

ZOO STANDARDS FOR KEEPING SMALL FELIDS IN CAPTIVITY

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INTRODUCTION

The family Felidae is one of the most diverse groups of carnivores, and includes species that range in size from 1 kg (2.2 lb) to over 500 lb (230 kg). Small cats are defined here as those felids having an adult body weight of less than 20 kg (44 lb (Emmons, 1991, p.62). In most "small" felids, a group that covers 29 species, males are larger than females. This group excludes lions, tigers, leopards, snow leopards, and jaguars, *Panthera sp.*; cheetah, *Acinonyx jubatus*; clouded leopard, *Neofelis nebulosa*; and puma, *Felis concolor*.

In the wild, all species of small cats are more or less solitary, i.e. intolerant toward adults of the same sex, and exhibit a spatially and temporally dispersed social system (Bekoff, Daniels, and Gittleman, 1984). Most species predominate in woodland and woodland fringe terrain although some species may be found in nearly all terrestrial habitat types. While larger species function at or near the top of the trophic level, many small cats also serve as prey for other carnivores. Larger felids, tigers, lions, leopards, etc., also procure substantially sized prey and typically eat only once in several days; many smaller species take rodents and small birds and must hunt and eat several times per day.

HUSBANDRY

Minimum size specifications - Minimum recommended enclosure size is based upon two weight categories of the cats, those under 10 kg (22 lb) and those ranging from 10-20 kg (22-44 lb) (see Table 1). Recommended minimum space **per cat** is as follows:

<10 kg = 6.5 x 6.5 x 8 ft (2 x 2 x 2.5 m) per cat (l x w x h)

<20 kg = 13 x 6.5 x 8 ft (4 x 2 x 2.5 m) per cat (l x w x h)

Floor space should be increased by 50% for each additional cat. Terrestrial species should have more floor space allocated than arboreal ones. Table 1 lists which cats are terrestrial; the above dimensions can be adjusted accordingly.

Enclosure contents - More important than an enclosure's size is its complexity and usability. Care should be taken to allow cats to utilize the vertical component of an enclosure by providing aerial pathways. Cats should have access to at least 75% of the enclosure's vertical space. Furthermore, small cats seem to prefer perching platforms at or near the top of their enclosure, a place from which they can "hide" and peer out. They also prefer localized heated areas. Durable plastic materials as well as wood make good platforms/shelves for cats. Small cats also require logs upon which they can "sharpen" their claws. Rotting logs exposed to the elements further stimulate clawing activity.

Each enclosure should include at least one visual barrier for a cat to completely hide behind. Each cat also needs a den or secure area that can be defended against a cagemate.

Shift or secondary holding areas are strongly recommended in order to safely move animals from their primary enclosure for cleaning, feeding, and medical procedures. There should be one holding cage for each cat. For cats weighing less than 10 kg (22 lb), each shift area should be no less than 2 feet (.61 m) high with minimum of 6 square feet (0.6 m²). For cats weighing 10-20 kg (22-44 lb), each shift area should be no less than 3 feet (1 m) high with a minimum of 10 square feet (1 m²).

GENERAL REQUIREMENTS

Temperature - Temperature extremes should not exceed those of the cats' respective native habitats. Each cat should be able to move to an area protected from wind, rain and direct sunlight. Heat pads can provide additional sources of heat for cats housed outside; appropriate placement of heat pads can encourage the cats to stay in public view. Cats housed continuously outdoors should each be provided with a den designed to protect the cat from the elements and temperature extremes.

Some tropical species of small cats as well as temperate ones can tolerate a fairly wide range of temperatures but it is necessary to acclimate them slowly to lower temperature ranges. Where indoor temperatures exceed 85 degrees F (29 degrees C), a ventilation system must be used.

Lighting - Sufficient lighting (approx. 100 foot candles at 10 feet (3 meters) should exist in indoor enclosures to permit routine cleaning, but more subdued light levels (20-30 foot candles) are recommended for exhibition purposes [**There is some suggestion that cats maintained indoors should be kept under full spectrum light but this is not substantiated.**] The majority of small cats are thought to be nocturnal in the wild and as a result, numerous zoos exhibit cats under a reverse day/night light cycle. Regardless, there are no data to suggest that reverse cycles increases the activity of the cats. In fact, small cats seem more attuned to the noises and activities of staff than to light levels.

