American Zoo and Aquarium Association
Minimum Husbandry Guidelines for Mammals:
Procyonids and Red Panda
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INTRODUCTION

Five genera of procyonids are currently recognized: olingo, *Bassaricyon* (five species); cacomistle, *Bassariscus*, including *Jentinkia* (two species); coati, *Nasua* (two species); kinkajou, *Potos* (one species); and raccoon, *Procyon* (six species). All have a Nearctic or Neotropical distribution. The red panda, *Ailurus fulgens*, is monotypic and found only in southwestern Asia. The morphological characteristics uniting procyonids relate primarily to adaptations of location, capture and processing of food. The most significant common adaptation, modification of their teeth for crushing and chewing, is the consequence of a primarily frugivorous/omnivorous diet. In nature, red pandas are adapted to a high altitude temperate environment and a bamboo diet. Their dentition follows the general procyonid pattern but exhibits modification to aid in the mastication of bamboo. Although procyonids are an ecologically, morphologically and behaviorally complex group, most are omnivorous. Raccoons forage for invertebrates and small vertebrates along small bodies of water; cacomistles and kinkajous are largely arboreal, searching for small vertebrates (cacomistle) and fruit (kinkajou) in trees; coatis forage for invertebrates, small vertebrates, and fruit on the forest floor and in trees. The minimally related red panda feeds primarily on bamboo, berries, fruits and young leaves. Their diet is considerably more herbivorous than that of the procyonids which are true omnivores.

GENERAL HUSBANDRY

Housing: Procyonids are small to medium sized nocturnal or crepuscular animals (only coatis are diurnal) with excellent climbing abilities. All are manually dexterous and some species are capable diggers. Most are restless and search constantly for food during their active period. These characteristics make procyonids escape artists and care must be taken to ensure that enclosures are properly escape-proofed. For management purposes, all procyonids should be
considered arboreal and provided with climbing apparatus, and both arboreal and terrestrial nest areas. Enclosure furnishings should enable animals to execute normal locomotor functions and provide visual isolation from people and conspecifics.

**Exhibit Space:**
Minimum space requirements for procyonids are based primarily on their need for locomotion and activity. In nature, most species travel extensively in search of food. Enclosures having a minimum floor area of 42 sq. ft. (4 sq. m.) and measuring 8 ft. (2.5 m) high, and complete with a nest box, are adequate for a single kinkajou, cacomistle, or olingo. Raccoons and coatis require a floor area of at least 81 sq. ft. (7.5 sq. m.). For all species, floor space should be increased by 20% for each additional animal. Housing: Red pandas should be housed outdoors, with access to indoor facilities where weather and temperatures dictate. Enclosures may be walled or moated, or the sides of mesh, fencing, glass, or any combination thereof. Enclosures should have a floor area of at least 400 sq. ft. (37.2 sq. m.), and be at least 12 ft. (4 m.) high, or have climbing structures of this height as red pandas prefer to nest in elevated perches. Enclosure access should be restricted to one or two sides so that animals can retreat from human disturbance. Nest boxes should be constructed of insulative material and placed at different shaded locations in order to maintain cool temperatures. Some part of the enclosure should be shaded at all times to provide relief from the sun.

**Daily Care:**
Although some species, are considered hardy and "easy" to maintain, procyonids require daily care and attention. This should include cleaning enclosures of leftover food and feces, checking animals for condition and normal behavior, and providing them with fresh food and water. Some species (red pandas, ring-tailed cats, coatis and raccoons) are relatively hardy and can be housed outside in moderate temperate climates if provided nest boxes and heat sources in winter. Subtropical and tropical forms (kinkajous and olingos) should be housed indoors if temperatures are expected to fall below 60 degrees F (15 C) for protracted periods. Social Management: Procyonids exhibit a wide range of social organization. Raccoons tend to be solitary and except during the breeding season, they are socially intolerant of conspecifics. At the other extreme are the social coatis. In the wild, adult males are solitary but in captivity, single adult males will be tolerated in female groups although they remain subordinate and are the most likely to be injured during intragroup social disputes. Group enclosures should be provided with refuges to accommodate males and reclusive females. The social system of ring-tailed cats appears intermediate between these two extremes; that of olingos and kinkajous is poorly known. In
captive, ring-tailed cats may be housed in the same enclosure. Kinkajous are generally solitary; in captivity they are socially tolerant. As with raccoons, care should be taken to avoid overcrowding enclosures because overt aggression may not be readily apparent. Red pandas should be maintained as monogamous pairs. Trios of one male and two females may be assembled for breeding provided one female is separated from the group at least 2-4 weeks prior to parturition. Every effort should be made to house solitary individuals with similarly aged individuals to ensure socialization.

