

Raccoon Care

Husbandry

Neonates

Neonatal raccoons (0 – 4 weeks) should be housed in dark, warm, den-like cages. A sky kennel or kennel cab lined with towels works very well. Carriers should be placed on heating pads for extra warmth. Newborns are typically fed Fox Valley® Orphan Raccoon formula every 2 – 3 hours via 1 ml or 3 ml syringes. Raccoons resistant to feeding (i.e. will not swallow the formula) may be fed via the insertion of a red rubber tube into the stomach. A raccoon's stomach volume, in mls, has been found to be equivalent to 10% of the body weight in grams; therefore, maximum feeding volume is determined by calculating 8% of the body weight. Each neonate is stimulated to urinate and defecate with a moistened paper towel after each feeding. Neonates are monitored carefully for any signs of upper respiratory disease (coughing, nasal or ocular discharge), diarrhea, lethargy, or umbilical abscesses.

Ideally, each clutch of raccoons should be housed in an area or room with a separate airflow system in order to minimize the risk of a distemper virus outbreak. Distemper virus is transmitted via aerosolization, therefore the virus can easily infect all raccoons in a shared airflow system. If placing raccoons in areas with separate airflow systems is not possible, covering each carrier entirely with towels may help in minimizing virus spread. Changing gloves between clutches or using alcohol-sanitizer on gloves between clutches may also decrease the risk of spreading the virus via fomites. Any neonates exhibiting clinical signs consistent with distemper should be isolated from all other raccoons.

Weanlings

As soon as the eyes open, raccoons should be offered a plate of weaning food. Weaning food consists of 30% canned dog food or moistened dry dog food, 25% small mice and chick pieces, 10% fish pieces, 20% fruit mixture, and 20% vegetables. Weanlings are fed ½ to 1 cup per individual, depending upon the size and age. As the raccoons become more interested in the weaning diet, the formula feeding frequency and volume is gradually tapered. Raccoons should be weighed on a regular basis in order to ensure that no weight is lost during the weaning process.

Juveniles

Raccoons should be moved to an outdoor exhibit at approximately 12 weeks of age for pre-release conditioning. Cage furnishings should include hollow logs, limbs, hide boxes, and a wading pool. Adult and juvenile raccoons easily escape from enclosures that are not secure. Raccoons should be released at approximately 16 weeks of age, depending upon health status, weight, etc. (Culp).

Adults

Injured adult raccoons rest comfortably in stainless steel cages typically utilized for moderately to large-sized dogs, but, as their condition improves, they will require more stimulation and enrichment and can be moved to the outdoor cage described above.

Enrichment

Enrichment for raccoons can be simple but very rewarding. A 7.5 X 13.5 cm piece of PVC pipe with 1.3 cm diameter holes drilled randomly throughout and screw caps on either end is both inexpensive and stimulating. Dog or cat food can be placed within the pipe. Kong® toys, which are commonly used with domestic dogs, are also very effective play items with raccoons. A securely hung bucket or tire with holes in the bottom for drainage works well to hide food within. Food frozen in ice cubes or ice blocks or hidden in pumpkins is also stimulating. Adding peppermint, allspice, clove, vanilla, or pepper to the surface of a toy also keeps raccoons interested (Heyn). Raccoons highly enjoy chasing after live fish in their enrichment pools, and these “feeder goldfish” can be purchased at most pet shops.

Restraint and Handling

Young raccoons can easily be restrained by tightly grasping the scruff, or loose skin located between the shoulder blades. If the raccoon is too large or too vicious to be restrained via the scruff, thick leather gloves should be utilized. Leather gloves typically cannot be used when scruffing an animal between the shoulder blades because the gloves impede the ability to grasp the skin and fur. Leather gloves allow the handler to manipulate the raccoon via simple manual restraint. Adult raccoons should be handled very cautiously, as they possess the ability to inflict severe bite wounds and potentially may be infected with rabies. Very debilitated raccoons can be handled with leather gloves and towels, but aggressive individuals should be

restrained with a rabies pole. These individuals can then be injected with chemical sedation via the use of a pole syringe.

