

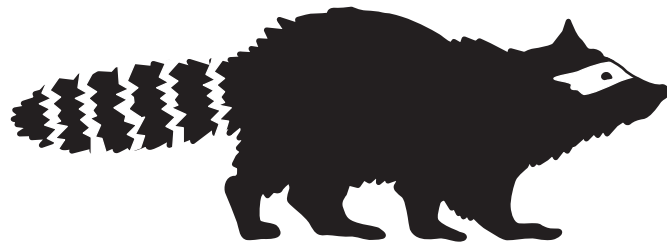
WILDCARE FOSTER CARE PROGRAM

# raccoons

*procyon lotor*

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## *Captive Rearing Protocol*



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*This document last modified October 10, 2008.*

**Please read this document entirely before beginning foster care!**

**If you have any questions, contact  
your team leader or WildCare medical staff.**



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# raccoon natural history

## **raccoon family tree**

### **Raccoon Family Tree**

Raccoons are the best-known members of the procyonid family, a family that includes coatis (or coatimundis), olingos, the cacomistle (or ringtailed cat), kinkajou, and lesser panda. Except for the lesser panda of the southeastern Himalaya region of Asia, the family is restricted to the New World.

They are classified as carnivores, but most are omnivorous—some almost herbivorous. The ringtail tends to be more carnivorous than the raccoon. The lesser panda is the most vegetarian of the group. Carnassial teeth are poorly developed.

They walk semi-plantigrade to plantigrade; and have non-retractile or semi-retractile claws. Soles of the feet are naked or partially hair-covered. All procyonids are good climbers and display some degree of hind foot hind-foot reversal, or inversion, to greater or lesser degrees; raccoon and coati exhibit some movement at both the ankle and hip, but the grasping hind feet are never fully reversed as they are in the kinkajou. This hind-foot mobility allows these arboreal animals to come down a tree head-first and hit the ground running.

They have probably been around since the Upper Eocene (35-40MYBP); fossils exist through the Pleistocene in Europe. Although they share traits with bears, dogs, weasels and even primates, new archaeological research indicates they are most closely related to the mustelids such as weasels and skunks. Excepting the coati, all are nocturnal.

The various senses of procyonids are reasonably well developed, but the raccoons and lesser panda appear to be above average in intelligence and are often described as being cunning. Like the mustelids, scent marking is used as a means of maintaining social organization and defining home ranges and travel routes.

Procyonids tend to be solitary, although families often move and feed as a group. Coatis and olingos travel in bands. All procyonids are arboreal and move around in trees with agility. On the ground, the raccoon resembles a small bear as it ambles along and, in fact, the German name for raccoon means “Washbear”.

Procyonids breed in late winter or early spring. After a gestation period of about two months (for the raccoons 54 to 66 days, for lesser panda 90 days), two to six young are produced. One litter a year is usual. Young raccoons “twitter” like young birds when disturbed in the nest, and the young of other procyonids also produce high-pitched calls. Most adult procyonids produce a variety of snarls, growls, whines, screams, and barks. Most of these calls have little carrying power. Being mainly arboreal, young procyonids are born in tree dens when they’re available. If tree dens are scarce, raccoons use old buildings, attics, chimneys, basements, crawl spaces or dens in the ground. Ringtails use crevices in rocks.

Except for the lesser panda, which is found in the southeastern Himalayas of Asia at elevations from 6,500 to 16,000 feet, procyonids are largely mammals of the lower elevations of temperate and tropical regions, in areas well supplied with water and trees. Some authorities consider procyonids the New World equivalent of the Vivverrids in the Old World. Raccoons have been introduced into parts of Europe (Germany, Russia, and Asia) and in many places are out-competing native vivverids such as civets and weasels for diminishing habitat.

## North American Raccoons

The typical North American raccoon weighs from 14 to 22 pounds, although a large male in the northern winter may weigh more than 40 pounds. Raccoons in California and in the southern United States are smaller and weigh less. Raccoons prefer wooded areas near water, but adapt well to human presence and are common in cities. They range from northern Alberta, throughout most of the United States, and into South America.

**Senses:** The raccoon is an intelligent, methodical, and inquisitive animal with very well developed tactile and olfactory senses. With ten times more nerve endings in their paws than are in human hand, their sense of touch is thought to be more sensitive than that of humans. There are four times as many sensory receptors in the forepaws as in the hind, which are used for balance. The walk is fully plantigrade with an ambling bear-like gait, although they can run at a good gallop, on the ground as well as straight up (and down) a tree—their rear ankles rotate nearly 180 degrees like those of a squirrel. They are good swimmers but tend to avoid deep water. Warnings of danger are picked up more by the raccoon's keen sense of hearing than sight. Vision is adapted to nocturnal activities and the ability to discriminate colors is unnecessary.

**Behavior:** The name raccoon derives from the Algonquin word “arakunem” meaning, “he washes with his hands.” But wash they do not. The familiar dipping of objects into water is rarely observed outside of captivity. In the wild this behavior will often be observed when the animal hunts for small prey at the edges of streams. The key words to their behavior are “learning” and “adaptation”. With a large cerebral cortex, the animals learn their behaviors from play, their mothers, and other raccoons. Because of their adaptability, raccoon behavior differs depending on the climate and living conditions.

The raccoon is not territorial, but occupies a home range that overlaps with the ranges of other raccoons. The size of an individual's range and its tolerance for other raccoons varies according to food availability and access to water. In cities and suburbs with plenty of human refuse, a range can be as small as half a mile; in the country, more than ten miles. In areas that provide abundant food sources with the corresponding high population density, raccoons can become fairly social animals, sometimes traveling in groups and denning together.

In California, raccoons do not establish permanent dens (except for the few weeks in spring with a female is raising young) but acquire the location of a series of “hides” along the trails of their territory. Scent-marking with anal glands alerts them to the proximity of other raccoons. Along with the “hides” within their territory, raccoons establish “latrine sites” that are used by all the raccoons within the area. In California where raccoon rabies is not present in the raccoon population, these latrine sites pose the greatest health risk to humans because of the contagious parasite shed in raccoon feces: *baylisascaris procyonis*.

They survive winter food shortages by acquiring huge stores of fat in autumn—traditionally from eating acorns. During the winter a raccoon may lose up to fifty percent of its fall weight. In very cold northern winter weather raccoons sleep for extended periods, but do not hibernate in the sense of becoming torpid. There have been reports of winter dens containing more than 50 raccoons.

# raccoon natural history

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## **natural diet**    **Natural Diet**

The sense of touch probably is of the greatest importance to the raccoon in its food-gathering activities. The diet of the raccoon changes with the season, feeding on whatever is most readily available: arthropods, insects, small mammals and nestling birds, carrion, earthworms, crustaceans, snails, mussels, reptiles, amphibians, eggs and fishes; more rarely birds. Plant material comprises over half the annual diet of the North American raccoon and includes wild fruit, berries, grasses, leaves, rinds, nuts (especially acorns), corn, wheat, grain, melons, and sweet potatoes. They have a notorious sweet tooth, and ripe persimmons and young sugar cane are favorites. Acorns and crayfish were the predominant diet of raccoons in our area, but living in close proximity to humans, their diets are no longer just acorns and crayfish and insects and bark, but pet food, food left by humans in parks, garbage cans, and in compost piles.

