FERRET FACTS

Ferrets come in many colors. Common coat colors are sable (black guard hairs with a cream undercoat), albino (yellow-white fur with red eyes), and cinnamon (beige guard hairs with a cream undercoat). Less commonly observed coat color variations include silver, black-eyed white, chocolate, Siamese, panda, and many other combinations.

The average ferret weighs 0.8 to 1.2 kg, and the average ferret lifespan ranges from 5 to 11 years. Normal body temperature in ferrets is 100 to 104°F, and average heart rate is 180 to 250 beats/minute. The average blood volumes in male and female ferrets are 60 ml and 40 ml, respectively. Normal hematocrit for ferrets (reference range = 46–57%) is higher than that of other mammals. Normal white blood cell count in ferrets (reference range = 5.6–10.8 × 10^3/µL) tends to be slightly lower than in other mammals.

Wild ferrets often undergo seasonal changes that may or may not be apparent in domesticated ferrets. Their body fat decreases in summer and increases in winter. Their hair coat molts in spring and fall, lightens in winter, and darkens in fall. All seasonal changes are generally less dramatic in neutered ferrets.

Ferrets also have a unique integument. They have thick skin, no sweat glands (so they overheat easily), active sebaceous glands responsible for their musky odor, and paired anal glands that are usually removed by breeders shortly after birth in the "descenting" process.

In addition, ferrets have a distinct cardiovascular anatomy. Their heart sits caudally in the thorax between the sixth and eighth ribs, and on a lateral radiograph, the heart may appear elevated off the sternum by fat deposits in the sternal ligament. In addition, ferrets have a single central carotid artery rather than bilaterally paired arteries, as in other mammals.

Ferret spleens also may be very large and are attached cranially to the greater curvature of the stomach. They may extend caudally to the left kidney and diagonally from the upper left quadrant to the lower right. Ferret spleens commonly are sites of extramedullary hematopoeisis.

Ferrets have short gastrointestinal transit times (3–4 hours in the adult). They have gallbladders and well-developed pyloric sphincters but are able to vomit. They do not, however, always vomit with gastrointestinal secretions. Wild ferrets tend to be solitary, while domesticated ferrets often live happily in groups. They may, however, demonstrate aggressive play behaviors such as neck biting.

Ferrets are strict carnivores with short gastrointestinal tracts. They do not digest fiber or carbohydrates well. Thus, they require a high-protein (30–35%), high-fat (15–20%), low carbohydrate diet. Dry kibble, which contains an excessive amount of carbohydrate, and sugary treats, should be avoided in ferrets due to their predisposition to developing insulinomas.

RESTRAINT

The degree to which a ferret needs to be restrained for examination generally depends on how ill the ferret is. Very ill or docile ferrets may only require minimal restraint. Very active or biting ferrets, however, may be restrained by hanging them by the scruff of the neck with all four legs off the table. This position generally relaxes the ferret and often elicits a "yawning" reflex that facilitates oral examination.

PHYSICAL EXAMINATION

Ferrets should be examined with a body systems approach, as for a dog or cat. Hydration is best assessed via measurement of mucus membrane capillary refill time and gingival "tackiness." Since ferrets tend to lose dorsal muscle mass when they lose weight, assessing the degree of skin tenting over the dorsum is generally an unreliable method of determining hydration status.

Ferrets hate to have their rectal temperature taken. Thus, unless a ferret is very ill, rectal temperatures are not taken routinely as part of the physical examination in ferrets. If rectal temperature is taken, it should be done at the start of the examination so that it is not falsely elevated from struggling.

Pupillary light response should be checked. Older ferrets often suffer from retinal degeneration leading to abnormal pupil dilation. Cataracts are also common in both adult and juvenile ferrets.

A thorough oral examination should be performed, including assessment of the teeth. The tips of canine teeth commonly break off in ferrets, and dental tartar and gingivitis are often seen in ferrets on soft diets.

Peripheral lymph nodes should be palpated. They should feel symmetrical and soft. Obese ferrets
commonly have symmetrically enlarged, soft lymph nodes that are encased in fat. Asymmetrical enlargement or firmness of lymph nodes warrants lymph node aspiration and further work-up.

The heart should be auscultated. Use of a pediatric stethoscope aids in auscultation. The normal cardiac rhythm in ferrets is normal sinus rhythm or respiratory sinus arrhythmia.

The abdomen should be palpated thoroughly in a systematic fashion. Hanging the ferret vertically by the scruff, displacing the organs downward, often aids in palpation. As ferrets are carnivores, like cats, they should not have a large amount of palpable gastrointestinal gas. They may, however, have palpably enlarged spleens that interfere with the assessment of other abdominal organs. Enlarged spleens should be palpated gently so as not to rupture them.