Sedation

There are several drug combinations that have been used with success in raccoons.

20 mg/kg Ketamine + 4 mg/kg Xylazine (reversal 0.15 mg/kg Yohimbine) (Kollias)

12 mg/kg Tiletamine/Zolazepam (Kollias)

20 mg/kg Ketamine + 0.1 mg/kg Acepromazine (Kollias)

3 mg/kg Tiletamine/Zolazepam + 2 mg/kg Xylazine (Kollias)

Vaccination and Anthelmintic Protocols

It is recommended that raccoons be vaccinated for canine distemper at eight, twelve, and sixteen or eighteen weeks of age using Galaxy D (Schering-Plough Animal Health Corporation, Omaha, NE) (Pare). Raccoons should also be vaccinated for rabies using Imrab-3 (Merial, Duluth, GA) at greater than twenty weeks of age. This vaccine should be boosted yearly in captive populations. It has been estimated that the incubation period for raccoon rabies in Ontario, Canada, is about five to six weeks, with a maximum of nineteen weeks. If indicated, Fel-o-Vac PCT (Fort Dodge Animal Health, Fort Dodge, IA) may be administered for vaccination against feline panleukopenia.

Raccoons are the natural host for *Baylissascaris procyonis*, a zoonotic roundworm that causes aberrant parasitic migration in humans and other mammals and avians. The author uses Fenbendazole (50 mg/kg PO SID for 3 days, then once weekly) in all raccoons admitted to the hospital.

Common Disease Conditions

Rabies

Raccoon rabies was first documented in Florida in the 1950's, and by 1977, raccoon rabies had spread to Virginia and North Virginia. The virus was first confirmed in raccoons in Massachusetts in September 1992 in Ashby, near the New Hampshire border, and the virus is considered endemic in the raccoon population of Massachusetts (Blanton). A total of 329 cases of rabies were documented in Massachusetts in 2005, which represented an increase of 1.23% from the previous year. Of these 329 cases, 207 were raccoons (Blanton).

Raccoons infected with the raccoon rabies virus isolate typically exhibit dramatic neurologic signs, including circling, head pressing,

Juveniles

Raccoons should be moved to an outdoor exhibit at approximately 12 weeks of age for pre-release conditioning. Cage furnishings should include hollow logs, limbs, hide boxes, and a wading pool. Adult and juvenile raccoons easily escape from enclosures that are not secure. Raccoons should be released at approximately 16 weeks of age, depending upon health status, weight, etc. (Culp).

Adults

Injured adult raccoons rest comfortably in stainless steel cages typically utilized for moderately to large-sized dogs, but, as their condition improves, they will require more stimulation and enrichment and can be moved to the outdoor cage described above.

Enrichment

Enrichment for raccoons can be simple but very rewarding. A 7.5 X 13.5 cm piece of PVC pipe with 1.3 cm diameter holes drilled randomly throughout and screw caps on either end is both inexpensive and stimulating. Dog or cat food can be placed within the pipe. Kong® toys, which are commonly used with domestic dogs, are also very effective play items with raccoons. A securely hung bucket or tire with holes in the bottom for drainage works well to hide food within. Food frozen in ice cubes or ice blocks or hidden in pumpkins is also stimulating. Adding peppermint, allspice, clove, vanilla, or pepper to the surface of a toy also keeps raccoons interested (Heyn). Raccoons highly enjoy chasing after live fish in their enrichment pools, and these “feeder goldfish” can be purchased at most pet shops.