Raccoons do not chase prey, but learn to dig for and grab it. Once the raccoon grabs something that might be edible, it sniffs it; then either drops or chews it thoroughly with the teeth bared. Nothing is gulped down. Live prey like crawfish, mice or centipedes are killed by a vigorous rolling with the hands until the prey is motionless.

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## **mating and family life**    **Mating and Family Life**

Mating season in North America is from January to March; In California it may begin in December. When their hormones rise, males become restless and aggressive, and will travel great distances seeking a receptive female. Males may mate with several females, but each female will only mate with one male. Mated pairs may remain together for a time. Like cats, the persistent, sharp calls uttered by the female during copulation are very audible in the night stillness, and also like cats, ovulation is initiated by copulation.

Females are able to breed at 10 months of age. Males are able to breed after the first year, although because of competition from older males do not usually get the opportunity to breed for the first two years. (*Evans, 1985*) If the female does not become pregnant during the first estrus, she can come into season again four months later.

Gestation is 60-73 days long. A litter of one to six (usually three or four) young, born weighing about 70 grams each. Ears open after 13 days and the eyes after 22 days. When she senses her time to give birth, the female will attempt to find a safe nest site. This is the only period of time when a raccoon will establish a "permanent" den site, and she may also have an alternative den as a fall-back.

For the first few weeks of their lives, the mother leaves her kits only to forage. When their mother is absent, the kits instinctively become silent and still. The mother may have two or more nest sites, and may move the kits if one site becomes threatened or uninhabitable. After a few weeks, she may begin bringing bits of food home for the kits explore. At about seven weeks the young begin to leave the nest, and when they are ten weeks old they regularly accompany the mother on hunting expeditions. They begin practicing catching insects and arthropods and feeding on fruit. The mother keeps the family together by trilling frequently; the young respond with an ever increasing repertoire of vocalizations.

# raccoon natural history

Weaning occurs when they are about two months old; and by four months they are self-sufficient. Even so, the mother is highly solicitous of them and may care for them for up to a year. They may separate for periods of time and then reunite, with apparent recognition.

In general, raccoons are solitary foragers, the exception being the female/young family unit. Because learning is so important to raccoon development, the behaviors can vary and may depend on the availability of resources such as food and shelter. Some raccoon mothers will adopt other young, some adult animals will kill nestlings of other raccoons. Observations in the 1950s by Sterling North have described the development of traditions which have been taught by the mother raccoon and maintained for several generations; in humans, anthropologists call this culture.

Raccoons have another little-understood social instinct to use one place to defecate. Latrine sites used by 40 or more individuals have been found.

## Longevity and Causes of Death

Outside of man, the mountain lion and bobcat, adult raccoons have essentially no enemies. With a fondness for eggs, nestlings, corn, and garbage, raccoons are a nuisance in some areas. They are poisoned, hunted (often with hounds) and trapped for fur, flesh and sport. Full-grown raccoons are fierce fighters, ripping and slashing with claws and teeth; few dogs can successfully subdue an adult. In water, a raccoon may drown its adversary. Even so, while it is conceivable for a wild raccoon to live as long as 16 years, the majority live less than five years, with only about one in 100 living to the age of seven. The average is 3.1 years. (Zeveloff, 2002)

Raccoons are susceptible to a wide variety of diseases: ringworm (fungal), coccidiosis (parasitic) and upper respiratory infections (bacterial) are not uncommon. They are especially susceptible to viral diseases such as enteritis, parvovirus and rabies. Serious diseases like distemper and rabies are frequently fatal, but others can be treated. Even without treatment, an otherwise healthy, well-fleshed animal with a good immune system may be able to recover from such things as infections, abscesses, and broken bones.

Parasites are a part of life to most wild animals, and being omnivores, raccoons are generally host to several, including coccidia, giardia, the raccoon roundworm *Baliscaris procyonis*, and scabies (mange).

The raccoon population density in a particular area is dependent upon the food supply, the number of suitable nest sites and predation pressure. Because of their intelligence, raccoons have actually thrived among humans, quickly learning to take advantage of our human luxuries: lushly watered gardens and fish ponds, a banquet of trash and pet food, unsecured crawl spaces, unrepaired roofs. The suburban raccoon's most dangerous enemy today is the car.

As a predator himself, however, the raccoon is thorough. Nocturnal and arboreal, raccoons are an excellent natural check on other intelligent and opportunistic species such as crows, ducks and rodents.

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## longevity and causes of death

# raccoons and humans

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## california state regulations

### California State Regulations

In California, all wildlife is considered property of the state. Individuals are not permitted to keep wild animals as pets. Hunters, trappers and rehabilitators are all licensed by the State of California, and the California Department of Fish and Game (CDF&G) is the government agency responsible for monitoring how wild animals are treated and displayed.

WildCare is in CDF&G Region 3. Each year, a “Memorandum of Understanding” (MOU) is issued to WildCare by the CDF&G reiterating the conditions under which the State of California will allow rehab agencies to treat and keep wildlife. The MOU is valid for one year. Foster care providers work under WildCare’s permit and must read and abide by the conditions of the MOU.

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## human/wildlife conflict issues

### Human/Wildlife Conflict Issues

In general, people tend to be polarized in their attitudes toward raccoons. Problems occur when some people in a neighborhood are feeding raccoons for the pleasure of seeing them come close while other neighbors are setting dogs on the animals and calling pest control companies to eliminate them.

Pest control companies are legitimate businesses, and CDF&G has limited control; state jurisdiction ends at humane considerations and environmental impact issues. This may change in the future, but at this time, nuisance wildlife control operators (NWCOS) are allowed euthanize animals and to trap and release them within 100 yards, as long as they are not reported for animal cruelty. New legislation dictates that they are no longer allowed to relocate animals.

With raccoons, most of the issues that come to the attention of CDF&G involve nuisance animals. Knowing this, it is easy to understand why CDF&G keeps a close watch on raccoon rehabilitation. Because of raccoons’ intelligence and consequent dependence on early learning, those reared by humans are thought to be more likely to be unafraid of humans when released and are therefore, more likely to become problem animals.

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## raccoons as pets

### Raccoons as Pets

There are a great many books and websites that rhapsodize about the delights of keeping raccoons as pets. In the 1940s and 50s before there were rehab agencies, people often tried, with varying success, to raise and domesticate orphaned raccoons. Some of the books are charming and revealed a great deal more about the nature of these animals than had been known before they were written. They are worth reading from the vantage point of time, but knowing what we do today, the lessons they provide are often what NOT to do.

Unlike dogs, raccoons can become extremely aggressive when their hormones develop and they become sexually mature. So in this time of human population density, there is no worse situation for a mature raccoon accustomed to human interaction than to be released in a densely populated area. Even in those cases where the raccoon had been neutered (illegal in California), their personality is still that of a raccoon—inquisitive, determined, focused, intelligent, uncontrollable, hyperactive, social. In other words, highly destructive as an indoor pet. They may become severely depressed when their natural instincts are suppressed, and in mating season, the most loving pet can become fierce and aggressive.