Ventilation - Indoor housing should be well ventilated in order to minimize drafts, odors, dust, and moisture condensation. There should be 8-10 complete changes of non-recirculated air per

hour, and with a 15-40% intake of fresh air. If possible, separate circulating systems for each indoor cat enclosure should be available to reduce the risk of disease transference.

Water - Fresh clean water should be available at all times. Water bowls should be cleaned and disinfected daily. Some species routinely defecate in water bowls. This behavior is difficult to discourage. Elevating water bowls 6-12 inches above the ground sometimes discourages this behavior. Automatic watering devices may be used for some cats.

Sanitation. Hard surfaces of primary enclosures, food containers, and water bowls should be cleaned and disinfected daily. Perches and shelves where animals climb, sit, and rest should also be kept free of feces and urine but it may not be necessary to clean them daily. Dirt substrates in outdoor planted exhibits should be raked and spot-cleaned daily. Footbaths should be used prior to entering and exiting all felid enclosures, or areas containing enclosures. Each should be filled with a disinfectant and its use strictly adhered to by all personnel. Appropriate controls for vermin infestation should be maintained.

Nutrition - The nutritional needs of small felids is well understood and the following summary by Mary Allen is offered (from Wildt, Mellen and Seal, 1992, pp 24-25).

"In general, wild felids share the same nutritional requirements as the domestic cat, although there is evidence that some species differ with respect to selected nutrients. Nonetheless, from a comparative perspective, wild felids are relatively easy to maintain nutritionally. The advent of

commercially-prepared, nutritionally complete diets have alleviated earlier reports of bone disease, common when cats were solely fed muscle or organ meats. Although well-balanced, these frozen meat-based products have several inherent problems. First, Vitamin A is present in exceptionally high concentrations. The domestic cat requires fewer than 10,000 (IU)/kilogram (kg) of dry matter (DM). Some commercial preparations contain 48,000 IU/kg DM. There is some evidence that liver damage in the cheetah may be related to excessive dietary intake of vitamin A. Because these products are well-fortified with other micronutrients, additional vitamins and minerals should not be supplemented. Secondly, fat content in these products usually is in excess of 35% DM. Obesity in zoo-maintained cats may be due, in part, to excessive dietary intake of fat contained with insufficient physical activity. Third, these foods are typically soft when thawed. Soft diet consistency may contribute to poor oral health. Evidence suggests that feeding bones with meat attached, 2 days/week, may help provide physical stimulation to teeth and gums. The provision of small, whole vertebrate prey (mice, rats, rabbits) twice/week will provide similar benefits to small-sized cats. And lastly, these meat-based diets are highly subject to spoilage. Thawing under refrigeration and delivery in insulated containers will check the growth of potentially harmful microbes. Other methods of feeding also can present problems. For example, it is well-recognized that leopard cats fed a specific canned felid diet (formulated to meet domestic cat requirements), developed severe optic problems eventually traced to a taurine deficiency. In cases where muscle or organ meat comprises the bulk of the diet (for instance in institutions with performing cats"), vitamin and mineral deficiencies can occur.

Based upon present knowledge, it can be concluded that inadequate nutrition does not appear to be affecting the health or reproductive fitness of most wild felids in captivity. Nonetheless, there are serious recommendations to be made, all of which should be adhered to at the institutional level. These include:

1. offering vitamin and mineral supplements only if the bulk of the diet consists of muscle or organ meats (appropriate types and amounts of supplements include 2 kg muscle [horsemeat], 15 g of steamed bonemeal and 1 Centrum @ tablet [vitamin/mineral source]).
2. providing detailed instruction to keepers as to the proper thawing, delivery and handling of foods highly subject to spoilage.
3. instituting a system for occasionally changing the diet and maintaining detailed records and dietary histories.
4. considering the regular use of a whole prey and/or bones with meat attached both for oral health and to stimulate natural eating behaviors."

Traditionally, captive felids have been fasted one day per week. While this method may be appropriate for larger cats, it is inappropriate for smaller felids. Fast days are NOT recommended for cats under 10 kg (22 lb).

VETERINARY CARE

Quarantine - Small felids are especially susceptible to diseases of the domestic cat and all newly arrived felids should be quarantined at least 30 days prior to entering the collection area. For cats originating from the wild or a range country source, the quarantine period should be extended. Beyond basic tests (CBC, serum chemistry panel, serum banking, and physical exam), serology testing for Feline Immunodeficiency Virus (FIV), Feline Infectious Peritonitis (FIP), Feline Leukemia Virus (FeLV), and Toxoplasmosis should be completed before the animal is mixed with other specimens. Three negative fecal checks should be completed, and the animal treated for external parasites (fleas, ticks, ear mites, etc.), if present.