Restraint and Handling

Young raccoons can easily be restrained by tightly grasping the scruff, or loose skin located between the shoulder blades. If the raccoon is too large or too vicious to be restrained via the scruff, thick leather gloves should be utilized. Leather gloves typically cannot be used when scruffing an animal between the shoulder blades because the gloves impede the ability to grasp the skin and fur. Leather gloves allow the handler to manipulate the raccoon via simple manual restraint. Adult raccoons should be handled very cautiously, as they possess the ability to inflict severe bite wounds and potentially may be infected with rabies. Very debilitated raccoons can be handled with leather gloves and towels, but aggressive individuals should be

unilateral head tilting, excessive licking of various body parts (most notably the genitalia and the tip of the tail), and periodic self-mutilation (Hamir). Raccoons experimentally infected with the canine rabies virus isolate displayed vague neurologic signs, including depression, anorexia, and lethargy, or were found dead in the cage with no premonitory signs (Hamir). Raccoons infected with the raccoon isolate displayed clinical signs that are more consistent with the “furious form” of rabies infection, whereas raccoons infected with the canine isolate exhibited signs more aligned with the “dumb form” of rabies infection. Raccoons infected with the raccoon rabies virus variant survived longer than those infected with the canine isolate (Hamir). It is believed that the incubation period for raccoon rabies virus isolate in Ontario, Canada, in wild raccoons ranges from 5 – 19 weeks (Rosatte).

Canine Distemper Virus

Canine distemper virus is considered enzootic in most raccoon populations. Epizootics of canine distemper have been documented in several populations of raccoons across the United States. In New Jersey, epizootics of canine distemper virus in raccoons have been documented in 4-year intervals, and peaks of prevalence were recorded at the end of the breeding season in March and again in September when kits dispersed (Williams). Juveniles appear to be most susceptible, and early clinical signs of infection consist of depression, mucopurulent nasal and ocular discharge, and a cough. Other clinical signs include lethargy, hyperkeratosis of footpads, and ocular and nasal discharge. Clinical signs unique to procyonids include cystitis with pyuria and jaundice. Central nervous system signs may occur concurrently with the symptoms listed above or may appear within 1-5 weeks after the resolution of systemic signs (Williams). Neurological signs include “chewing gum” seizures, hyperesthesia, cervical rigidity, cerebellar and vestibular signs, paresis or paralysis, aimless wandering, incoordination, and myoclonus (Williams). Duration of the clinical disease is variable but typically ranges from 4 – 6 weeks (Williams). It is important to note that the primary differential diagnosis for the neurological form of canine distemper in raccoons is rabies virus infection.

Mortality from canine distemper virus is typically high in raccoon populations (Junge). Nonetheless, a serological survey conducted in an urban setting in Missouri revealed that 56% of clinically healthy, captured raccoons were seropositive to canine distemper. This indicates that many raccoons survive the disease or exposure to the virus and seroconvert (Junge). It has been suggested that wild animals that survive canine

distemper virus infection possess lifelong immunity to re-infection (Williams). Transmission of the virus occurs via aerosolization or direct contact with oral, respiratory, and ocular fluids. Viral shedding may occur even if an individual is subclinically affected. Incubation period ranges from 1 week to 1 month or more (Williams).

Canine distemper virus is relatively fragile in the environment and is easily inactivated by ultraviolet light, heating, and drying. Common disinfectants inactivate the virus as well. A cytologic diagnostic feature of canine distemper virus is the presence of intracytoplasmic and intranuclear eosinophilic inclusion bodies in epithelia, neurons, and astroglia (Williams). Smears of conjunctival scrapings and cytologic examination of buffy coats may reveal the presence of inclusion bodies. It is important to note that cytology is not sensitive in the early stages of canine distemper infection or in animals experiencing a prolonged course of disease. Paired serologic tests (10 – 14 days apart) may be helpful in achieving a diagnosis. The most important differential diagnosis for canine distemper virus is rabies, which commonly infects raccoons. Clinical signs of rabies infection is similar to that described for domestic species.

Raccoon Parvovirus

Raccoon parvovirus is genetically identical to feline parvovirus (Junge). Transmission occurs via the fecal-oral route, and the virus may survive for months in the environment (Junge). Clinical signs include depression, inappetence, fever, vomiting, and diarrhea. In the same serological study from Missouri discussed above, a high seroprevalence (51%) for raccoon parvovirus was documented in clinically healthy raccoons. This indicates an immune response to infection or exposure and suggests that infection induces a long-lasting, possible life-long immunity to re-infection (Junge).