## Public Education

One of the most important roles we play as wildlife rehabilitators is to help foster in others a greater understanding of the natural world around us, including our native wildlife. There are several areas where we might interact with the public: helping resolve “nuisance” wildlife issues, publicity involving animals in our care, attempts to reunite separated raccoon families, arranging appropriate release sites, etc. These are all excellent opportunities to help further public education about these interesting animals.

Many homeowners would say that raccoons are their biggest nemesis. Pest control companies claim to “solve” the homeowner’s raccoon problem. But the extreme solution—trapping and euthanizing—is ineffective. Trapping and killing raccoons only removes the resident animals temporarily. Other animals can then move into the appealing territory that is now available. Relocating the animal is illegal in California, and just moves the problem somewhere else; makes the area available to another animal and has been shown to spread disease.

The only real solution is public education, and we can play a role in helping educate those around us. Don’t feed wildlife. Don’t leave pet food outside. Don’t throw meat or bones into the compost. Get trash cans with locking lids and use bungee cords if necessary. Clear garden areas of fallen fruit and cut back tree limbs that might provide access to the roof. Exclude them from the home. Seal attics, crawl space or other attractive den areas. Especially in March and April, females will be looking for nesting sites.

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## public education

## Reuniting Families

Our first choice of caregiver is always an animal’s natural mother. After we determine that the baby is healthy, our first action is always to attempt to reunite the family. The orphan’s history will determine whether a reunion is possible. Generally, if the mother is alive, healthy, uninjured, and has not been relocated, a reunion should be an option. Getting the history also provides the opportunity to educate the finder and possibly enlist his or her help. The history will also reveal clues to possible problems that may develop in the first stage of intake—such as degree of dehydration, possible hidden injuries or exposure to viral diseases. Raccoons are very attached to their young and have good memories; they will return to the place they were separated for several nights in an attempt to find them. They recognize their babies’ voices and scent, and will not be put off by the smell of the humans’ touch (*Sorensen, 2004; Miller, 2000*).

If the babies have been without food for an extended period of time, they will need supportive care and probably medical treatment. Once stabilized, they can be left in a cardboard box or partially opened kennel (with a heat source, if necessary) in a protected area where the mother will be most likely to look for them. The box or kennel should be placed in the area at dark, and left there untouched until right before dawn. Unless they are cold or hungry the babies are not likely to crawl away from a secure warm nest. After dawn the rescuer should check the box, and if the babies are still there, take them back into rehab for the day of feeding and care until the following night, when the procedure should be repeated. After three nights, it becomes less likely that the mother will return, and the animals should be considered orphaned. (*Cotten, 1999*)

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## reuniting families

# raccoon foster care volunteers

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## about foster care volunteers

### About Foster Care Volunteers

Since the 1970s, WildCare has taken in from 50-100 injured and orphaned raccoons each year. Somewhere around half of these are babies too young to survive on their own. If we are unable to reunite babies with their mother, they need foster parents.

Foster Care is a unique opportunity for adult volunteers to care for orphans in their own home or yard. Opportunities to foster animals are highest in spring and summer. Having children or pets will not prevent you from fostering wild animals, but you will need to keep all other people and pets separated from wildlife. WildCare provides caging and supplies.

Foster Care volunteers are licensed by the Department of Fish and Game under the WildCare permit, and must have six months of hospital volunteer experience OR the approval of WildCare staff. Because raccoons are considered a rabies-vector species by the Marin County Health Department, a series of 3 pre-exposure shots are required for volunteers who wish to handle raccoons.

As a Foster Care volunteer, you will need a suitable area at home and a schedule that can accommodate the needs of the animals. You must attend the team training and agree to abide by WildCare's policies on release, educational animals and euthanasia. You will need to sign and keep a copy of the current MOU with the state of California (see California State Regulations, page 8) and agree to a home-site inspection by the Raccoon Team Leader or WildCare staff. You must respect the wildness of these animals. These babies are cute, but they need to remain wild.

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## matching caregivers to animals

### Matching Caregivers to Animals

Raccoons are raised in groups of two to six animals. Single animals must be raised with at least one other animal—even if it means transferring the cub to another facility. The size and development stage of a group determines where the animals can be placed. A group of infants can be cared for in an apartment that has a quiet room, but when the animals reach their next stage of development, they will need a protected puppy pen outside. Caregivers who don't have access to a fenced-in or otherwise protected yard will have to transfer the young animals to someone else.

**Infants:** Housed in a cardboard or plastic kennel on a heating pad in a quiet room away from pets and children. Caregiver will need to be able to bottle-feed them from four to six times a day.

**Weaning age:** Housed in a plastic kennel in a predator-proofed puppy pen in a fenced-in area outdoors. Caregiver will need to be able to bottle-feed them from one to three times a day and begin the weaning process onto solid food. This outdoor area should provide the space and stimulation to allow the young animals to begin climbing and exploring when the caregiver is present.

**Juveniles:** Once weaned, they are housed in a large predator-proof raccoon run outdoors. The caregiver will need to feed the animals one to two times a day and keep the caging and water dishes clean. The animals will need live-hunting at this time, with clams, crawfish, crickets, worms, and mice.

# raccoon foster care volunteers

## caregiver responsibilities

Besides feeding and cleaning, there are certain other responsibilities that fall in your area of responsibility as a foster caregiver.

### **Maintain Medical Schedules**

Except in an emergency, all visits for medical purposes should be scheduled in advance with the assigned medical staff person.

- Observe your animals! Learn what “normal” looks like and watch for signs of abnormality. Call your team leader or medical support if you have concerns.
- Do regular fecal tests as instructed by med staff and give anthelmintics on the two-week schedule established by the med team.
- Weigh the animals each week and update their cards.
- At about 700 grams weight, begin the scheduled series of distemper vaccines.
- Bring your animals in for “well-baby” checks as instructed by the med staff.
- Stay ahead of your animals’ development and plan for timely release. If necessary, transfer animals so they can socialize to an appropriate release group (See Appendix B, Raccoon Development Guidelines.)

### **Record Pertinent Information**

Keep accurate notes on the patient record. You don’t need to record every poop, but you do need to record changes in behavior or appearance.

- Record all medications as you give them
- Log your animals out of the general log in pencil when they leave with you.
- Keep your Team Leader updated on your animals on a regular basis.
- Return patient records to WildCare when you return or release the animals.
  - If you return the animals to WildCare, erase the pencil “FC” notation from the log, and write the return date on the card. Set the animal up in the enclosure and leave appropriate instructions for volunteer maintenance.
  - If you release the animals, or the animal dies, write the “Disposition,” date and location of release in the appropriate area of the card and on the log.
- Your donated hours help WildCare secure funding. Record the time you spend on foster care and report it to WildCare monthly.

### **Practice Hygiene and Protection**

Wildlife can transmit zoonotic infections (See Zoonotic Diseases, p 20). Precautions must be followed by those who are in close contact with them.

