>
</table>

The Vitamin B Group
- These vitamins are water soluble and only stored in the body for short periods of time.
- Cats have a high requirement for B vitamins so deficiency may occur
- B vitamins are Thermolabile

<table>
<thead>
<tr>
<th>Vitamin (B1)</th>
<th>Source</th>
<th>Function</th>
<th>Deficiency</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiamine</td>
<td>Meat, cereal, yeast</td>
<td>Carbohydrate and protein metabolism</td>
<td>Anorexia, spasticity heart failure and death. * If fed large amounts of fish</td>
<td>Dog: 0.1 mg, Cat: 0.5 mg</td>
</tr>
<tr>
<td>Riboflavin (B2)</td>
<td>Organ meats, eggs, yeast, cereal</td>
<td>Growth and skin condition</td>
<td>Unlikely</td>
<td>Dog: 0.2 mg, Cat: 0.5 mg</td>
</tr>
<tr>
<td>Panthotenic acid</td>
<td>Organ meats, eggs, yeast</td>
<td>Growth and skin condition</td>
<td>Unlikely</td>
<td>Dog: 1.0 mg, Cat: 1.0 mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>Organ meats, eggs, yeast, cereal</td>
<td>Health of mouth tissue</td>
<td>Mouth and tongue ulcer, bloody diarrhoea</td>
<td>Dog: 1.1 mg, Cat: 4.5 mg</td>
</tr>
<tr>
<td>Pyridoxine (B6)</td>
<td>Organ meats, eggs, yeast, cereal, fish</td>
<td>Protein metabolism blood formation growth</td>
<td></td>
<td>Dog: 0.1 mg, Cat: 0.1 mg</td>
</tr>
<tr>
<td>Folic acid</td>
<td>Organ meats, yeast</td>
<td>Normal blood and facial growth</td>
<td></td>
<td>Dog: 0.02 mg, Cat: 0.1 mg</td>
</tr>
<tr>
<td>Biotin</td>
<td>Organ meats, egg yolk, meat</td>
<td>Normal growth and healthy skin</td>
<td>Poor growth * if fed excess egg white</td>
<td>Dog: 0.01 mg, Cat: 0.005 mg</td>
</tr>
<tr>
<td>Choline</td>
<td>Organ meats, eggs, yeast</td>
<td>Protein metabolism</td>
<td></td>
<td>Dog: 120 mg, Cat: 200 mg</td>
</tr>
<tr>
<td>B12</td>
<td>Muscle meat, milk, liver</td>
<td>Normal blood</td>
<td></td>
<td>Dog: 0.002 mg, Cat: 0.002 mg</td>
</tr>
</tbody>
</table>

* Excess vitamin/mineral supplementation are as deficiencies
<table>
<thead>
<tr>
<th>Mineral</th>
<th>Source</th>
<th>Function</th>
<th>Deficiency</th>
<th>Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>Bones, milk, cheese, white bread</td>
<td>Bone formation, nerve and muscle function</td>
<td>Poor growth, rickets, convulsions</td>
<td>Very high levels – bone deformities</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>Bones, milk, meat</td>
<td>Bone formation, energy utilisation</td>
<td>Rickets (rare)</td>
<td>Symptoms of calcium deficiency</td>
</tr>
<tr>
<td>Potassium</td>
<td>Meats, milk</td>
<td>Water balance, nerve function</td>
<td>Poor growth, paralysis, kidney and heart lesions</td>
<td>Muscular weakness</td>
</tr>
<tr>
<td>Sodium/chlorine</td>
<td>Salts, cereal</td>
<td>Water balance, muscle and nerve activity</td>
<td>Poor growth, exhaustion</td>
<td>Thirst, high blood pressure (intake maintained)</td>
</tr>
<tr>
<td>Magnesium</td>
<td>Cereals, bones, green vegetables</td>
<td>Bone formation, protein synthesis</td>
<td>Anorexia, vomiting, muscular weakness</td>
<td>Diarrhoea</td>
</tr>
<tr>
<td>Iron</td>
<td>Eggs, meat (liver), green vegetables</td>
<td>Part of haemoglobin (oxygen transport)</td>
<td>Anaemia, low resistance to hookworm infestation</td>
<td>Weight loss, anorexia</td>
</tr>
<tr>
<td>Copper</td>
<td>Meats, bones</td>
<td>Part of haemoglobin</td>
<td>Anaemia</td>
<td>Not known in dogs</td>
</tr>
<tr>
<td>Zinc</td>
<td>Meats, cereals</td>
<td>Digestion, tissue maintenance</td>
<td>Hair loss, skin thickening, poor growth</td>
<td>Diarrhoea</td>
</tr>
<tr>
<td>Manganese</td>
<td>Tea, nuts, cereals</td>
<td>Fat metabolism, many enzyme function</td>
<td>Reproductive failure, poor growth</td>
<td>Not known in dogs</td>
</tr>
<tr>
<td>Iodine</td>
<td>Fish, dairy produce</td>
<td>Part of thyroid hormone</td>
<td>Hair loss, apathy, drowsiness</td>
<td>Toxic</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Organ and muscle meats, milk</td>
<td>Part of vitamin B12</td>
<td></td>
<td>Not known in dogs</td>
</tr>
<tr>
<td>Selenium</td>
<td>Cereals, fish, meats</td>
<td>Associated with vitamin E function</td>
<td>Muscle damage</td>
<td>Not known in dogs</td>
</tr>
</tbody>
</table>
Feeding Cats and Dogs

Introduction

Good nutrition is essential in maintaining the health and well being of an animal. It is important that diets are complete and balanced, ie the diet contains all the essential nutrients for a particular animal in the correct proportions.

This means that when formulating a diet several factors must be considered:

(a) Species and breed (cats and dogs have different requirements; in some cases breeds may also have specific requirements)

(b) Individual variation (metabolic rate will vary between individuals)

(c) Life stage (growing animals have higher requirements than geriatric animals; pregnant and lactating animals also have increased requirements)

(d) Climatic conditions (in hot environments, nutrient requirements are reduced in comparison to cold environments)

(e) Level of activity (active animals will have higher nutrient requirements)

(f) Other stresses (stress will increase nutrient requirements).

As a general rule of thumb the amount of calories to feed is that amount which will maintain the animal’s optimum weight. When at optimum weight, the animal’s ribs and spine can be palpated but are not visible.

Cats versus Dogs

Cats and dogs have different nutritional requirements. Unlike dogs, cats are strict carnivores whereas dogs prefer an omnivorous diet. Hence dog foods are generally quite inadequate in meeting the nutritional requirements of cats.

Some dietary differences between cats and dogs include:

• cats have higher protein requirements

• arachidonic acid is an essential fatty acid in the cat but not in the dog

• taurine and arginine are essential amino acids in the cat, but non essential in the dog

• cats have greater requirements for some vitamins, eg Vitamin A and niacin (one of the B complex group).

• cats should be fed ad lib or at least twice a day

Because of the essential requirements for amino acids and fatty acids, diets for cats must be based on an animal source, ie cats cannot be fed a vegetarian diet.
Requirement for adults

Maintenance requirements refer to the dietary requirements of a healthy adult animal, which is moderately active but not in work, not pregnant or lactating, and not unduly stressed (e.g., exposed to extremes of heat or cold, or recovering from illness or surgery).