Leptospirosis

Raccoons are the maintenance hosts for *Leptospira grippotyphosa*, and a seroprevalence of 6-9% was detected in the serological survey conducted in Missouri (Junge). It is thought that various species of wildlife, including raccoons, act as the source of infection for both people and domestic animals. The majority of *Leptospira* infections in wildlife occur within stable host-parasite relationship, and no clinical disease is observed (Leighton).

Miscellaneous Conditions

Raccoons are commonly affected by ear mites (*Otodectes cynotis*). Although the infestations are often asymptomatic, auricular pruritis, ear flapping, and head shaking may be observed. Mites may be eliminated by a single topical treatment or injection with ivermectin. Lungworm infection (*Crenosoma vulpis*) commonly infects raccoons. The infective larvae are found in the intermediate host (snail or slug), and clinical signs include coughing, nasal discharge, and dyspnea. Affected individuals are highly susceptible to secondary bacterial pneumonia.

References

- Amir, A.N., G. Moser, C.E. Rupprecht. Clinicopathologic Variation in Raccoons Infected with Different Street Rabies Virus Isolates. *J Vet Diagn Invest* 1996;8:31-37.
- Blanton, J.D., et al. Rabies Surveillance in the United States during 2005. *J Am Vet Med Assoc* 2006;229:1897-1911.
- Culp, R.H. Orphan Raccoon (*Procyon lotor*) Rehabilitation. In: Ludwig D, ed. *National Wildlife Rehabilitation Association's Wildlife Rehabilitation Vol. 14*. Edina, Minnesota: Burgess Print Company, 1996;155-171.
- Dubey, J.P., et al. Clinical Coccidiosis in Raccoons (*Procyon lotor*). *J Parasitol* 2000;84:1299-1303.
- Heyn, S. Behavioral Enrichment for Mammals. In: D. R. Ludwig, ed. *National Wildlife Rehabilitator Association's Wildlife Rehabilitation Vol. 17*. Edina, Minnesota: Burgess Print Company, 1999;105-112.
- Junge, R.E., et al. A Serological Assessment of Exposure to Viral pathogens and *Leptospira* in an Urban Raccoon (*Procyon lotor*) Population Inhabiting A Large Zoological Park. *J Zoo Wildl Med* 2007;38:18-26.
- Kollias, G., N. Abou-Madi. Procyonids and Mustelids. In: R. S. Larsen, T.J. Kreeger eds. *Zoo Animal and Wildlife Immobilization and Anesthesia*. Blackwell Publishing, 2007;417-428.
- Leighton, F.A., T. Kuiken. In: E.S. Williams, I.K. Barker, eds. *Infectious Diseases of Wild Mammals*. Ames, Iowa: Iowa State Press, 2001:498-502.

Pare, J.A., et al. Humora Response and Protection From Experimental Challenge Following Vaccination of Raccoon Pups with a Modified-Live Canine Distemper Virus Vaccine. *J Wildl Dis* 1999;35:430-439.

Prange, S., S.D. Gehrt, E.P. Wiggers. Demographic Factors Contributing to High Raccoon Densities in Urban Landscapes. 2003;67:324-333.

Rabinowitz, A.R., L.N.D. Potgieter. Serologic Survey for Selected Viruses in a Population of Racoons, *Procyon lotor* (L.), in the Great Smokey Mountains. *J Wildl Dis* 1984;20:146-148.

Rosatte, R., et al. Rabies in Vaccinated Raccoons from Ontario, Canada. *J Wildl Dis* 2007;43:300-301.

Williams, E.S. Canine Distemper. In: E.S. Williams, I.K. Barker, eds. *Infectious Diseases of Wild Mammals*. Ames, Iowa: Iowa State Press,2001:50-59.