- No person who is immuno-compromised or pregnant should handle raccoons.
- A series of three rabies pre-exposure inoculations is required for anyone who will be touching raccoons. People doing supportive rehabilitation tasks such as preparing food or washing dishes DO NOT require immunization.
- Feces should be flushed down the toilet or sewers—not storm drains.
- Soiled toweling should be washed separately from human laundry, in a dilute bleach solution at the ratio of 1 part bleach to 32 parts water (about ½ cup bleach per gallon). Wear rubber gloves when handling soiled laundry.
- Food dishes should be washed separately from human dishes and sterilized in bleach solution above. Wear rubber gloves when washing soiled dishes.
- Raccoons must be kept completely separate from pets and children.
- Raccoons must be wormed regularly and vaccinated on schedule.
- Wash your hands after handling animals, food or bedding.

# raccoon captive care

## getting started

### Getting Started

Before you take your new charges away from WildCare, check that the proper intake protocol has been followed by the med staff. (See Appendix A, Raccoon Intake Protocol) If the animal will require medication, be sure the medicine is labeled with the name, strength and date before you leave. Depending on the age of the animal, assemble the supplies you'll need using the following list:

- Patient records and second sheets
- KMR
- electrolytes
- high-quality puppy chow that is highly digestible, low fiber
- heating pad (check for heat accuracy)
- squeeze-type baby bottles
- baby bottle nipples
- weaning food: fish, chicks, mice, persimmons and grapes
- towels/paper towels/tissue
- graduated sized kennels

### You may also need:

- prescribed medication
- SQ fluids and syringes
- gloves
- feeding dishes
- jars/mixing bowl
- litter box
- hammock (towel & rope)
- wading pool
- puppy pen or other outdoor caging
- welder's gloves

## handling, stimulation and restraint

### Handling

Handling of orphaned infants is a necessary part of their successful rearing. Contact is important to most young mammals, and in normal development, the mother raccoon spends a good amount of time licking, nuzzling and interacting with her young. Gentle fondling with young or frightened babies will comfort them and allow the caregiver to stay aware of the animals' general condition. It is important to keep young raccoons in contact with each other, or in the unlikely event of a single animal, with a furry toy companion and something interactive like a warm water bottle and periodic human handling.

As the young approach weaning age, interaction with the human caregiver should decrease. Avoid exposing your skin at this time, both for your protection and to minimize your familiar smell. Wear long pants such as jeans and light gardening gloves. Be sure they are old clothes, because they **will** get food on you. During weaning especially, the cubs will rush toward the sound of a caregiver's voice and try to climb your legs. Strongly discourage this by shaking them off. As they approach you, redirect them to each other and/or their food dishes. Retreat behind a window inside and observe from a distance.

### Stimulation

You will need to stimulate infants after each feeding to encourage elimination until you observe that the baby is fully self-eliminating. Gently stimulate the genital area with a quantity of tissues or small towels. Babies should urinate at each feeding; defecation may be slightly less regular.

### Restraint

For any behaviors that only a human could perform, such as examinations or administering medications, etc. "scruffing" is the safest way to handle the

young animals. It is the equivalent of the way the mother would carry the baby, and infants instinctively become limp and docile when scruffed. If necessary to prevent squirming, a firm grip around the base of the tail and one of the back legs will increase control while scruffing.

Restraint of adult raccoons requires specialized gloves, equipment and training, and should NEVER be attempted if you are by yourself. When capturing properly-raised wild raccoon orphans for release, two people should use one of the following procedures. Use heavy welder's gloves and a strong net.

1. When the raccoon is netted, it will struggle and scream. Firmly take hold of the fur at the back of the neck in a way that prevents the raccoon from turning its head to bite. Stabilize your grip by firmly holding the base of the tail and one hind leg together with your other hand. Lift the animal by the scruff and leg/tail into the nearby cage that has been prepared for transport.

2. The second method is to pin the raccoon's head to the ground once it has been netted. Then place your hands around the body at the shoulders, with the forelegs between your index and third fingers. Be sure your thumbs firmly hold the head to keep it from turning to bite.

## About Housing and Husbandry

Raccoons should be maintained outdoors as much as possible. Look for ways to be sure that the sounds and smells of the wind, birds and other animals is familiar to them from as early an age as possible. Indoor sounds, while comforting to humans, should not be as comforting to wild animals as natural sounds. Try to find a way to provide warmth and security in a safe outdoor area.

As much as possible, try to provide the typical toys, obstacles and smells your orphans would experience in a natural upbringing. Raccoons are highly dependent on learning, and part of our job as a rehabilitator is to provide the most enriched habitat we can manage. Appropriate toys would include pine cones, rocks, twigs, shells, acorns, etc. Inappropriate toys would be anything human, such as balls, plastic cups, paper products, keys, coins, etc. The exception would be a stuffed toy used to comfort a singleton.

Wild raccoons frequently use latrine areas. When they are very small, the mother will dispose of their wastes, but early innate behaviors will direct them to begin to urinate and defecate in a specific area as they begin to move about more. You can take advantage of this behavior at the various stages, (and save yourself some clean-up work) by providing them a sanitary space to eliminate away from their feeding area. Dirt-filled litter boxes (such as a flower box) have proven very effective and easy to clean. Simply lift out the solid feces daily and change the dirt every several days. Feces should be flushed down the toilet, not into storm drains.

The IWRC *Minimum Standards for Wildlife Rehabilitation* (Miller, 2000) recommends that outdoor enclosures should allow a minimum of 30 square feet per animal when raccoons are group housed. An enclosure which is 12'x18' (216 square feet) could house seven raccoons, and an enclosure which is 40'x20' (800 square feet) could house 26 raccoons. Cages used for raccoons should not be used for other species to prevent possible parasite contamination.

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## about housing and husbandry

# raccoon captive care

## about diets and feeding

### About Diets and Feeding

The most common feeding utensils for raccoons are syringes and bottles, with a variety of nipple types. Baby bottles are the recommended method. Nipple holes may be adjusted according to need; simply pierce an intact nipple with either a toothpick or a hypodermic needle and set in a cup of boiling water for thirty seconds. Then place in a cup of cold water. If flow is still too fast, soak the nipple in hot water for approximately 10 seconds to shrink the hole. Getting the proper flow of formula is critical to prevent aspiration. (See Aspiration, p. 18)

All captive rearing methods should be developed with respect to naturally occurring behaviors, and feeding is no exception. Newly admitted babies are accustomed to the mother's teat and do not always readily accept hand feeding. The baby should be lying on its stomach or slightly to one side. It is helpful to feed in a position that is comfortable to the handler as well as to the baby. Hold the bottle directly in front of the face—there is no need to stretch the neck in an unnatural position. For the first several feedings, it may be helpful to tilt the bottle and drip (or squirt) the warm pedialyte or formula. This will facilitate food recognition and reduce aspiration problems. Gently ruffling the fur at the base of the neck will also initiate a suckling response and help them get the idea. Monitor behavior during feeding and adjust accordingly.

## milk replacement formula

### Milk Replacement Formula

The following table compares raccoon milk to the available formula substitutes as fed. At WildCare, KMR is the choice for infant raccoons.