There are many types of complete and balanced maintenance diets available that meet the requirements of adults in a maintenance state.

Growth requirements

Growing animals have greater energy and nutrient requirements than adult animals as dietary requirements must maintain bodyweight as well as supplying nutrients for growth. In cats and dogs, growth occurs most rapidly in the first six months of life. Cats usually attain their adult body size at 6–12 months of age. Small breeds of dogs reach their adult body size at 6–12 months of age, large breeds reach their adult size at 10–16 months of age whereas giant breeds reach their adult size at 18–24 months of age. Growing animals have higher dietary requirements for energy, protein (for tissue growth and repair), calcium and phosphorus (for bone growth) than adult animals. When compared to an adult animal of similar weight, a growing animal should be fed 2× adult maintenance from the time of weaning until it has reached 1/2 its adult weight; 1.5× maintenance is required until the animal is 4/5 of its adult size, and in the latter stages of growth the requirement is 1.2× maintenance.

Figure 10.1 – Growth graph
Table 10.1: Age at which adult size is attained

<table>
<thead>
<tr>
<th>Species</th>
<th>Age when adult size is attained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>6–12 months</td>
</tr>
<tr>
<td>Small breeds of dogs</td>
<td>6–12 months</td>
</tr>
<tr>
<td>Large breeds of dogs</td>
<td>10–16 months</td>
</tr>
<tr>
<td>Giant breeds of dogs</td>
<td>18–24 months</td>
</tr>
</tbody>
</table>

Complete and balanced commercial growth diets are readily available for cats and dogs. They are usually more convenient and reliable than preparing a diet from scratch and should be fed at least until the animal has reached 75% of its adult body weight. Commercial growth diets supply all the essential nutrients for growth in correct ratios and therefore should not be supplemented. Supplementation can be detrimental to the health of the growing animal, for example supplementation with calcium can result in skeletal development problems.

Commercial growth diets are usually nutrient dense. This allows growing animals with comparatively smaller gastrointestinal capacity, compared to adults, to ingest sufficient nutrients in relatively small volumes of food. Growing animals must also be fed on a more regular basis than adults. At weaning, food must be offered at least three to four times daily. The number of feeds should be slowly reduced as the animal grows. As adults, dogs only need to be fed once daily; cats should be fed twice daily as a minimum.

Overfeeding a growing animal should be avoided, as it is detrimental to the animal’s health, especially in the case of dogs. Overfeeding accelerates the growth of the animal and results in the development of an increased number of fat cells, predisposing the animal to obesity. Rapid growth can also lead to defects in skeletal development particularly in large and giant breeds. To prevent overfeeding, food intake should be monitored. Ad lib feeding should only be introduced, if at all, once the dog has reached 80% of its adult size. In most dog breeds this occurs at around nine months of age; in giant breeds this occurs much later at around 18 months of age.

Mild to moderate underfeeding of a growing animal is not detrimental. Animals that are underfed somewhat will develop normally and reach normal body size.

Cats are less likely to overfeed and therefore growing cats can often be fed ad lib without risking overfeeding especially if the cat exercises regularly.

Many owners are tempted to offer cow’s milk to their growing pet, especially kittens. Cow’s milk is best avoided as it contains more lactose than carnivorous milk and may lead to diarrhoea as many puppies and kittens lose the ability to digest lactose. If pups and kittens are orphaned they should be fed a commercial milk replacer designed for puppies and kittens e.g. Divetelact®.
Requirements for geriatric animals

As animals age their energy requirements decrease. Geriatric animals usually lead a sedentary lifestyle, i.e., physical activity is greatly decreased, and their metabolic rate slows. Hence energy requirements may decrease by as much as 30–40% of maintenance.

Body constitution also changes with age. Muscle mass decreases and body fat percentage increases. These changes become more marked as the animal becomes more sedentary. A controlled exercise program, where appropriate, will help to slow these changes.

Geriatric animals should be fed less calories than a normal adult and protein intake should be adequate and of good quality. Changes in metabolism and digestion associated with aging may also increase requirements for Vitamins A, B and E.

Choice of diet in the geriatric should take into consideration concurrent disease. Where dietary management is appropriate prescription diets may be recommended e.g., renal diet, heart diet, liver diet, weight management diets etc.

As routine is often important to a geriatric animal, any diet changes should be made slowly and in some cases, especially in cats, a more palatable diet may need to be fed. It is often beneficial to feed geriatric animals 2-3 times daily to minimise hunger between feeds and to ensure better use of nutrients.

Requirements for pregnant animals

The bitch and queen vary in their feeding requirements during pregnancy although at the end of gestation the requirements for both will be about 25%–50% more than normal maintenance requirements. Total weight gain at the end of gestation should be about 15–25%.

In the bitch, food intake needs to be increased at around weeks five to six of gestation. Rapid weight gain occurs in the last trimester and hence food intake will increase accordingly and by the end of gestation the bitch will consume about 25–50% more than maintenance requirements.

In the queen, weight gain occurs from week two of gestation and is associated with foetal growth as well as an increase in body fat, which is lost during lactation. Food requirements therefore increase from week two and weight gain occurs in a linear fashion throughout pregnancy. By the end of gestation, food requirements will be 25–50% more than maintenance requirements.

A good quality highly digestible food should be fed during gestation. In the case of the bitch a growth diet can be fed in the last trimester although growth diets for large breed dogs should be avoided. If home prepared food is fed during pregnancy, it is essential that it be complete and balanced.
Supplementation is unnecessary if a complete and balanced diet is fed. Calcium supplementation during pregnancy should be avoided as excessive amounts of calcium can lead to eclampsia or hypocalcaemia once the bitch is lactating and the offspring may be born with soft tissue calcification.

During the last trimester the feeding routine may need to be changed. The uterus is enlarging rapidly during this period and taking up more space in the abdomen. The stomach therefore, has a smaller capacity within which it can expand, so smaller meals should be offered more frequently. Alternatively the animal can be fed ad lib or fed a food that is more nutrient dense. (ie. the volume of food needing to be ingested to meet requirements is reduce )

Prior to breeding, the bitch and queen should be at an optimum weight. If underweight prior to breeding, the animal may not be able to meet demands of pregnancy and foetal death may occur; if overweight the foetuses may be too large and dystocia may occur.

Requirements for lactating animals

During lactation energy requirements increase, peaking at the time of peak lactation (three to four weeks after parturition). Requirements will then begin to taper off.

Table 10.2: Feeding Requirements during lactation

<table>
<thead>
<tr>
<th>Week of lactation</th>
<th>Food requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>1 x maintenance</td>
</tr>
<tr>
<td>Week 2</td>
<td>2 x maintenance</td>
</tr>
<tr>
<td>Weeks 3-4</td>
<td>2-3 x maintenance</td>
</tr>
<tr>
<td>Week 5 onwards</td>
<td>Requirements decline</td>
</tr>
</tbody>
</table>

It is important that adequate energy is provided to meet the demands of milk production so that weight loss during lactation is not excessive. A highly digestible, nutrient dense food should be fed and is best offered ad lib. When the offspring begin to eat solids, the bitch and queen are best fed away from their offspring so that the offspring cannot eat their food.