The urogenital system should be examined. Male ferrets have a J-shaped, bony os penis within the prepuce. Swelling or inflammation of the prepuce may signify urinary tract obstruction from prostatic enlargement secondary to adrenal gland disease. In spayed females, vulvar enlargement occurs commonly from adrenal disease but may also be seen with ovarian remnants retained after ovariohysterectomy.

The skin should be carefully assessed. Ferrets with adrenal disease often have bilaterally symmetrical alopecia or diffusely thin hair coats with comedones (blackheads) and pruritus. Tail tip alopecia also occurs with adrenal disease but may be seen seasonally in ferrets with normal adrenal glands.

**HOSPITALIZATION**
Ferrets may be housed in stainless-steel cat and dog cages as long as the bar spacing is small enough to prevent escapes. Ferrets will squeeze out between widely spaced bars. Cat and dog cages can be modified by adding a Plexiglas plate over the bars, extending at least half way up the height of the cage door. Very ill ferrets may need supplemental heat or oxygen. In addition, most ferrets like to have shredded paper or a towel for burrowing.

**VENIPUNCTURE**
Venipuncture in ferrets is generally performed without sedation unless ferrets are fractious. Anesthetizing ferrets with isoflurane decreases all hematologic values, thereby altering complete blood count (CBC) results, and is therefore less desirable. Fidgety ferrets may be distracted with food or Nutri-Cal® (Tomlyn, Buena, NJ) during venipuncture. Up to 10% of the ferret’s blood volume may be taken safely at one time. However, very small volumes (< 1.5 ml) are usually adequate to obtain CBC and chemistry results.

Larger blood volumes may be sampled from the jugular vein or anterior vena cava. The jugular vein is more lateral in the neck in ferrets than in dogs and cats. To take blood from the jugular vein, the ferret is restrained like a cat, with its head and neck extended and its front legs pulled down. Venipuncture is accomplished with a 25-gauge needle attached to a 1- to 3-ml syringe.

For sampling from the anterior vena cava, the ferret is restrained on its back with its head and neck extended and its front legs pulled caudally along its body. Unsedated ferrets must be calm and restrained by two assistants; ferrets that struggle during this procedure can suffer vena caval laceration. A 25-gauge needle attached to a 1- to 3-ml syringe is inserted up to the hub at a point just lateral to the manubrium at a 45-degree angle to the length of the body. The needle is directed toward the opposite hind leg, and the syringe is aspirated as the needle is withdrawn. If the ferret struggles at all, the needle must be completely withdrawn and the ferret allowed to sit up so as not to lacerate the vein.

For smaller blood volumes, samples may be taken from the lateral saphenous vein, just proximal to the hock, with a 25- to 28-gauge needle attached to a 1-ml or insulin syringe. The cephalic vein may be used, too, for sampling small blood volumes. Blood is taken from the same site as in dogs and cats with a 25- to 28-gauge needle attached to a 1-ml or insulin syringe.

**CATHETERIZATION**
Catheter placement in ferrets generally requires sedation unless the ferret is moribund. Intravenous (IV) catheters may be placed in ferrets in the lateral saphenous or cephalic veins. Jugular catheters may be placed, too, with difficulty, but they are often not tolerated well by ferrets. Before a peripheral catheter is inserted, the skin overlying the vein should be punctured with a 20- to 22-gauge needle. A 24- to 26-gauge catheter is inserted, attached to a T-connector, taped in, and wrapped. E-collars usually are not necessary.

Intraosseous catheters may be necessary in very hypovolemic or very small ferrets. They are usually placed in the sedated ferret (unless the ferret is moribund) in the proximal femur. A 20- to 22-gauge 1.5” spinal needle or a 20- to 22-gauge needle with a surgical steel wire stylet is inserted into the medullary cavity. An intraosseous catheter may be replaced with an intravenous catheter when the ferret is better hydrated.

**FLUID THERAPY / DRUG TREATMENT**
Maintenance fluid rate in ferrets with crystalloids is estimated at 60–70 ml/kg/day IV, divided q 8–12h. When calculating fluid rates for ferrets, as in cats and dogs, you must account for ongoing losses and dehydration. Fluids may be administered to mildly dehydrated ferrets subcutaneously over the dorsum or to severely dehydrated ferrets intravenously with a fluid pump or buretrol. Supplementation with potassium, dextrose, and B vitamins may be added as needed.

Colloids are given to hypoproteinemic or shocky ferrets. Hetastarch may be administered IV at a rate of 10–20 ml/kg/day. If hetastarch is given, the volume of concurrently administered crystalloid should be reduced by a third to a half. Very shocky ferrets may be bolused
URETHRAL CATHETERIZATION

The urethral opening is then dilated by flushing in saline with a 3-ml syringe. The needle must be withdrawn and the catheter slowly inserted until urine is withdrawn with a 25-gauge needle attached to a 3- to 6-ml syringe. The needle must be withdrawn quickly if the ferret struggles so as not to lacerate the thin-walled bladder.