	Milk Composition					
	% Solids	% Fats	% Proteins	% Carbo	Ash	KCals/ml
Raccoon <sup>1</sup>	16.2	4.2	6.1	4.8	1.1	.90
KMR <sup>2</sup>	18.2	4.5	7.5	4.75	1.5	.83
Esbilac <sup>2</sup>	15.2	6.5	5.0	2.4		.90
Fox Valley (1:2)	19.8	4.9	7.9	4.4		1.17
Fox Valley (1:3)	14.1	3.5	5.6	3.1		.78

<sup>1</sup>R. Jenness, R. E. Sloan: Composition of milk of various species; Dairy Sci. Abstr. 32 (10):599-613, 1971

<sup>2</sup>PetAg, 2003

The powdered KMR formula is reconstituted using one part powder to two parts water or electrolytes (depending on specific animal's condition). Always try to prepare enough formula for the next 24 hours. Newly prepared formula should not be fed immediately, but should be allowed to settle for at least 1 hour whenever possible. This reduces the amount of air bubbles and decreases the chance of diarrhea and bloat. Warm only the amount needed for one feeding, and do not re-use the unused, warmed portion. Heating may be done either by submersing full bottles in hot water or by microwaving. Regardless of the method, always mix formula after heating and test temperature before feeding.

## amounts to feed

### Amounts to Feed

The amount fed at each feeding should be determined by the state of health and stomach capacity of each animal. Precise measurement of feeding amounts is not necessary, but a good gauge is that the stomach capacity is about 5% of the animal's weight in grams. Stop feeding when stomach is full—the skin should be

stretched around the full belly, but should never be tight. Remember, raccoons love to suckle and beg to overfeed, but this can cause health problems like aspiration, bloat and diarrhea. Determine the stomach capacity, using this guideline: **Amount fed = 5% of body weight (in grams)**

**Example:**

Weight in grams	356 grams
Divide by 10, rounding up (10%)	36
Divide in half, rounding up (5%)	18cc

There has been some confusion about the difference between stomach capacity and frequency of feedings. (For example, if you need to feed a very weak animal more frequently, you don't feed to the full stomach capacity every time; trying to digest so much food only adds physical stress to a compromised system.)

Growing animals require a basic number of kilocalories (kcal) each day to maintain their weight. This number is the Basal Caloric Rate. They need double that number to grow. That number is 2X the Basal Caloric Rate. Growing animals that are also sick or injured may need 3X or more to heal or recover AND grow. Babies grow fast, so you must keep checking their weights and increasing the amount of food.

Refer to the Kilocalorie Feeding Chart in Appendix C. A 250 gram raccoon, for example, has been calculated to have a Basal Calorie need of 24.75 kcal/day. To grow it will need 49.50 kcal/day. KMR delivers 0.83 calories per ml. (49.50 kcal divided by .83 = 59.64 ml of KMR daily.) Since its stomach capacity is only 5% of body weight, or about 12.5cc, you can divide its total caloric need for the day by what its stomach can hold (59.64 divided by 12.5). The result (4.8) means you would feed a minimum of five feeds over the course of the day just to get enough calories into the animal without exceeding its stomach capacity. The chart on Appendix C actually recommends that you feed less than the stomach capacity more often as it is gentler on the animal's system.

## Diet Changes

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## diet changes

Any time a diet is changed, it must be done gradually. Always wean in the new diet at 25% intervals. Successful absorption can be assessed by the condition of the stool. Stools should be firm but not dry. Raccoons on KMR formula will have a stool that is bright yellow. The addition of solid foods at the appropriate stage will change the color and size of the stool.

Following is an example of a transitional diet for a healthy raccoon that has been newly admitted. Ratios indicate amount of electrolytes to one part of already mixed KMR (i.e., 5:1 means 5 parts electrolytes to one part of already mixed KMR).

Feeding	Ratio Pedialyte to KMR	Timing
First	100% electrolytes	On intake
Second	5:1 electrolytes:KMR	2 hours after intake
Third	4:1 electrolytes:KMR	2 hours after previous feeding
Fourth	3:1 electrolytes:KMR	2-4 hours*
Fifth	2:1 electrolytes:KMR	2-4 hours*
Sixth	1:1 electrolytes:KMR	2-4 hours*

\*The goal of the transitional diet is to move them to the appropriate caloric intake as quickly as they are able to tolerate it. During the transition, monitor the animal closely for bloat, dehydration, diarrhea, etc. After transition, feeding should be maintained at full strength KMR reconstituted with water. (See Kilocalorie Feeding Chart, Appendix C).

# raccoon captive care

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## **electrolytes**    **Electrolytes**

Because we assume some degree of dehydration on intake, all newly admitted animals should be given subcutaneous injections of electrolytes for up to 72 hours if necessary. Lactated Ringers Solution (LRS) is preferred over LRS with 2½% dextrose because the added sugar (dextrose) can be dehydrating. However, if the animal is severely malnourished and possibly in a low blood sugar condition, the added dextrose may be indicated by medical staff. Discontinue electrolytes once the animal is thriving on its present diet—generally after 24 hours.

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## **pro-biotics**    **Pro-biotics**

Pro-biotics are recommended to replace beneficial bacteria found naturally in the mother's milk and to make formula more digestible. Because the probiotics delivered in products such as Bene-Bac™ or health-food store capsules may have been killed in storage, these products cannot be relied upon to deliver live cultures (*MacLeod and Perlman, 2003*). Fresh, full-fat yogurt for human consumption is best. Goat milk yogurt is preferred because of its higher digestibility. Choose the product with the maximum number of live culture species and fewest added ingredients such as gelatin or agar. Add it to formula at a quantity of about 5% of the total (approximately two teaspoons per cup).

Probiotics should be given to young and/or weak animals, and to those that are on antibiotics or who are immuno-compromised.

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## **about weaning**    **About Weaning**

Coaxing young raccoons to abandon bottle-feeding requires three behavior changes: associating food with a dish rather a bottle, learning to like the taste of the food we have to offer, and learning to chew. To some extent they will also look to you to let them know what is good to eat. Raccoons love suckling, so you'll need to be firm as well as flexible and creative. Seven to eight weeks is the ideal age to start. You will most likely need to use your hands at first.

Keep a close watch on the animals' growth rates during weaning. You may need to limit formula intake so they have an incentive to wean while being sure that they continue to gain weight. This will be especially difficult if the animal is recovering from an illness or injury. In this case, don't push weaning too hard. Raccoons will eventually reject the bottle when they get old enough.

If you are new to raccoon weaning, talk to other experienced rehabbers for ways to introduce them to solid foods. We do not recommend mixing dog food or other solid food into their bottled regular formula. It is very easy to cause moderate to severe diarrhea from the higher fiber additive, and it doesn't actually help wean them. They love to suckle and will suck down the gruel/formula and still refuse to eat from a dish.

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## **weaning foods-**    **Weaning Foods**

As you wean the raccoons off formula, be sure they are getting a balanced diet of protein, carbohydrates, fats and plenty of calcium. Eggs are high in fat (good) but very low in calcium (bad), so if eggs are a major part of the diet, a calcium supplement should be included in the form of eggshells or calcium carbonate.

Watch for diarrhea. This can be a sign that weaning is progressing too quickly.



At the first indication of diarrhea, back off on the diet change. (See Diet Changes, p.15.)

If they are fond of formula, KMR Custard helps them transition to solid foods.

**KMR Custard:**

2 slightly beaten eggs  
½ cup KMR powder  
1 cup water  
250 mg calcium carbonate (crushed)

Whisk ingredients together and pour into custard cups. Set cups in a shallow pan of hot water one inch deep. Bake at 325° for 45 minutes.