Water needs to be freely available to meet the increased needs of milk production.
Requirements for working dogs

Dietary requirements are greater than maintenance when an animal is in work and vary depending on the type of work performed. Commercial working dog diets are available, however if the demands of work are moderate, increased amounts of a maintenance diet can be fed to meet the animal’s requirements.

In the case of sprinting animals, where work involves small bursts of activity, additional energy should be supplied in the form of carbohydrates. This will help to maintain the body glycogen stores.

Endurance animals, such as cattle and sheep dogs, work for long periods of time. Depending on the level of work, working dogs may require two to three times their maintenance energy requirements. This is best addressed by increasing the amount of energy in the food in the form of fat. A nutrient dense, high fat, highly digestible food such as a commercial working dog diet should be offered several times a day.

Maintaining equipment and hygiene standards

It is important that high standards of hygiene are maintained when food is being prepared. Such hygiene standards relate to:

• The general food storage and preparation area
• Equipment used to store, prepare and present food
• Personal hygiene

General food storage and preparation areas and equipment

Food storage and preparation areas should be cleaned of spills, liquid or otherwise immediately; to ensure safety of workers (avoid slips and falls), prevent cross-contamination of foodstuffs and/or to avoid leaving potential food sources for vermin.

The food preparation area should be one that can be kept free of pests. It should be fully enclosed and where required have screens on doors and windows. It should be constructed of materials that are non-porous, free of cracks and/or crevices and can be easily cleaned. The same applies for surfaces upon which animal diets are prepared – non-porous, free of cracks and be easily cleaned.

Discrete food preparation areas (i.e. chopping boards and tables) should be cleaned after use and the entire food preparation area should be completely cleaned daily, using appropriate cleaning products. All equipment used should be well maintained, cleaned after each use and appropriately stored when not in use.
Personal hygiene

A common and easily avoided source of contamination to animal feed is by humans. Poor personal hygiene can lead, in particular, to an increased risk of biological contamination of food.

Practicable measures should be taken to maintain personal hygiene and includes:

- Wearing clean clothes (avoid cross-contamination as a result of animal faeces picked up on clothes)
- Washing hands
  - after blowing nose or coughing into hand
  - after using the toilet
  - after handling raw food
  - after emptying rubbish containers
  - after cleaning animal enclosures
  - before handling food

**NOTE:**
Hands should be washed with appropriate cleaning agent and hands then dried with a single use towel (ie paper towel)

- report illnesses to workplace supervisor
- make sure cuts and sores are covered
- don’t cough, sneeze, smoke, drink or eat near food
Personal Protective Equipment (PPE)

The importance of PPE should not be underestimated as it protects the worker from hazards associated with preparing feed for animals and cleaning associated with feeding. The following is a list of PPE, which maybe required when preparing and feeding animals.

- **Boots** – good sturdy boots with added toe protection (steel caps) or even gumboots maybe required for foot protection and worn as protection against chemical agents.

- **Overalls** – maybe required to prevent cross contamination from outside/inside the workplace (eg from cleaning animal waste) and worn as protection against chemical agents.

- **Gloves** – maybe required to prevent cross contamination from outside/inside the workplace (eg from cleaning animal waste) and prevent exposure by direct contact to the worker. Gloves are also worn as protection against chemical agents. Mesh gloves are also recommended when cutting up food to prevent injury to hands.

- **Protective eyewear** – worn to protect the eye from chemical splashes and feedstuffs

- **Hearing protection** – maybe required to protect the ears from noise such as machinery or animal noises (eg piggery or boarding kennels)

- **Respirator or facemask** – maybe required to protect against chemical inhalation or dust inhalation from some feeds

- **Sun protection** – such as sunscreen, hats or long sleeved shirts and long trousers are required when feeding animals outdoors
Injection Techniques

Intravenous injection

Introduction

Administration of medication by intravenous injection is a technique that is commonly performed in veterinary practice. It is a technique that requires skill on both the part of the operator and the handler who is restraining the animal.

Equipment required for intravenous injection

Equipment, which is required for intravenous injection, includes clippers, swabs, syringes, needles and the agent for injection. These are depicted in figure 2.1.

Syringes and needles are available in various sizes. Syringes are selected according to the volume of fluid to be injected and needles according to the size of the patient; examples are depicted in figures 2.2. The size of the ‘bore’ is referred to as the ‘gauge’, 18 gauge has a large bore, and 25 gauge has a small bore. The length of the needle commonly varies from ½ to 1 inch (1 to 2.5 cm). These are depicted in figure 2.3.

Selection of the needle size for injection is determined by the size of the vein and the operator preference. For example, a 21 gauge, 1 inch (2 cm) needle is often used for intravenous injection in the dog whereas a 23 or 25 gauge needle is commonly used in cats.
Common sites for intravenous injection

There are three sites that are commonly used for intravenous injection. They are the:

6. cephalic vein
7. jugular vein
8. recurrent tarsal or saphenous vein

These are depicted in figures 2.4, 2.5 and 2.6.
Figure 2.3 – Needle sizes commonly used for intravenous injection

Figure 2.4 – Cephalic vein
Preparing sites for intravenous injection

Prior to injection, the site must be prepared. In most cases the site is clipped and swabbed with an antiseptic. See Figure 2.6.

Performing intravenous injection

Having correctly prepared the injection site it is now possible to inject an agent directly into the vascular system.

Connecting the needle and syringe

After selection of an appropriately sized syringe and needle, these are connected. The hub of the needle is firmly placed onto the nozzle of the syringe so that the bevel of the needle is upwards, as depicted in figure 2.7.
Filling the syringe
When the needle and syringe are correctly fitted, it is possible to fill the syringe from a container. When filling the syringe it is important to ensure that the following guidelines are considered:
- the top of the drug bottle should be swabbed
- the prescribed agent should be selected
- the syringe should be filled accurately to the desired level
- the syringe should be free from air bubbles.
See Figure 2.8.

Inserting the needle into the vein
When inserting the needle into the vein the following steps should be followed. Points to take specific note of are:
- identify the location of the vein
- stabilise the vein with the free thumb
- insert the needle through the skin in a swift manner without jabbing
- slowly position the needle so that 75% of the needle is in the vein.
See Figure 2.9.

Checking for blood on drawback
If the needle is correctly positioned, applying gentle drawback pressure on the syringe plunger will allow blood to enter the syringe. However, in very small or shocked patients (if blood pressure is poor) blood may not enter the syringe on drawback. See Figure 2.11.

Injecting the agent
Having determined that the needle is correctly placed in the vein, the agent may be injected. Applying gentle pressure to the syringe plunger will cause the agent to be administered. See Figure 2.12.

Removing the needle and applying pressure to the vein
Having administered the agent into the vein, the needle should be removed. This is achieved by applying gentle but firm traction on the needle and syringe. Pressure should then be applied to the vein to minimise unwanted bleeding. See Figure 2.13.

