FERRETS (*Mustela putorius furo*) are commonly kept as companion animals, with at least 800,000 believed to be held in the UK ([www.nfws.net](http://www.nfws.net)).

Ferrets belong to the family Mustelidae, which is claimed to be one of the oldest living carnivore mammalian families, and also includes polecats, weasels, otters, badgers and skunks (Powers and Brown, 2012). Many studies suggest they may be closely related to the steppe polecat (*Mustela eversmanni*). However, examination of external chromosome shape has determined ferrets are the domesticated version of the European polecat (Fisher, 2006).

It is vital to appreciate ferrets’ specific husbandry requirements and predisposition to certain conditions to maintain their physical and behavioural health.

Natural behaviour and captive housing requirements

Ferrets enjoy social interaction and quickly become habituated and bonded to their owners. They love to play and behave like excitable puppies, even initiating tag games to be chased, and will perform elaborate leaps (Fisher, 2006). There is an increasing trend towards keeping ferrets indoors, but, owing to their intensely inquisitive nature, they should be supervised when playing to ensure they don’t disappear down crevices or chew electric cables or pliable items.

If ferrets are kept outdoors they need protection from the elements (wind, rain and direct sunlight) and it is highly recommended they live in an aviary-type enclosure, big enough for a person to walk into. A variety of enrichment strategies and items can be provided, ensuring varying height levels and including branches, nest boxes, hammocks and swinging platforms.

Ferrets require lots of exercise and should be allowed to express both climbing and burrowing behaviours. Appropriate materials and soft bedding should be given for ferrets to snuggle into or mould a nest. An extensive description of a ferretarium and other outside enclosures for ferrets, as well as ideas for environmental enrichment, can be found in Lewington (2008).
Handling

Aggressive ferrets can have a tenacious bite so when approaching animals of unknown temperament it may be necessary to wear thick gardening gloves. However, most pet ferrets tolerate handling well and can be restrained around the pectoral girdle while the other hand supports their weight.

More active ferrets can be scruffed by the loose skin on the back of the neck (Figure 1) while cradling the hips in the opposite hand (Zaffarano, 2010).

Veterinary care

A brief anatomy of the main organ systems follows, with specific attention to those organs affected by the more commonly encountered ferret diseases.

Integument

Ferrets have a fine undercoat and coarse, long guard hairs that provide excellent insulation (Evans and An, 1998). They undergo a heavy moult twice a year, concurrently with seasonal weight changes. Their skin can be particularly tough, especially over the scruff region and in males. Sebaceous glands are found all over the body, but in higher density around the mouth and anus, and are responsible for the characteristic ferret musk.

Alopecia is a common complaint in ferrets. It may be seasonal, but several diseases including hyperadrenocorticism (Figure 2), hyperoestrogenism, parasitism, food hypersensitivity or neoplasia must be considered. Skin scrapes and hair plucks, radiography, ultrasonography, haematobiochemistry and serum adrenal hormone panel can be performed to reach a definitive diagnosis (Meredith, 2009; Schoemaker, 2009).

Digestive system

Ferrets have typical carnivore dentition, consisting of long canine teeth for grasping and holding prey, premolars and molars for cutting and tearing meat. The stomach of ferrets is simple and they have a weak cardiac sphincter, which enables vomiting.

The small intestine is relatively short, accounting for a comparatively short gut transit time (approximately three to four hours in the adult). Ferrets should, therefore, not be starved for more than four to six hours. They also do not have a caecum, appendix or ileocolic valve and the large intestine is about 10cm long, consisting of the colon, rectum and anus.

At the very caudal part of the rectum are two well-developed anal glands, which produce a serous
yellow liquid with a powerful odour. In the UK, the RCVS deems the removal of these glands an
unnecessary mutilation, unless affected by a specific medical condition requiring action.

Furthermore, descenting a ferret does not significantly reduce its characteristic strong smell, which
mainly arises from its sebaceous glands (Powers and Brown, 2012). Ferrets share similar digestive
physiology to dogs and cats and present gastrointestinal (GI) diseases (such as inflammatory
bowel syndrome [IBS]) that are common across these groups of animals (Huynh and Pignon,
2013). Nevertheless, some GI abnormalities are specific to ferrets and often present a real
diagnostic challenge to the clinician. A thorough diagnostic plan in these cases would include:
complete physical examination, haemato- biochemistry, coproscopy (for example, *Giardia,
Eimeria*), bacteriology (such as *Salmonella, Campylobacter*), PCR (for example, ferrets enteric
coronavirus, rotavirus, *Helicobacter*, distemper virus), ultrasonography, gastroscopy, exploratory
laparotomy, cytology and/or histopathology of collected samples (for example, lymphoplasmacitic,
eosinophilic or pyogranulomatous infiltrates, lymphoma), and immunohistochemistry.