- **Soft fruits.** Begin with persimmon, mango, sweet plums, banana (sparingly—they are very low in calcium and high in potassium), applesauce, grapes. When eating these well, add apple pieces, peaches, plums, pears, cherries.

- **Proteins:** Begin with formula, KMR custard, scrambled egg. When eating these well, add chicks, smelt, raw eggs (be sure to use eggs you are sure will not be potential carriers of salmonella), and mice. Phase out the formula, custard and scrambled eggs.

- **Carbohydrates:** Begin with soft soaked puppy food (highly digestible formulas). When eating these well, add corn, acorns, sweet potato pieces. Phase out the soaked puppy food and replace with unsoaked puppy kibble.

**Live foods:**

- Begin with insects—king mealworms, silkworms, crickets, earthworms, snails and similar-sized invertebrates, add goldfish, feeder fish, clams and oysters.
- As they develop (15 weeks or more), live-hunt on crayfish and live mice.

**Tips for Weaning**

- Wear old clothes whenever working with weaning-age raccoons. They WILL get food on you.
- Offer them a tablespoon-full of warm KMR custard from your hand after a mid-day bottle. Most like it immediately and will begin suck-chewing it readily.
- Persimmon “syrup” and applesauce are good transitional foods to fruit. Offer it after their bottle when they are looking for more formula. Go easy on these because they are very high in sugar.
- Once they know they like a food item, give it to them in a small dish and avoid using your hands. Put the dish down near their kennel and run away to where they can’t see you so they focus on the dish and not on you.
- When you know they are adjusting to the custard and soft fruit, mix a little formula-soaked softened puppy food in the dish with KMR custard and some persimmon or applesauce.
- Don’t continue increasing the formula as they gain weight. Instead, slowly increase the amount of soft solid food they get in dishes.
- Grapes help them learn to chew food. Introduce them to the taste of grapes when you see them start to chew at the bottle’s nipple, but be sure they don’t inhale a grape while trying to suck on it. Cut the grape in half.
- When you switch from four times a day to three (and from three to two), offer them a dish of solid food at the time they would have gotten the extra bottle. Gradually eliminate the formula so they are self-feeding by ten weeks.

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**tips for weaning**

# raccoon health concerns

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## **aspiration**    **Aspiration**

This is the term used to describes the inhalation of fluid into the lungs. It is very common for young animals nursing from a bottle to aspirate formula from improper flow rate or overzealous suckling. To prevent it, you will have to experiment to find the nipple size and opening that is comfortable for the animal's age and development. Aspiration is common in gavage feeding, due to mis-tubing; either tubing into the lungs, or not placing the tube far enough down the esophagus into the stomach.

To treat aspiration, immediately stop feeding and allow the animal to clear its nose and lungs. Be sure nostrils are clear and, and immediately remove fluid on nose and face so it is not re-inhaled. With head downward, gently pat or massage back with fingertips. If further help is necessary, give a careful inverted shake with control of the head, neck, and spine. The severity of aspiration requires a judgement call. If it only aspirated a little through the nose, no further treatment may be required. If liquid has gone down into the lungs, however, it may take from a few hours to a few days for the lungs to recover fully, depending on the condition of the animal and the severity of the aspiration. In this case, after restoring breathing, place animal in a warm (preferably humid) area such as in an incubator or with a heating pad, plus a safe, hot water bottle. Consult medical staff for antibiotics if necessary (usually TMS or Clavamox). Learn to recognize the "crackling" sound of fluid in the lungs.

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## **bloat**    **Bloat**

Bloat is the build-up of gas in the gastrointestinal tract. It can be caused by a variety of things, including overfeeding, sucking in air from the nipple, improper diet, formula too hot, cold or curdled, or an intestinal infection.

To treat the condition, stimulate the baby to urinate and defecate. Stop feeding (see example on page 19). Lay the animal on a heat source and massage the sides of the abdomen from rib cage downward. If no improvement in 1 hour, contact medical staff immediately. Bloat is often fatal. In treating bloat, food will make it worse, but hydration is essential, preferably sub-cutaneously to allow the gut to rest and pass the gas. Antacids and simethicone are being used successfully in some cases, and should be explored with the medical staff. Keep a close watch of all animals in your care as others may also become affected.

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## **cns abnormalities**    **Central Nervous System (CNS) Abnormalities**

Can be genetic (rarely) or due to injuries or illnesses. CNS abnormalities include circling (note direction) repetitive behaviors, stargazing or staring upward, uncoordinated motor skills, blindness, inappropriate responses to stimulus (i.e., snarling at nothing), etc. Report these immediately as they are possible signs of distemper and may require quarantining the animal for the protection of the others.

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## **dehydration**    **Dehydration**

This will cause lethargy and loss of appetite, and can develop quickly, especially if the animal has had diarrhea. If lethargic and uninterested in nursing, offer them electrolytes or plain water instead; thirsty animals may readily take water.

# raccoon health concerns

To check for dehydration by the skin-tent method, pull up the skin between the shoulder blades and see how long it takes to return to position. Well-hydrated skin will return within a few seconds.

You can use your finger to check the mouth and tongue for dryness. A dry mouth will feel tacky. Or check the capillary refill time on the gums with a Q-Tip. Severe dehydration requires SQ fluids and immediate medical attention.

## Diarrhea

## diarrhea

“Without a doubt, the most common malady in raccoons less than 3-4 weeks of age is diarrhea, due to diet, or, more specifically, excessive food intake. Raccoons have a rather immature digestive capability at this age. Excessive calorie intake (usually 25-30% above recommended levels can overload the digestive enzyme system. ...cubs will drink much more than they need, develop bloat, greenish stool and fulminating diarrhea.” (Evans, 1986)

Diarrhea can also be caused by a diet change; feeding formula too hot, too cold, incorrectly mixed or spoiled; treatments with antibiotics or other medications; poor hygiene; stress; bacterial or viral infections; and gastrointestinal parasites. During weaning, higher fiber foods such as dog food may be a cause.

Diarrhea is a symptom, not an illness. (Huckabee, 1998) Any treatment of diarrhea should go hand in hand with continuing diagnostic procedures to confirm whether the diarrhea is solely dietary or whether there is an infectious component. If diarrhea persists, STOP feeding and begin electrolyte therapy (for babies on formula) or if at the weaning stage, back off to half-strength KMR/Pedialyte, eliminating the dog food. Anti-diarrheal medications (i.e., Kaopectate, Pepto-Bismol) should be used with extreme caution, and only as an aid to recovery once the cause has been determined and corrected.

When the diarrhea subsides and stools begin to return to normal, slowly reintroduce the age-appropriate diet. During weaning, look for “highly digestible” on the dog food label and wean slowly. If the stomach flora is likely to have been compromised by severe diarrhea or its treatment, some pro-biotics, such as Benebac or yogurt, are a good idea at this time.

“We caution you on the use of antibiotics in dietary diarrhea. Since the bacterial flora is already upset, broad spectrum antibiotics will readily exacerbate this problem by further altering the flora and perpetuating the diarrhea.” (Evans, 1986)

Do not dismiss the presence of diarrhea. If the animal is weak, fasting may not be indicated. If conservative management is necessary, the animal should also receive a course of SQ fluid.