Disposing of the syringe and needle
Used syringes and needles should be disposed of in an appropriate manner. Syringes may be placed in a rubbish bin, or cleaned and recycled. Needles should be placed into a properly designed Sharps container. See Figure 2.14.
Figure 2.6 – Preparing an injection site

Figure 2.7 – Positioning the bevel for intravenous injection
Figure 2.8 – Filling the syringe

Figure 2.9 – Inserting the needle into the vein
Figure 2.10 – Drawing blood back into the syringe

Figure 2.12 – Approved sharps disposal containers
Intravenous catheters

Intravenous catheters may be inserted in cases where a constant infusion, repeated injections or injection of irritant materials is required. They are inserted into the vein and a plastic cannula is left in place. The parts of an intravenous catheter are depicted in figure 2.13.

![Figure 2.13 – Parts of an intravenous catheter](image)

Intravenous catheters are available in a number of styles, gauges and lengths. They should be selected according to the size of the patient. For example, an 18 gauge catheter may be used in a dog and a 22 gauge in a cat.

In addition to the intravenous catheter you will require clippers, swab, 2 cm adhesive tape, and a catheter plug.
Placing an intravenous catheter

The patient should be restrained in a similar manner as for intravenous injection, the site should be clipped and swabbed. The instructions below are for right-handed operation. Vein should be occluded before commencing this procedure.

Step 1
Place your left hand under the animal’s carpus and grip the leg firmly, with your thumb and fingers on the top of the carpus. See Figure 2.14.

Step 2
Hold the catheter in the right hand. Note that the catheter is held parallel to the surface of the skin and the operator’s fingers are not curled underneath the catheter. See Figure 2.15.

Step 3
Insert the catheter through the skin. See Figure 2.16.

Step 4
When the catheter enters the vein, blood will appear in hub of the catheter. See Figure 2.17.

Step 5
Extend the fingers and thumb of your left hand to stabilise the catheter whilst removing the stylet with your right hand whilst advancing the cannula into the vein. See Figure 2.18.

Step 6
Place a plug into the end of the catheter and tape the catheter to the patient’s leg. See Figure 2.19.
Removal of an intravenous catheter

The procedure for removal of an intravenous catheter is similar to that of an intravenous needle. After removal, pressure should be applied to the site to avoid unwanted bleeding and if necessary a light dressing should be applied.

Figure 2.14 – Restraining a patient for intravenous catheterisation

Figure 2.15 – Clipping the cephalic vein for intravenous catheterisation
Figure 2.16 – Preparing the injection site

Figure 2.17 – Holding the catheter for insertion
Figure 2.18 – Inserting the catheter

Figure 2.19 – Stabilising the catheter

Figure 2.20 – Injection into vein via catheter
Subcutaneous injection

The loose skin from the back of the neck to the rump is the most common site for the administration of this injection.

Only non-irritant drugs should be administered by this route as there may be irritation or necrosis.

1. Draw up the required volume of drug using a sterile needle and syringe.
2. Restrain the patient.
3. Raise a fold of skin (e.g., the scruff).
4. Clean the skin with an alcohol swab (Spirit should not be used when injecting a vaccine, as it may inactivate the drug.)
5. Insert the needle under the skin and draw back gently on the plunger. If blood appears, a blood vessel has been punctured, and a new site must be selected. If no blood appears then the drug may be injected into the patient.
6. Massage the injection site gently to disperse the medication.
7. Record details of the medication given and the route of administration.
8. Dispose of the needle and syringe safely.

Intramuscular injection

The quadriceps muscle group in front of the femur is the most common site for intramuscular injections. Other sites include the lumbodorsal and triceps muscles. The gluteal and hamstring muscles should be avoided, as there is a danger of bone and sciatic nerve damage.

The technique is similar to that for the subcutaneous injections except that the needle should be inserted at right angles to the muscle mass.

Intramuscular injections can be painful and volumes injected should not exceed 2 ml in cats and 5 ml in dogs.
Pain and Pain Control

Drugs used to control pain

Pain may be relieved, at least in part, by environmental or behavioural (eg petting, stroking) manipulations, as well as by drugs.

In the case of environmental control, emphasis is placed on the well being of the animal. In dogs, socialisation with humans appears to be an important stress relieving factor. Petting, stroking, verbal encouragement and eliciting a purr from a cat will help alleviate pain and stress.

In the case of drugs, analgesics, sedatives and tranquillisers may all be used. The appropriate drugs and dosage will tend to be different for each case depending on the species, age and the severity of pain present.

Pain in animals is often difficult to assess as they possess an inborn behavioural tendency to mask pain. Evolution has enhanced this inborn behavioural tendency because animals showing weakness, pain or distress become targets for predators. Therefore, careful observation of the animal is required to identify sometimes subtle behavioural changes that indicate that the animal is in pain.

Signs of pain

Some signs that may indicate the animal is in pain include, looking repeatedly at an area on the body, biting at the painful area, alterations in breathing pattern, vocalisation, attempts to protect (eg bite) or move away when it is touched, limping, crying, guarding and licking an area. Restlessness, pacing, trying to get comfortable, reluctance to move and lying in one place for prolonged periods, are other symptoms that may be present.
**Narcotics or Opiates**

These drugs act to elevate the pain threshold and alter the body’s response to pain. Examples include codeine, morphine, oxymorphone, pethidine, methadone (Methone), butorphanol (Dolorex) and buprenorphine. Side effects include respiratory depression, cardiac depression and vomiting. The severity of the side effects depends on the drug used, the species of the animal and the dose rate. An advantage with the use of these S8 drugs is that these potentially hazardous side effects can be reversed with the use of a narcotic antagonist such as Naloxone (Narcan) or Nalorphine.

**Non-narcotic Analgesics**

This is a large group of diverse drugs that includes aspirin, indomethacin (Cu-Algesic), flunixin (Finadyne), phenylbutazone (Myoton), ketoprofen (Ketofen), carprofen (Zeneclur) and meloxicam (Metacam). One of the problems with prolonged use of these drugs especially if given orally and in combination with corticosteroids, is the potential to cause gastrointestinal tract ulceration and bleeding. The newer drugs such as carprofen and meloxicam are less likely to cause this problem. Oral medications should be given with food to reduce the potential for gastric irritation.

Tranquillisers such as acepromazine (Promex) and diazepam (Valium) do not have good analgesic properties when used alone. If given in combination with an opioid however, they improve the analgesic effect of the opioid. In contrast xylazine (Rompun) is a potent analgesic at doses that does not cause sedation. If higher doses are required sedating effects can be reversed with the use of yohimbine (Reversine).
Pre and post operative analgesia

Providing effective analgesia reduces the time taken for post-operative recovery, as well as being important for patient welfare.

When post-operative pain is anticipated, an analgesic may be given as a premedication or during surgery. This helps to avoid a painful recovery.

The animal should be monitored for signs of pain during the recovery period. If clinical signs become apparent, the veterinarian should be informed so that analgesics can be administered.

The following Opioids and NSAIDs are commonly used in veterinary practice for pain control.

Opioids

Opioids are classified as Controlled Drugs, previously known as S8 or Drugs of Addiction. They have stringent storage and recording requirements and must be stored in a locked cupboard with detailed records kept of their use. They should only be handled by the veterinarian.