A dietary history may be important as dietary hypersensitivity has been reported in the ferret and
because ferrets have a limited protein digestibility compared to cats (Fekete et al, 2005; Piazza and
Diez, 2009). The ferret's short intestinal tract and lack of intestinal brush borders enzymes
contributes to their inefficient absorption, especially of carbohydrates (Fisher, 2006). Therefore,
high-quality food items containing highly digestible animal protein (35 per cent to 55 per cent of dry
matter), 18 per cent to 20 per cent fat, low fibre (two per cent) and limited carbohydrates, are
recommended for ferrets (Piazza and Diez, 2009).

Good quality dry pelleted ferret foods are now widely available and provide the required daily
nutrition. Ferrets will also benefit from a varied additional protein source, such as chicken, fish and
eggs.

**Reproductive system**

Male ferrets (hobs) have relatively small testes. They have closed inguinal canals and do not
retract testes into the abdomen. Their palpable os penis has a J-shaped tip, which makes urethral
catheterisation difficult (Figures 3 and 4). The preputial opening lies on the ventral abdomen, just
caudal to the umbilical area. The prostate is the male’s single accessory reproductive gland, which
surrounds the proximal urethra (Evans and An, 1998).

Female ferrets (jills) have paired ovaries located just caudal to the kidneys, a bicornuate uterus
with two long uterine horns meeting caudally in a short uterine body and a single cervix. The
urethra opens into the vaginal floor at the urethral orifice.

The vulva is located close and ventral to the anus. Jills are seasonally polyoestrous and induced
ovulators with ovulation generally occurring 30 to 36 hours after copulation. An obvious vulvar
swelling develops when the jill is in oestrus (Figure 5).
If ovulation is not induced, either mechanically or chemically, the female will remain in oestrus until a changing photoperiod occurs. However, persistently high oestrogen levels can cause bone marrow suppression and, possibly, fatal aplastic anaemia (Chitty, 2009). Mating is a rough process with the male grabbing the female by the scruff, but this behaviour is necessary for ovulation.

Gestation is approximately 42 days and foetuses are usually palpable from around 14 days, although ultrasonography is generally required for confirmation of pregnancy. The kits are altricial, being born hairless, blind and completely dependent on their mother (Figure 6).

Endocrine system

The adrenal glands are located near each kidney, embedded in fat and covered by the peritoneum. Hyperadrenocorticism is one of the most common diseases of ferrets and it is different from Cushing’s disease seen in dogs and cats. In ferrets, plasma sex steroid hormones (androstenedione, 17 ?-hydroxyprogesterone and oestradiol) levels are elevated. Increased concentrations of gonadotrophins, which occur after neutering due to the loss of negative feedback, persistently stimulate the adrenal cortex, resulting in adrenocortical hyperplasia and tumour formation (Schoemaker, 2009). Extensive literature is available and further reading is encouraged using the literature referenced (Schoemaker et al, 2002; Schoemaker and Kuijten, 2004; Schoemaker et al, 2004; Schoemaker et al, 2008a and b; Schoemaker, 2009; Kuijten et al, 2007).

Common techniques

Venipuncture

Common sites for venipuncture and blood collection include the cephalic, jugular, lateral saphenous vein, and the cranial vena cava. Ferrets can react to the application of alcohol, therefore adequate restraint and control of the animal is necessary when sedation or anaesthesia are not performed. No more than 10 per cent of the total blood volume should be taken from healthy animals at any one time (Zaffarano, 2010).

Fluid therapy

A short GI transit time, coupled with a high metabolic rate, make ferrets easily susceptible to rapid dehydration and weight loss. Hydration, blood glucose, nutrition and body heat are parameters that need to be carefully monitored in sick ferrets (Zaffarano, 2010). Intravenous catheters (26G) should be placed in the cephalic or saphenous veins for prompt fluid therapy in dehydrated or collapsed patients. If intravenous routes are not available then intraosseous catheters can also be used (proximal femur or proximal tibia).