### Example of treatment for formula-fed babies with diarrhea or bloat

7pm	Discontinue food and give subcutaneous (SQ) fluids
8pm	Feed 100% electrolytes
midnight	100% electrolytes
8am	100% electrolytes
noon	3 parts electrolytes to 1 part KMR (25% KMR)
4pm	1 part electrolytes to 1 part KMR (50%) and give SQ fluids
8pm	1 part electrolytes to 3 parts KMR (75%)
midnight	100% KMR
Adjust according to the animal's response, consulting with the medical staff.	

# raccoon health concerns

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## **misdirected suckling**

### **Misdirected Suckling**

This frequent problem doesn't occur in the wild. Natural rearing by the mother would provide the cubs hours of suckling and small amounts of milk over a long time. In rehab, the feeding process happens for mere moments a few times a day. The baby raccoons turn to each other for the comfort of suckling, using whatever is available: an ear, tail, toe, genitals, even their own paws. It is often the result of a lack of behavioral stimulation. It is usually not harmful unless there is a smaller animal that is being suckled by everyone. You will see wet patches, but watch for raw areas and get advice if you discover a problem.

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## **symptoms of illness**

**Anorexia (Loss of Appetite):** Causes can include overfeeding, dehydration, bacterial or viral infections of the intestinal tract.

**Diarrhea:** See page 19.

**Lethargy:** This can be a sign of illness, overheating, dehydration, or the result of overexertion. Lethargy at inappropriate times, such as when the animal should be hungry, can be an indication of dehydration. Seek help if the condition persists more than a few hours or worsens.

**Gummy or teary eyes:** Another symptom that can be caused by dust, dehydration or illness for the same reasons human eyes develop these symptoms. Raccoons sometimes just have "sleep" in their eyes just as do other animals. Excessive mucus should be evaluated as soon as possible.

**Ragged breathing or "crackling" sound in the lungs:** When you hold the animal to your ear and listen to its breathing after an animal has aspirated some formula, you may hear this sound. It is the sound of fluid in the lungs. It may also develop a day or more after aspiration. Crackling in the lungs can be an indication of pneumonia or in the case of aspirated formula, can develop into pneumonia. If you hear it after six hours, consult the medical team as antibiotics may be indicated.

**Runny nose:** Can be the result of cold, wet, allergies or serious illness. Monitor duration and watch for other signs of illness

**Sneezing:** Raccoons sneeze for the same reasons humans do. Dust, allergies, inhaled irritants, illness. It is of concern only when in the presence of other symptoms or if it continues beyond a reasonable duration. **Staggering:** Head injuries, poisoning, distemper. Seek medical attention immediately. Monitor duration and watch for other symptoms.

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## **common zoonotic diseases**

## **parasites**

### **Identifying and Treating Diseases**

Raccoons are susceptible to a number of common zoonotic diseases and parasites that can be transmitted to other animals, including humans in some cases. These can be contracted at any stage, but are more commonly encountered after the animals have reached weaning age. Lungworm, tapeworm, bacterial infections, fleas and ticks are all common. Most are from environmental contact, either fecal-oral, direct contact with another animal, or from contaminated soil, water or food. The following descriptions are for identification and general information; if you suspect any of the following, consult with your medical staff or a veterinarian.

## **Chlamydiosis**

Chlamydiae are intracellular parasites that are not very host specific. They may infect a large number of bird and mammal species. A single syndrome usually predominates during an outbreak. Persistent infections are typical. The disease syndrome in raccoons may mimic the infections seen in cats. (DeGhetto, 1998) Conjunctivitis with mild diarrhea and dehydration has been reported. Diagnosis is through fecal examination.

## **Cryptosporidiosis**

Cryptosporidiosis is an illness caused by the protozoan *Cryptosporidium*, a single-celled parasite shed in feces. Cryptosporidia belong to a larger group of protozoans called coccidia (PHAC, 2002). The most common symptom is watery and profuse diarrhea, often accompanied by abdominal cramping. In humans, nausea, vomiting, fever, headache and loss of appetite may also occur. Some animals infected with *Cryptosporidium* may not become ill.

Infection occurs when the organism is ingested, typically by drinking contaminated water—an especially common occurrence in raccoons housed in close quarters. The infection is diagnosed by fecal exam. There is no specific treatment other than supportive care, but coccidia found in fecal tests can be treated with Baycox. Fluid therapy is indicated if dehydration is a problem. Anti-diarrheal medications such as Kaopectate or Pepto Bismol may provide some temporary improvement as part of supportive care. Oocysts (eggs) are immediately infective and are resistant to most disinfectants, but can be killed in the environment with a 5% ammonia solution or by desiccation (ISUCVM, 2003).

## **Giardiasis**

Giardiasis is an intestinal illness caused by a microscopic parasite called *Giardia lamblia* or *Giardia intestinalis* which are passed in feces. It is a very commonly reported cause of diarrheal illness in humans, and is frequently found in fecal tests done on raccoons at WildCare. It tends to occur in wildlife from contaminated surface water (CDC, 2004). People who become ill have symptoms that include mild to severe diarrhea, increased flatulence, abdominal cramps, weight loss and bloating. Fever is rarely present. The infection is diagnosed by fecal exam.

The symptoms may appear from 3 to 25 days after exposure but usually within 7-10 days. The carrier stage generally lasts from a few weeks to months. Treatment with specific antibiotics may shorten the carrier stage; Flagyl may be effective in eliminating the diarrhea. However, some individuals may recover without medication.

Prevention includes proper hygiene: wash hands thoroughly; dispose of feces so as not to contaminate surface or groundwater; keep raccoon drinking water clean.

## **Scabies**

Scabies is a fairly common condition of the skin caused by a microscopic mite. Mites that cause scabies burrow into the skin producing pimple-like irritations and severe itching. Occasionally bacterial infections may occur following intense scratching at the site of the burrow (Fitzgerald, et. al, 2004). Mites that cause scabies are transferred by direct skin-to-skin contact.

# raccoon health concerns

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## common zoonotic diseases

## parasites, continued

Definitive diagnosis involves demonstrating the presence of the mite by skin scrapings and microscopic examination of the scraped specimen. The most prominent symptom of scabies is intense itching. An animal is able to spread scabies until mites and eggs are destroyed, usually after one treatment with an effective anti-scabies medication. Mites do not survive more than 48-72 hours once off the host (CDC, 2005). Except in severe cases, inanimate objects such as bedding or caging does not spread mites that cause scabies. Raccoons determined to have scabies are treated with an oral dose of Ivermectin.

To prevent contamination, avoid physical contact with the infested animal. Bedding and cages used by an infested animal in the 48 hours before treatment may be laundered and dried at the highest temperature or stored in a container such as a plastic bag for 5 to 7 days to kill mites and their eggs.

### **Baylisascaris procyonis**

*Baylisascaris procyonis* is the name of the intestinal roundworm species found commonly in raccoons. It is very similar to *Toxocara canis* and *Toxocara cati*, the dog and cat roundworms, and like *Toxocara* spp., when it is ingested by species other than its natural host, it can travel through the organs and muscles; this is called larva migrans syndrome (White, 1993; CDC, 2002).