Morphine

Morphine is an opioid which gives excellent analgesia and some sedation. It is presented as a clear liquid which is generally given as an intramuscular injection, but may also be given via slow intravenous drip (morphine infusion), or as an epidural injection administered while the patient is anaesthetised.

An intramuscular injection of morphine provides analgesia for 2–4 hours, epidural morphine provides analgesia for up to 12 hours, and a morphine infusion provides continuous analgesia.

Atropine is often used with morphine to counteract the side effects of bradycardia and salivation.

• Beneficial effects of morphine include:
  – excellent analgesia
  – sedation
  – reduced dose of anaesthetic required

• The side effects of morphine include:
  – excitement or mania in cats and horses, especially if given large doses
  – vomiting
  – bradycardia or slow heart rate
  – defecation
  – salivation
  – slight respiratory depression
  – colic in horses
Contraindications
Morphine is not generally used in cats or horses due to the risk of excitement.

Buprenorphine
Buprenorphine is one of the longest acting opioid and is marketed as 'Temgesic'. It is presented in 1 ml glass ampoules.

It is a strong analgesic used for short term relief of moderate to severe pain. Its duration of activity is variable but will generally last between 3-8 hours. It can be given s/c, i/m or slow i/v. It has an onset of activity of 15-30 minutes and hence, is often given as a premedicant. It works better if given before pain is established.

- The beneficial effects of buprenorphine include:
  - good analgesia
  - some sedation

- Side effects of buprenorphine include:
  - only slight decreases in heart rate
  - only a slight decrease in blood pressure
  - minimal respiratory depression
  - occasional vomiting

Contraindications
Buprenorphine relies on the liver for metabolism and excretion, and should therefore not be used in-patients with liver disease.

Butorphanol
Butorphanol is marketed as 'Torbugesic' or 'Dolorex', and is usually given by subcutaneous or intramuscular injection. and is a good analgesic as well as a mild sedative.

Butorphanol is generally injected subcutaneously or intramuscularly, and provides 3–4 hours of analgesia. It also has an antitussive (anti-coughing) effect, which can be useful in keeping brachycephalic patients intubated for as long as possible in recovery.

- Beneficial effects of butorphanol include:
  - good analgesia
  - some sedation
  - heavy sedation if combined with another sedative such as acepromazine
  - very little cardiovascular or respiratory depression
  - antitussive (ie anti-coughing) which allows the endotracheal tube to be removed later into recovery

- There are no major side effects of butorphanol.

Contraindications
Butorphanol is metabolised by the liver, so is often avoided in-patients with liver disease.
Pethidine
Pethidine is a clear liquid, usually given by subcutaneous or intramuscular injection. The effects of pethidine, as with other opioids, can be reversed by administering naloxone.

- Beneficial effects of pethidine include:
  - analgesia for one to two hours after administration
  - onset of analgesia is 10-15 minutes
  - light sedation
  - can be used in cats

- The side effects of pethidine are:
  - excitement or mania in cats and horses, if given large doses
  - sudden drop in blood pressure if given intravenously

Contraindications
Pethidine is considered a safe drug and can generally be given even to old or sick patients.

Non Steroidal Anti Inflammatory Drugs (NSAIDs)
Non-steroidal anti-inflammatory drugs (NSAIDs) are a class of analgesics which includes such drugs as aspirin, carprofen, ketoprofen and meloxicam. They are not opioids but usually scheduled as prescription drugs. They act to control pain and inflammation, and may be used to control either chronic pain (such as with degenerative joint disease) or post-operative pain.

Use of NSAIDs can lead to gastrointestinal ulceration, especially long term use, as well as kidney problems, especially if used in patients who are dehydrated or who have renal disease patient).

Antibiotics should be used with NSAIDs if an infection is present, as NSAIDs will interfere with some inflammatory processes necessary for fighting infection.

Carprofen
Carprofen ('Rimadyl') is an NSAID which may be used to relieve post-operative pain.

'Rimadyl' should be refrigerated, and any unused drug discarded 4 weeks after opening. It may be injected subcutaneously or intravenously, and provides analgesia without sedation.

The NSAID side-effects such as gastric ulceration, kidney problems, and platelet disturbances are rarely a problem with short term (up to 3 days) use of carprofen. However carprofen should be avoided in patients already having gastric or renal problems, or dehydration. It is also contraindicated in animals which are pregnant, hypotensive, or have heart disease.
Clean Theatre Equipment

Introduction

Preparing instruments and materials for sterilisation begins with cleaning following by packing.

Although there are many methods of preparing packs the principles, which should be followed, remain the same and these will be discussed. In addition we shall discuss one (1) suitable method of preparation.

Preparation of packs is a single link in a chain of events that lead to the production of sterile equipment and materials, which are suitable for use in the surgery. If any element in this chain of events should not be effectively completed the pack may not be completely sterile and could result in post operative infection.

Cleaning instruments and materials

Instruments

Instruments should be carefully cleaned prior to sterilisation. Although methods of cleaning vary there are some general rules which should be followed. You should:

• soak instruments immediately after use
• clean them with plenty of running water
• handle instruments carefully
• only use instruments for their intended purpose
• be careful not to damage sharp edges
• take care to clean locks and ratchets well.

Three methods are commonly used to clean instruments. They are the use of fresh running water, ultrasonic cleaners and chemical agents.
Fresh running water

Washing instruments with large volumes of clean running water is an effective, if time consuming, procedure if carried out properly.

When using this method it is important to use plenty of water and to ensure that difficult to clean areas such as locks and ratchets are effectively cleaned. In addition it is important to ensure that sharp instruments are not damaged by rough handling or the use of abrasives such as ‘steel wool’.

Ultrasonic cleaners

Ultrasonic cleaners are machines, which use high frequency sound waves moving through water to which has been added a low sudsing detergent. They produce their effect by vibrating foreign material away from surgical instruments. An example is depicted in figure 3.1.

This method has the advantages that they are quick and easy, producing clean instruments thoroughly without damaging them.
Chemical Cleaners (‘Rapidex’, ‘Pyroneg’ and ‘Endozyme’)

Chemical agents such as ‘Rapidex’, ‘Pyroneg’ (depicted in figure 3.2) and ‘Endozyme’ are agents that effectively clean instruments by soaking. This is an effective method of cleaning instruments and avoids the need for special equipment.

Instrument milk

Instrument milk (depicted in figure 3.2) is a commercially available agent that is used to lubricate and polish instruments after cleaning.

It is recommended that instrument milk should be used regularly. Lubricants that are used to ensure that instruments open and close easily are removed by constant cleaning and sterilising.

Materials

Materials such as drapes and gowns should be carefully cleaned prior to packing for sterilisation. In most cases materials are laundered and the following rules should be followed. You should:

- soak materials prior to washing to remove blood and other foreign materials
- rinse all materials well after washing to ensure that any traces of detergent are removed
- remove any lint
- remove any x-ray badges prior to soaking or washing.
Packing of instruments and materials

Many different techniques are used for packing instruments and materials depending on personal preference. Irrespective of the technique it is important to ensure that the instruments or materials are thoroughly cleaned to ensure that sterilisation is enhanced.