Nutritional therapy
Maintenance of caloric intake is critical in debilitated ferrets. Supportive diets include Hill's Prescription Diet A/D, Oxbow's Carnivore Care formula, and Lafeber's Emeraid Nutritional Care System's Carnivore diet. The food should be offered to ferrets as soon as they show coordinated movements following anaesthesia or when dehydrated and following periods of anorexia.

Pureed chicken or turkey baby food can also be used on short-term, if more balanced dietary products are not available (Zaffarano, 2010).

**Conclusion**

Adrenal disease, pancreatic disease (insulinoma) and lymphoma are three of the most commonly encountered diseases of pet ferrets, but newly identified diseases are more often encountered in private practice (Johnson-Delaney, 2010). Ferrets are also susceptible to both influenza A and B and can potentially expose humans via aerosol transmission.

This article is merely a platform for the practitioner and it is strongly recommended the references are consulted for more in-depth information on ferrets.

**Skunks**

Skunks belong to the subfamily Mephatidae of the Mustelidae and are less commonly kept as pets because they tend to become less friendly with age and can spray from their anal scent glands. This makes skunks undesirable pets (Schoemaker, 2010).

The striped skunk (*Mephitis mephitis*) is the species more often seen in captivity. All skunks produce a malodorous defensive secretion, the characteristic smell of which is attributed to volatile thiol compounds. These compounds have been found to be able to react with oxyhaemoglobin forming methaemoglobin (Wood et al, 2002).

Anecdotal reports exist of illness or death in dogs following encounters with skunks and there is one described case of methemoglobinemia and Heinz body anaemia in a dog sprayed with skunk musk (Zaks, Tan and Thrall, 2005). Skunks can be very inquisitive and like to climb and dig, and their housing is comparable to that of ferrets.

In contrast to ferrets, skunks are omnivorous and consume a mix of whole prey, insects, fruit and vegetables. In captivity, their food intake should be carefully monitored as obesity is frequent. Skunks are susceptible to canine distemper virus, rabies and canine adenovirus.

Vaccinations have been recommended by some authors, but none of the available vaccines are approved for use in this species (Schoemaker, 2010). Metabolic bone disease is frequently seen in pet skunks, usually as a result of inadequate nutrition (Dragoo, 2009). Radiography and blood chemistry (including ionised calcium) may help the diagnosis.
Skunks are prone to other diseases caused by bacteria, internal and external parasites, fungi and viruses (Table 1). For more extensive information about skunks, please refer to the literature (Dragoo, 2009; Schoemaker, 2010; Kramer and Lennox, 2003).

References


**References**


Figure 1. The ferret can be handled by grasping the skin on the nape of its neck while supporting its back end.
Figure 2. Alopecia is the most common clinical sign noted in adrenal gland disease in ferrets, with a reported incidence of 90 per cent. The loss is usually symmetric and progressive and might be accompanied by pruritus in some cases. Many other differential diagnoses need to be ruled out.
**Figure 3.** The tip of the male penis is characteristically J-shaped, which can complicate urethral catheterisation.
Figure 4. The male ferret possesses an os penis that can be seen radiographically.
Figure 5. An enlarged vulva is normally seen in jills in oestrus. However, this is also commonly seen in a spayed female ferret with adrenocortical disease.
Figure 6. Ferret kits are born altricial and with their eyes closed.

<table>
<thead>
<tr>
<th>Metabolic bone disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Hepatic lipidosis</td>
</tr>
<tr>
<td>Dental disease</td>
</tr>
<tr>
<td>Gastrointestinal parasites</td>
</tr>
<tr>
<td>Ectoparasites</td>
</tr>
<tr>
<td>Abscesses</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
</tr>
<tr>
<td>Dermatitis</td>
</tr>
<tr>
<td>Gastroenteritis</td>
</tr>
<tr>
<td>Canine distemper</td>
</tr>
<tr>
<td>Rectal prolapse</td>
</tr>
<tr>
<td>Seizures (hypocalcaemia, hypoglycaemia)</td>
</tr>
</tbody>
</table>

Table 1. The most common diseases encountered in pet skunks (Kramer and Lennox, 2003)