Diet:
In captivity, most species can be given a general omnivorous carnivore diet with few problems. Some species are notably more carnivorous (cacomistle) while others are more frugivorous (kinkajou); this should be taken into consideration when devising diets. There is a tendency for some procyonids to become obese from over-feeding or lack of exercise. Bamboo is an essential part of the red panda's diet and at least 20 leaves per animal should be fed daily. If possible, bamboo should be available ad lib. All bamboo substitutes should be carefully reviewed for palatability, digestibility and nutritional content before being offered. Supplemental diets (gruels, cakes, biscuits, etc.) should contain a high percentage of fiber and be low in cholesterol and fat. The energy requirements of red pandas significantly increases in winter and appropriate adjustments should be made in the quantity of the diet at these times.

VETERINARY CARE

All species are susceptible to rabies and should be vaccinated with killed virus (KV) products. Most, if not all, species are also susceptible to canine distemper. This disease is readily induced by the use of live or modified live vaccines (MLV) of avian origin and only KV vaccines (when commercially available) should be used. Because MLV vaccines fail to induce persistently high titers in any species, animals must be vaccinated frequently in order to maintain high titers. Red pandas should receive an initial series of vaccines when 8 weeks old, and be vaccinated again every 3 weeks until they are 16 weeks old. Thereafter red pandas should to be vaccinated twice a year. Parasite examination should be conducted twice a year and infestations treated accordingly. Procyonids are susceptible to a variety of parasites: ascarids (*Toxascaris* and *Toxocara*), hookworms, whipworms, tapeworms, lungworms, and heartworms. Red pandas suffer from the lungworms *Crenosoma*, *Troglostronulus*, and *Metastrongyle*. Antihelminthic drugs used for treating other carnivores are effective. Stools of all species with diarrhea should be cultured for enteric pathogens: *Yersinia* sp. and *Salmonella* sp. All species are
susceptible to toxoplasmosis. *Baylisascaris procyonis*, a nematode parasite for which the raccoon is the primary host, is of increasing veterinary and public health concern. This parasite have been reported in both wild and domestic animals (Kazacos, Fitzgerald and Reed, 1991), and in humans, and is the primary cause of cerebrospinal nematodiasis in birds in zoos. Because anthelminthics are generally ineffective in treating *B. procyonis* infections (Hill et al, 1991), good management practices, including the prevention of cross contamination of exotics by raccoons via their enclosures or feces, and by cleaning of raccoon enclosures during and after occupancy, appear to be the most effective means to reduce or eliminate the likelihood of infection.

Procyonids: All genera of procyonids are susceptible to leptospirosis. In addition, coatis are impacted by feline panleucopenia. Vaccination for these diseases should be considered if local geographic location or zoonotic conditions dictate.

Red panda:
Dental disease is common in red pandas and a source of bacterial entry that may progress to tissue infection and/or septicemia. Animals fed soft gruel diets high in carbohydrates are very prone to tartar accumulation and gingival problems, both of which may lead to generalized dental disease and tooth loss. For this reason, routine dental examination should be included in annual physicals, particularly for older pandas. Hair loss is not uncommon in captive red pandas. Young pandas may have dermatophytosis (*Microsporum gypseum*) while in older animals, skin parasites and hypothyroidism has been diagnosed as a cause of a non-pruritic dermatitis and alopecia.

**LITERATURE CITED**