Irrespective of the packing technique which is used the following principles should be adhered to. They should be packed so that:

• proper sterilisation is promoted
• equipment and materials are not damaged
• contents can be unpacked in an aseptic manner
• packs can be stored (if necessary) so that they maintain sterility for a reasonable period of time.
• sterilisation indicators such as steamclox indicates whether sterilisation has been effective
• packs are dated and named for proper identification
• ratchet instruments should not be closed any further than the first click and it is preferable that they are left open
Two methods of packing instruments and materials

Depicted in figure 3.3 are two (2) methods that may be used to pack instruments or materials. When performing this task particular notice should be taken of the following points.

(g) all folds should be crisp and neat
(h) the finished bundle should be firm but not excessively tight
(i) it is preferable to double wrap packs as this extends their storage life.
(j) packs should be secure with autoclave tape
(k) pack should be dated and named.

![Diagram of Method 1 and Method 2]

Figure 3.3 – Two (2) methods of packing instruments and materials
One (1) method of folding surgical drapes and towels

Depicted in figure 3.4 is one method of folding surgical drapes and towels. You will notice that all folds are made in an ‘accordion style’. This technique is used as it ensures that steam penetrates materials easily and that they are most readily autoclaved.

When performing this task particular notice should be taken of the following points:

(i) all folds should be crisp, neat and ‘accordion style’

(m) the finished bundle should be firm but not too tight.

**Figure 3.4 – One method of folding surgical drapes and towels**
A method of folding a gown

Depicted in figure 3.5 is suitable method of folding a gown that is to be sterilised for use within the operating theatre. When performing this task particular notice should be taken of the following points:

(n) the gown is folded inside out so that only the inside surfaces are touched by operating theatre staff
(o) all folds should be crisp, neat and ‘accordion style’
(p) the finished bundle should be firm but not excessively tight.

Figure 3.5 – One method of folding a gown
Cleaning the operating room environment

Between surgical cases the operating table, instrument trolley’s etc should be wiped down with a suitable disinfectant and body tissues disposed of according to legislative requirements.

At the completion of the surgical session the entire operating room should be cleaned thoroughly. Floors should be vacuumed, and mopped with an appropriate disinfectant. All horizontal and vertical surfaces should also be cleaned. Particular attention should be made to the moving of the operating table (where possible) and clean underneath.
Asepsis and Methods of Sterilisation

Introduction

Aseptic technique is an important role of the surgical nurse. By definition aseptic technique is the performance of tasks that render the surgical field free from pathogenic micro-organisms.

The success of any surgical procedure depends on healing. If infection is present healing will not occur or will be delayed. Minimising the risk of infection is a fundamental principle of surgical technique.

Sources of post operative infection

Sources of post operative infection are surgical staff, the patient, surgical materials, equipment and the environment.

The aim of asepsis is to minimise the number of pathogens thereby minimising the risk of post operative infection.

In practice it is not possible to carry out ‘sterile surgery’ (which implies that the surgical field is free from all micro-organisms). Even if all possible care is taken in the preparation of materials, equipment and the patient it is not possible to sterilise the patient’s skin. When the surgeon makes the first incision, bacteria deep in the skin of the patient enter the wound. This is therefore, not a sterile environment, rather it is an aseptic environment.
Sterilisation

Sterilisation is an integral part of aseptic technique associated with surgery conducted in veterinary practice.

Sterilisation techniques that may be seen in practice include boiling (moist heat), autoclaving (steam under pressure) and cold sterilisation (disinfection). Sterilisation using radiation is a common feature of articles purchased already sterilised.

There are a number of factors that should be considered when choosing a suitable method of sterilisation. These factors include the type of material to be sterilised and whether the materials are to be stored prior to use.

Rules which should be followed to perform effective sterilisation

Irrespective of the sterilisation technique which is chosen there are a number of rules which should be followed to minimise the risk of failure.

These rules include:

(q) The materials and equipment to be sterilised must be compatible with the technique.

(r) Materials should be thoroughly clean and free from oil, grease and proteins such as blood, pus etc

(s) All materials should have adequate exposure to sterilising agent at the correct concentration or amount for an adequate time.

(t) The sterilising equipment should be in good working order.

(u) All equipment and packs must be properly prepared and loaded into the sterilising environment.

Assessing the effectiveness of sterilisation

The effectiveness of sterilisation may be assessed physically, chemically or biologically.

Physical assessment

The use of gauges to indicate time, temperature, pressure or other parameters is referred to as physical assessment.

These techniques are unreliable because they are open to human error and the gauges may be faulty. They should only be used as an indicator that the sterilising process is occurring.
Chemical assessment

Chemical assessment involves the use of indicators that undergo a colour change when certain parameters are reached.

Examples of chemical indicators are autoclave tape and steamclox.

- Autoclave tape
  Autoclave tape is used to indicate that the temperature of steam has reached an adequate level. It does not indicate the period of time at which that temperature was maintained and therefore does not imply that correct sterilisation procedure has occurred. An example of autoclave tape is depicted in figure 2.1.

  ![Autoclave tape](image)

Figure 2.1 – Examples of chemical indicated autoclave tape, steamclox, sterilope and OK indicators

- Other indicators
  Other chemical indicators for assessing the effectiveness of steam sterilisation include ‘sterilope autoclave bags’ and ‘propper OK strips’. These are depicted in figure 1.

  In addition chemical indicators are found on the items which have been gamma sterilised. The indicator undergoes a chemical change in response to irradiation.

Biological indicators

Biological indicators imply the use of living matter to indicate the effectiveness of sterilisation. As it is biological matter that we are trying to destroy, this is the most effective form of monitoring.

Biological indicators are usually found in the form of spores as in ‘Sporestrips’. These strips are impregnated with non pathogenic bacterial spores which if placed on an agar plate will activate and grow into a colony. These strips are placed in the steriliser. Upon completion of a sterilising cycle, the strip is ‘plated out’. If the sterilising has been complete no growth will occur.
Boiling

Boiling is a technique which does not destroy all bacterial spores. Some of the bacteria responsible for post-operative infection are spore forming eg bacteria which cause gas gangrene and tetanus. The advantage of boiling is that the equipment requirement is cheap and reliable. It is a rapid method of destroying most organisms (with the exception of spores) rapidly.

The major disadvantages are that boiling does not destroy spores, instruments and materials are wet and hot when ready for use and cannot be stored. Some equipment, such as drills, cannot be boiled as they contain oil or grease. Some materials will not withstand immersion in water (eg most types of suture material).

Cold sterilisation (disinfection)

Cold sterilisation requires the use of chemicals to disinfect materials and equipment. Like boiling, cold sterilisation should be considered unreliable as not all spores are destroyed by this process. However if these chemicals are used correctly it is a useful technique where other methods are unavailable.

Cold sterilisation is commonly used for instruments required for minor procedures where contamination has already occurred eg minor stitch-ups, abscesses.

Chemical groups that may be used for cold sterilisation include alcohol, iodines, chlorhexidine and chlorines. Care should be taken to ensure that the chemical will not damage the instruments or materials and that any residues on the equipment will not irritate the tissues of the patient.

