

## **Heat Stroke in Ferrets**

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### **Mechanisms of heat loss:**

Radiation - the loss of body heat to the ambient environment

Conduction - the loss of body heat to a cooler substance touching the body

Convection - the loss of body heat to air or fluid currents moving over the body

Evaporation - the loss of body heat through respiration and panting (and sweating to some degree, although this is more convection)

Temporary increases in body temperature can usually be handled by these measures, but as the ambient temperature rises, they lose their effectiveness.

### **A Brief Overview of Hyperthermia:**

As the body temperature rises, the brain tells the body to dissipate heat by increasing cardiac output to increase blood flow to the skin and muscles. Blood flow to the internal organs is decreased to allow the maintenance of normal blood pressure. Continued high body temperatures will result in a number of problems related to this, including stimulation, then depression of the respiratory system, a change in the chemical makeup of the blood, hypoxia (decreased oxygen levels), and then cellular damage as free radicals form in the absence of oxygen. This cellular damage can be irreversible. As the free radicals cause the blood vessels to dilate, hypotension and shock occur.

As heat levels remain high, direct cellular damage is done by the high temperatures. Decreased blood flow results in hypoxia and changes in metabolism. The blood can begin to form microclots in the blood vessels, resulting in even further damage as blood flow is restricted. Multiorgan failure can occur.

Signs of heat stroke can be as mild as excessive panting and weakness or progress through a range of symptoms including muscle cramping, nausea, depression, seizures, coma, and death. An animal may appear to recover from heat stroke only to develop signs of organ failure or other problems a few days to a week later. Kidney failure, liver and gastrointestinal signs, cardiac problems, and DIC (disseminated intravascular coagulation) are all possible sequelae, or may even be present during the initial episode. Nervous system damage can occur, as can severe muscle injury.

The amount of damage done to the body depends on two things - how high the core temperature becomes, and the length of time that it is elevated. Fevers are not considered to be heat stroke, as they are rarely at temperatures (105 F or higher) that can cause damage, and are considered an appropriate response to a body's illness.

### **Ferrets and Heat:**

Ferrets are evolved as cold weather animals. This means that their mechanisms for heat loss are much less efficient than their mechanisms for retaining heat. They cannot sweat, and their fur tends to be dense and to entrap air near the skin, so convection is of very little help to them. Radiation is very inefficient above an ambient temperature of about 80% of their body temperature, so about 80 F. Conduction is of use if there is a cool surface near them, but otherwise useless. And evaporation - panting - is of minimal help due to their small size - there simply isn't enough surface area for evaporation to be cooling to them at all.

Unfortunately, this all means that ferrets are very susceptible to heat stroke at temperatures above 80 to 85 degrees. A ferret with heat stroke may be very red, or flushed in appearance.

They may be prostrate, glassy-eyed, or even unconscious. Since ferrets with insulinoma may exhibit similar signs, it is important to note the ambient temperature before determining which problem it may be.

#### **Treatment of Heat Stroke:**

Since the degree of damage done is dependent on the length of time the temperature is elevated, start cooling the ferret as soon as heat stroke is suspected. While instituting these measures, get to a veterinarian so that further treatment can be begun.

- Do NOT immerse the ferret in an ice or cold water bath. This will cause the peripheral blood vessels to constrict and actually make things worse.
- Do not cool lower than 103 degrees rectal temperature, as doing so will actually result in hypothermia.
- Do not use alcohol or ice packs on the skin.
- Do not give subcutaneous fluids unless directed to do so by your vet. They may cause peripheral blood vessels to constrict.
- Use cool or tepid water to wet the skin and hair coat.
- Direct a fan toward the animal to increase air flow, which will increase the heat loss as the water on the skin evaporates.
- If the animal is conscious and will drink, small amounts of a cool liquid will be helpful, but do not force the animal to drink.

Once you are at the veterinarians, an assessment will be made of whether further measures are needed. They may include intravenous fluids, cool water enemas, or other cooling procedures. Drugs to control any cardiac problems will be started. Oxygen therapy should be done to increase the amount of oxygen reaching the tissues, and may require intubation. Bloodwork is needed to determine the function of the kidneys and liver, and will probably need to be repeated depending on the degree of heat stroke suffered. The ferret may need to be hospitalized for some time. Drugs may be needed to protect the gastrointestinal system.

#### **Prevention of Heat Stroke:**

First and foremost, air conditioners are wonderful things. If, for any reason, climate control is not possible, the following are some ways to keep your ferrets from suffering heat stroke.

- Circulate the air - fans, open windows, etc.
- Cool surfaces for them to lie on - bottles of ice in the cage, stone tiles are some examples. With bottles of ice, be careful to wrap the bottle in cloth to avoid getting the ferret too cold.
- Cool water to drink - bowls allow them to wet themselves (and everything else, unfortunately!) and many ferrets will drink more from a bowl than from a bottle.
- Swimming or cool water baths - a wet ferret is rarely an overheated ferret.

For those who also own other pets, this all applies to them as well, with the exception of temperature. However, I have seen dogs with heat stroke on days where the temperature was not above 85 F, so watch your cats and dogs on hot days as well. Especially watch any animal with heart or respiratory disease, no matter what species they are.