Vaccinations - Adult felids should receive annual vaccinations against feline distemper (panleukopenia), rhinotracheitis, and calicivirus (FVRCP), semi-annually if practical. Killed products are best. They should also receive prophylaxis against rabies, annually or at three year intervals, depending on the product used. Only killed rabies vaccines should be used for cats. In areas where tetanus is endemic, felids should be vaccinated for this disease on an annual basis. Felids are also susceptible to non-specific diseases such as tuberculosis.

Kittens should be vaccinated with killed (FVRCP) (Fel-o-vax) vaccine at 6-8 weeks, and receive a series of four immunizations every three weeks as well as when six and 12 months old. Young should also be given rabies vaccine at 4-6 months if a risk of exposure is present.

Fecal exams - A minimum of two fecal examinations are recommended per year, and appropriate parasite therapy instituted as necessary.

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Table 1. Weights of small cats (after Sunquist, 1991)

Cats weighing <10 kg

Cats weighing 10 - 20 kg

| Genus Species | Common Name | Wt (lb) | Wt (kg) | Habits |
|---------------------------------|--------------------|----------------|----------------|---------------|
| <i>Prionailurus rubiginosa</i> | Rusty-spotted cat | 2.2 | 1.0 | arboreal |
| <i>Prionailurus planiceps</i> | Flat-headed cat | 3.4-4.5 | 1.6-2.1 | terrestrial |
| <i>Felis nigripes</i> | Black-footed cat | 3.3-5.5 | 1.5-2.5 | terrestrial |
| <i>Oncifelis guigna</i> | Kodkod | 4.5-5.5 | 2.1-2.5 | terrestrial |
| <i>Leopardus tigrina</i> | Oncilla/tiger cat | 3.8-6.0 | 1.8-2.8 | arboreal |
| <i>Felis margarita</i> | Sand cat | 4.5-6.5 | 2.0-3.0 | terrestrial |
| <i>Otocolobus manul</i> | Pallas' cat | 5.5-7.8 | 2.5-3.5 | both |
| <i>Felis catus</i> | Domestic cat | 6.5-8.8 | 3.5-4.0 | terrestrial |
| <i>Leopardus wiedii</i> | Margay | 5.5-8.8 | 2.4-4.0 | arboreal |
| <i>Pardofelis marmorata</i> | Marbled cat | 4.5-11.0 | 2.0-5.0 | arboreal |
| <i>Oncifelis geoffroyi</i> | Geoffroy's cat | 4.5-13.3 | 2.0-6.0 | arboreal |
| <i>Herpailurus yagouaroundi</i> | Jaguarundi | 6.5-13.3 | 3.0-6.0 | terrestrial |
| <i>Oncifelis colocolo</i> | Pampas cat | 7.0-14.0 | 3.2-6.4 | terrestrial |
| <i>Prionailurus bengalensis</i> | Leopard cat | 6.5-15.5 | 3.0-7.0 | both |
| <i>Felis silvestris</i> | Wildcat | 6.5-17.5 | 3.0-8.0 | terrestrial |
| <i>Oreailurus jacobita</i> | Mountain cat | 8.85 | 4.0 | |
| <i>Lynx canadensis</i> | Canadian lynx | 19-22 | 8-10 | terrestrial |
| <i>Lynx rufus</i> | Bobcat | 15-22 | 7-10 | both |
| <i>Profelis aurata</i> | African golden cat | 11-27 | 5-12 | terrestrial |
| <i>Lynx pardinus</i> | Spanish lynx | 26-28 | 12-13 | terrestrial |
| <i>Prionailurus viverrina</i> | Fishing cat | 13-30 | 6-13 | terrestrial |
| <i>Leopardus pardalis</i> | Ocelot | 15-29 | 7-13 | both |
| <i>Catopuma temmincki</i> | Asian golden cat | 27-33 | 12-15 | terrestrial |
| <i>Caracal caracal</i> | Caracal | 24-33 | 11-15 | terrestrial |
| <i>Felis chaus</i> | Jungle cat | 9-35 | 4-16 | terrestrial |
| <i>Leptailurus serval</i> | Serval | 18-40 | 8-18 | terrestrial |
| <i>Lynx lynx</i> | Eurasian lynx | 37-44 | 17-20 | terrestrial |