The effectiveness of the disinfection is influenced by the:

- nature of the micro-organisms (especially the presence of bacterial spores)
- number of micro-organisms
- the concentration of the disinfectant
- the length of exposure to the disinfectant
- the amount of organic matter present
- temperature
- type and conditions of materials to be disinfected.

An anti-rust additive must be added to the disinfectant solution to prevent instruments rusting.
Radiation sterilisation

Radiation sterilisation is not to be performed in the clinic. Gamma sterilisation is commercially performed to sterilise items such as scalpel blades, surgical suture materials, rubber gloves, syringes, dressings and catheters. Radiation sterilisation is reliable and does not damage delicate materials. This process requires extremely expensive specialist equipment.

Dry heat

Dry heat involves the use of an oven to sterilise equipment. This technique is commonly used in laboratories to sterilise glassware.

This technique has the advantages that the equipment required for dry heat sterilisation is cheap, that it does not damage sharp instruments and that it is relatively quick (sixty minutes at 160°C).

The disadvantages of this technique are that many materials such as plastics, rubber and cloth are damaged by dry heat. In addition the equipment sterilised by this method cannot be readily stored.

Steam sterilisation (autoclaving)

Autoclaving requires the use of special equipment which produces steam in a confined space. When placed under pressure the temperature of the steam rises and becomes a reliable method of sterilisation.

The simplest form of autoclave is a pressure cooker. Most commonly in veterinary practice displacement autoclaves are used. Displacement autoclaves work on the principle that air in the sterilising chamber is removed by pressure as the steam is produced. In large hospitals vacuum autoclaves are used. In this case all air is removed from the sterilising chamber by a vacuum pump thus speeding the sterilisation process.

The advantage of steam under pressure is that it is a reliable method of sterilisation, it penetrates many materials, is relatively quick and equipment may be stored prior to use.
For example, a pack which requires exposure to steam under pressure at:

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Sterilising Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>110°C</td>
<td>Requires 18 minutes</td>
</tr>
<tr>
<td>121°C</td>
<td>Requires 12 minutes</td>
</tr>
<tr>
<td>125°C</td>
<td>Requires 8 minutes</td>
</tr>
<tr>
<td>132°C</td>
<td>Requires 2 minutes</td>
</tr>
</tbody>
</table>

The disadvantage of autoclaving is materials such as rubber and some plastics are damaged by the intense heat. Equipment containing oil or grease is damaged and super sharp instruments are blunted by the steam.

![Figure 2.2 – An example of an autoclave](image-url)
Procedure for operation of the autoclave

Although autoclaves vary, the basic operating procedure is similar. Some autoclaves are more automatic and therefore avoid the need to carry out some steps manually.

Described is a standard procedure for a non-automatic unit:

9. Plug in the autoclave and turn it ‘ON’.
10. Check the water level in the water reservoir. Fill if necessary.
11. Fill the autoclave chamber to the correct level.
12. Load the autoclave.
13. Close the chamber.
14. Set the autoclave to the correct autoclaving time.
15. Switch the autoclave on to sterilise.
16. When the autoclaving time has finished turn the sterilising switch to ‘OFF’.
17. Release the pressure from the autoclaving chamber.
18. Wait until the pressure gauge reads ‘ZERO’ pressure.
19. Open the chamber. Carefully unwind the door. Watch out for hot steam, remove stopper and open the door about 10 cm.
20. Set the autoclave to ‘DRY’.
21. Collect the sterile packs when cool and dry.
Prepare Theatre or Surgical Operating Area for Use

Preparation of surgical team

Preparing the surgical team for surgery is yet another link in a chain of events that are designed to minimise post operative infections.

In this case the overall aim is to produce and maintain a sterile field. This sterile field is considered to be the area of the front of the body above the waist.

Described in this unit is a technique that might be used to maintain the highest standards of asepsis possible. We do however recognise that in many clinics ‘short cuts’ are taken where only a selection of these techniques are performed to produce what is considered to be an acceptable level of asepsis for the particular practice.

Aspects of preparation that are considered here are applying mask and cap, the surgical scrub and gowning.

Applying surgical masks and caps

Although surgical masks and caps are not worn in many veterinary clinics others insist on their application prior to entering the surgical area.

The aim of the surgical mask is to prevent contamination of the patient by any micro-organisms from the operator’s airways or oral cavity.

The aim of wearing a surgical cap is to prevent hair or scurf contaminating the patient and therefore predisposing to post surgical infection.

An example of how to wear a surgical mask and a surgical cap is depicted in figure 3.3.
Figure 3.3 – The surgical mask and cap

**Scrubbing and drying**

Scrubbing and drying of hands prior to surgery is common to all veterinary practices. Although the technique may vary the aim remains the same. The surgical team is attempting to remove pathogenic micro-organisms that are on the hands without damaging the skin itself.

Micro-organisms found on the skin are divided into three (3) types:

1. contaminant or transient
2. resident
3. deep or hidden.

**Contaminant or transient flora**

These are acquired casually by contact, e.g. working in the garden, changing dressings. These bacteria may be pathogenic or harmless. These micro-organisms are easily removed by washing with soap and running water for one minute.

**Resident flora**

These are the stable, persistent residents of the skin. These are harder to remove or kill than the transients. Fortunately only about 5% of the resident flora is pathogenic but this proportion may be increased by constant contact with infected material.

The bacteria population of the hands may increase rapidly under gloves. A surgeon or assistant who wears gloves continuously for a few hours may end up with a bacterial population greater than before the pre-surgical scrub.

Fortunately mechanical cleansing (washing) and use of anti-septic solutions can significantly reduce the bacterial count.
Deep or hidden bacteria
These bacteria live deep in the hair follicles and sebaceous glands. Most of these are non-pathogenic and cannot be removed without sterilising the skin.

Effective scrubbing technique will remove transient and some resident bacterial. A suggested method of scrubbing is described below and shown in figure 3.4.

The three (3) minute scrub
22. Turn on the water and adjust it for temperature and pressure
23. Apply antiseptic to the hands and wash up to within 4 cm of the elbows producing a good lather
24. Clean the nails with a nail file or nail pick
25. Rinse beginning at the hands and moving towards the elbows keeping the hands elevated to prevent water flowing back from elbows to hands
26. Obtain a sterile brush, wet it and apply antiseptic
27. Scrub from hands to within 4cm of the elbows completing one arm at a time:
   - Finger nails – 10 strokes each
   - Each finger surface and interdigital space – 5 strokes each
   - Palms – 5 strokes each
   - Backs of hands – 5 strokes each
   - Each arm surface – 5 strokes each covering 4-5cm at a time
28. Rinse from hands to elbows keeping the hands elevated
29. Turn water off with elbows
30. Dry the hands

Figure 3.4 – The principles of scrub technique
Drying technique

One technique of drying hands is described below.

Let towel open, use one end and thoroughly dry fingers then start up the arm using a slow circular motion – never return to an area you have already dried. Take the opposite end of the towel and dry the other hand and arm, again starting with the fingers and moving up the arm. This is depicted in figure 3.5.