Cystocentesis

Cystocentesis is usually performed in unsedated ferrets unless they are fractious. The technique is similar to that used in cats. The ferret is restrained in lateral recumbency, the bladder is palpated and stabilized, and urine is withdrawn with a 25-gauge needle attached to a 3- to 6-ml syringe. The needle must be withdrawn quickly if the ferret struggles so as not to lacerate the thin-walled bladder.

URETHRAL CATHETERIZATION

Urethral catheterization is commonly performed in male ferrets with urinary obstruction from prostatic enlargement secondary to adrenal disease. This procedure is often difficult because the urethral opening is on the ventral penis, alongside the os penis. The prepuce in male ferrets with urethral obstruction is often swollen making it difficult to see the urethral opening. The ferret is sedated, and the penis is exteriorized. The urethral opening is then dilated by flushing in saline with a 24-gauge IV catheter. A lubricated, 3.5-French red rubber feeding tube, a 3.0-French ferret urinary catheter (Slippery Sam catheter®, Global Veterinary Products, New Buffalo, MI), a tomcat catheter, or a 20-to 22-gauge 8" jugular catheter without a stylet is passed alongside the IV catheter. Saline is flushed in continuously as the catheter is passed into the bladder. Whatever catheter is used, it should be premeasured and marked with the distance from prepuce to bladder. A sterile guitar string may be used inside the catheter as a stylet to stiffen it for easier passage. Care must be taken not to force the catheter in; forcing it can lead to urethral rupture, particularly at the pelvic flexure. Once the catheter is in the bladder, it should be stabilized with butterfly tapes sutured to the prepuce and to the abdominal skin about 5 cm distally. The remainder of the catheter is taped to the tail, and a closed urinary collection system is attached. In very active ferrets, the catheter should be bandaged to the abdomen. All ferrets with urinary catheters should be fitted with e-collars to prevent chewing. Urine output, serum electrolyte concentration, and kidney function are then monitored.

Male ferrets with urethral obstruction from adrenal gland disease that cannot be unblocked with urethral catheterization should have their bladders emptied via cystocentesis and should undergo adrenalectomy as soon as they are stable. A temporary tube cystostomy is performed at the time of adrenalectomy if the urethra is not patent. Urine output, serum electrolyte concentration, and kidney function are monitored. Male ferrets rarely require urethral catheterization unless they have urethral obstruction from very large uroliths. Female ferrets are sedated and placed in ventral recumbency with the hind end elevated. The urethral opening is visualized with a vaginal speculum 1 cm cranial to the clitoral fossa. A 3- to 5-French red rubber tube with a wire stylet is passed into the bladder through the urethral opening.

SPLENIC ASPIRATION

Splenic aspiration is commonly performed in ferrets with splenomegaly to obtain samples for cytologic analysis. In ferrets with splenomegaly, this procedure helps distinguish extramedullary hematopoiesis from neoplastic conditions such as lymphoma. Sedation is generally required only if the ferret is fractious. The ferret is restrained in dorsal or lateral recumbency, and the skin over the area to be aspirated is shaved and prepared aseptically. One hand is used to insert a 25-gauge needle attached to a 3-ml syringe into the spleen percutaneously as the other hand immobilizes the spleen.

BONE MARROW ASPIRATION

Bone marrow aspiration in ferrets requires sedation. Sites commonly aspirated include the proximal femur, iliac crest, and proximal humerus. Over the proximal femur, the site is prepared steriley, and a small incision is made over the greater trochanter. A 20-gauge 1.5"
spinal needle is inserted just medial to the greater trochanter. The needle is advanced with rotation and aspirated with a 6- to 12-ml syringe. Samples obtained are then expelled on to slides and gently "squash prepped" for cytologic analysis.

TRACHEAL WASH
Tracheal wash is performed in ferrets to obtain samples for cytologic analysis and culture. The ferret is anesthetized and intubated with a sterile endotracheal tube. An open-ended urinary catheter is passed through the tube to the level of the tracheal bifurcation. Two to 3 ml of sterile saline is flushed in, the ferret is coupaged, and the saline is immediately aspirated for analysis.

BLOOD TRANSFUSION
Blood transfusions are generally performed in ferrets with packed cell volumes ≤ 25% and with clinical signs of anemia or thrombocytopenia (ie, tachycardia, tachypnea, weakness, petechia). Ferrets have no blood groups, so there is little risk of transfusion reaction. Large males are generally preferred as donors. Ferrets may be pretreated with corticosteroids [prednisolone sodium succinate (22 mg/kg IV); dexamethasone sodium phosphate (4–8 mg/kg IV, IM)]. Six to 12 ml of donor blood is collected into acid-citrate dextrose (ACD) (1 ml ACD: 6 ml blood) and infused in to the recipient IV or IO. When a donor is not available, Oxyglobin® (Biopure Corp., Cambridge, MA) may be administered at 11–15 mg/kg IV over 4 hours and may be given up to twice in 24 hours.

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