Figure 3.5 – Drying technique

- Discard the towel.

You are now ready to put on the sterile gown.
Gowning

The principle aim of putting on a sterile gown is to ensure that the front surface of the gown remains sterile. This means that you are permitted only to touch the inside surface of the gown. One way this can be achieved is by following the steps below.

31. Pick up the sterile gown by the neck and allow it to unfold. Do not allow it to fall on the floor or touch any other item.
32. Identify the arm holes
33. With the right or left hand holding the collar, place the other hand into the arm hole.
34. Hold both arms upwards and extended to support the gown and wait for an assistant to adjust and tie the gown.
35. The assistant may adjust the gown by using the inside surface of the gown and must not touch the outside of the gown

This is depicted in figure 3.6.

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**Figure 3.6 – Putting on a sterile gown**
Gloving

The principle of putting on gloves is that the outside surface of the glove must not be touched by the hand. There are two (2) methods of achieving this. One is open gloving and the other by closed gloving technique. The open gloving technique is described here.

36. The glove pack will be opened by an assistant.
37. The right or left glove is picked up by the turned cuff and the right or left hand is placed into the glove.
38. The other glove is picked up by the turned cuff, with the gloved hand, and the other hand is placed into the glove.
39. The cuff of both gloves are then pull up.
40. The gloves are adjusted.

This is depicted in figure 3.7.
Pre-operative animal preparation

Preparation of the anaesthetised patient prior to surgery varies considerably from practice to practice. The aim of this preparation remains the same, that is to minimise post operative infections. Described below is one standard procedure. It is divided into clipping and swabbing.

Clipping the patient

The area is usually clipped using electric clippers with a size 40 clipper blade. The area should be large enough so that hairs don’t contaminate the surgical site during surgery. As a general rule the clipped area should be 4.5 cm$^2$ larger than the required surgical site. The area should be vacuumed to reduce contamination of animal and environment.

Swabbing the patient

There are many scrub methods used in practice – no particular method is the correct method but you should always work from the incision site outwards. An example of a simple yet effective scrub method is as follows:

- scrub site with Betadine scrub then rinse and repeat
- swab with 70-80% alcohol working outward from the incision site.
- paint or spray with Betadine solution immediately before surgery begins (again working outward from the incision site).

Irrespective of the chemicals used, the principles remain the same.

- Initially swabbing the incision line then working outwards always applies. Never return to a swabbed area with a contaminated swab.
- Do not damage the area by scrubbing too vigorously
Unpacking surgical equipment

In principle this should be done in such a way that equipment maintains sterility and can be handled safely by the surgeon or surgical assistant. The unpacking of ‘peel packs’ and ‘double wrapped surgical packs’ is described.

Opening ‘Peel Packs’

Scalpel blades, surgical gloves and some suture materials are presented in ‘peel packs’.

Peeling back the outer package as depicted in figure 3.1 opens these.

Figure 3.1 – Opening ‘peel packs’
Opening ‘Double Wrapped’ surgical packs

Double wrapped surgical packs must be opened for use by the surgeon or surgical assistant.

When opening these packs it is essential not to touch the inner wrap. This is depicted in Figure 3.2.

Figure 3.2 – Opening a ‘double wrapped’ surgical pack
Control of Reproduction

Introduction
Management, surgical or chemical methods, can achieve reproductive control. Control may be necessary for several reasons, for example so that breeding can be delayed until the female is of mature size, or to give the female adequate time between litters, or to allow breeding when the appropriate male is available, or if the animal is not required for breeding purposes.

Management practices
Management practices to control reproduction involve separating the female from the male so that mating cannot occur. The female must be confined so that males cannot gain access to the female and so that the female cannot escape.

In queens, where ovulation is induced by cervical stimulation and the oestrus cycle continues until the queen is mated, ovulation can be induced artificially. A glass rod can be used to stimulate the cervix and induce ovulation. The ovulated eggs will not be fertilised and the queen will go into anoestrus. This technique is used when the queen is not required for breeding in a particular season.

Surgical procedures for controlling reproduction
There are a variety of surgical procedures that are used to control reproduction. They involve either the removal of the ova or sperm producing organs or surgery to prevent the release of ova or sperm.

Ovariohysterectomy and castration are the most commonly performed procedures and are desirable because they also remove the source of oestrogen and progesterone production in the female and the source of testosterone production in the male. As well as affecting sexual behaviour, an absence of sex hormones will also contribute to a reduction in certain diseases such as prostatic disease and perianal adenomas in male dogs and mammary tumour in the bitch, if ovariohysterectomy is performed before the bitch’s first oestrus cycle. Both procedures are irreversible.
Ovariohysterectomy

Ovariohysterectomy or speying is a procedure that involves the removal of both the ovaries, which produce ova as well as the hormones oestrogen and progesterone, and uterus. This means that the female will not experience oestrus and cannot become pregnant.

Tying tubes

This procedure involves tying the fallopian tubes so that ova are unable to pass from the ovary to the uterus.

Although this procedure is effective in preventing breeding, it is not commonly performed in companion animals. Fertilisation of the ova and pregnancy cannot occur, however the female will still experience oestrus and will mate because the ovaries are still functional. Uterine infections, such as pyometra, can also still occur because these infections are dependent on female hormones.

Castration

Castration involves the removal of both testes and hence the removal of the spermatogenic cells and the interstitial cells, which produce testosterone. This means that the castrated male cannot breed and secondary sex characteristics such as muscle development and accessory sex gland development are reduced. Castration may also influence behavioural characteristics associated with the hormone testosterone such as roaming, aggression and urine spraying, especially when performed prior to the animal reaching sexual maturity.

Vasectomy

Vasectomy is a procedure, which involves tying off and removing part of both of the vas deferens, preventing the passage of sperm therefore rendering the male infertile. As the testes are still able to produce testosterone, the male will still exhibit secondary sex characteristics and mating behaviour, however the ejaculated seminal fluid will not contain any sperm.

This procedure is not commonly performed in veterinary practice as it has no affect on the secondary sex characteristics and does not prevent testosterone dependant diseases.
Chemical control of reproduction

Hormones can be used in the control of reproduction to:

- postpone the onset of oestrus
- suppress the signs of oestrus
- terminating pregnancy
- suppress sexual activity in the male
- treat prostatic disease.

Suppression of sexual activity in the male

Progesterone’s have an anti-androgenic effect, ie they oppose the effects of male hormones by suppressing the release of testosterone. As a result they may be used to suppress sexual activity as well as behaviours such as roaming, aggression and urine spraying. The fertility of the male remains unaffected.

Prostatic disease

The progesterone-like chemical Deladumone acetate is often used in the treatment of diseases of the prostate gland in the dog. In entire male dogs, the function and size of the prostate gland is dependent on the hormone testosterone, and as they age the prostate gland often enlarges. This enlargement may interfere with the passage of faeces through the gastrointestinal tract by pressing on the colon and rectum, resulting in constipation, or it may interfere with urination by constricting the urethra.

Castration is indicated in these dogs to remove the source of testosterone and thus reduce the size of the prostate gland. If castration cannot be performed, Deladumone acetate injections can be administered at regular intervals to suppress the release of testosterone.