Infection in raccoons is fairly common, but rarely causes symptoms in them. Fecal exams at WildCare have revealed newly-hatched larvae in raccoons as young as 3 weeks. The infection in raccoons is diagnosed by fecal exam and easily controlled with anthelmintics. However, when eggs are ingested by humans or other animals, the migrating larvae can cause serious damage to the central nervous system. (Kazacos and Boyce, 1990). Infection is spread when infective eggs, shed in raccoon feces, are ingested by a person or animal. Young children are at the highest risk when raccoon latrine sites are in close proximity to their play areas.

*Baylisascaris* eggs have a tough sticky coating that breaks down under ultraviolet sunlight and becomes infective after 2-4 weeks. Infected raccoons commonly shed millions of eggs in their feces. The eggs can be resistant to many environmental conditions, and with adequate moisture, can survive in the soil for years. Bleach does not kill the fresh egg, but does interfere with the sticky coating so it can be washed from clothing and dishes. Care should be taken to avoid contaminating hands and clothes. Prompt removal and destruction of raccoon feces will reduce risk for exposure and possible infection.

Wildlife rehabilitators who handle raccoon feces are at increased risk, but the larger risk is the public health issue of peri-domestic raccoons and their tendency to use communal latrine sites (Roussere, Murray, et.al., 2003). While people enjoy feeding raccoons, they do not worm them the way they would worm their dogs, and don't realize they are encouraging parasites. This feeding interferes with the natural population controls, encourages congregations of animals, communal latrine sites and transmission of roundworms.

Symptoms of infection depend on how many eggs are ingested and where in the body the larvae migrate. Swallowing a small number of newly-deposited eggs may cause no infection to a healthy human adult. Ingesting large numbers of mature eggs may lead to serious symptoms and even death. After ingesting eggs, symptoms of infection may take several weeks to develop, and are very difficult to diagnose.

# raccoon health concerns

No effective treatment is yet available, but proper precautions can minimize this risk. To keep other animals (including ourselves) from contracting Baylisascaris, we observe the following protocols:

- Administer the correct dose of Strongid T (Pyrantal Pamoate) every 2 weeks to prevent the possibility of the raccoons developing worms. However, remember that shed eggs can live outside a host for years, and don't relax your hygiene protocols just because the raccoons are receiving anthelmintics.
- Launder raccoon towels in a disinfecting bleach solution.
- Dispose of all feces in the appropriate sewers or toilets.
- Wash your hands well each and every time you touch a raccoon
- Take every opportunity to teach the public about the dangers of feeding raccoons and the resultant latrine sites it encourages.

## **E. Coli 0157:H7**

Gram-negative bacteria such as E. Coli can cause bacterial enteritis in raccoons (*White, 1993*). Escherichia coli 0157:H7 is a bacterium that infects the intestinal tract and may produce a toxin that affects other parts of the body as well. Infections usually cause diarrhea, often bloody, and severe abdominal cramps with little or no fever. Some individuals may become infected but display no symptoms. The symptoms of E. coli 0157:H7 infection typically appear from 3 to 8 days, but usually about 3-4 days, following exposure.

Infection with E. coli 0157:H7 can be acquired by eating contaminated food or water and by contact with fecal material from infected persons or animals. Foods that have been associated with E. coli 0157:H7 infections are raw or undercooked beef (especially ground beef) and unpasteurized (raw) milk.

Treatment with antibiotics has not been shown to be effective. It is important to prevent and treat dehydration. Wash hands following contact.

## **Leptospirosis**

Leptospirosis is caused by several strains (called serovars) of the bacterium *Leptospira*. The raccoon serovar is *Leptospira autumnalis*. Many species of wild and domestic animals are reservoir hosts of leptospirosis and can be asymptomatic carriers. The bacteria are excreted in urine, which can then contaminate water, moist soil, or vegetation. Humans can acquire the infection if this contaminated material contacts abraded skin, mucous membranes, or is ingested. (*Wisconsin Division of Public Health, 2001; Washington State Department of Health, 2004*). In 2004, the disease occurred as an outbreak with up to 57% infection rate among California sea lions, causing seizures and kidney failure with nearly 50% mortality (*Gulland and Haulena, 2004*).

Symptoms reported in dogs include conjunctivitis, congestion and difficulty breathing, vomiting, frequent urination or inability to urinate. In extreme cases, bacteria invade liver and kidneys, causing jaundice and renal failure. (*McDonough, 2001*).

Vaccines are available for some serovars. Infections can be treated with antibiotics (*CDC, 2005*) Prompt specific treatment, as early in the illness as possible, is essential. Prevention includes sanitation to eliminate contact with water that may have been contaminated by infected urine from rodents or other carrier hosts.

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**common  
zoonotic  
diseases**

**bacterial  
and fungal  
infections**

# raccoon health concerns

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## common zoonotic diseases

## bacterial and fungal infections, continued

### Salmonellosis

Like botulism, salmonella bacteria are not frequently found in raccoons, but are more common in opossums, rodents, deer and some birds, and are very common in reptiles. However, Salmonella can be introduced in the captive care diet and cause bacterial enteritis in raccoons (*White, 1993*). Signs of infection include acute diarrhea, fever, vomiting, anorexia, lethargy and dehydration. Diagnosis is usually made by culture of fecal sample. It is transmitted directly from fecal-oral contamination, or by ingesting contaminated material such as raw eggs or improperly processed meat that may have fecal contamination. Contaminated foods usually look and smell normal. All foods (including vegetables) can become contaminated but thorough cooking kills salmonella (*CDC, 2004*).

Treatment is based on culture, but Baytril has been found to be effective in some cases. Proper hygiene is crucial. Typhoid fever is a form of Salmonella.

### Ringworm (Tinea)

Ringworm is an infection of the skin caused by one of several types of fungi. In raccoons, it often is indicated by hair loss and scratching, and may present as a secondary infection in an animal that has other medical problems (*WildCare case, 1998*). It can be contagious to humans from directly handling an infected animal or indirectly by contact with objects that have contaminated hair. Ringworm can be diagnosed by culturing the fungus from the site, by a microscopic examination of a bit of material taken from the lesion, or by examining the site using a special ultraviolet lamp called a Wood's lamp (*MedlinePlus, 2003*).

Ringworm on the human body appears approximately 4 to 10 days after the infection occurs, and usually consists of a flat, roundish lesion, the edge of which may be dry and scaly or moist and crusted. As the lesion expands, the center portion often clears to a normal appearance.

Ringworm is treated with antifungal ointment applied to the skin, or by oral antifungal drugs taken internally. Internal antifungal drugs should be used with caution, however; in at least one case Griseofulvin was found to cause neurological symptoms in a raccoon (*Dicke, 2003*). Because ringworm is caused by several types of fungi, infection with one species of fungus will not necessarily provide immunity to future infections. To prevent reinfection, a fungicidal agent such as bleach may be helpful.



## **Distemper**

Distemper is often used as a generic term for a number of possible viral infections, including parvovirus and enteritis. It is not zoonotic to humans, but unvaccinated dogs and cats are at risk. Raccoons are susceptible to viral strains related to both feline and canine distemper (*Parrish, Leathers, et. al., 1987; Barker, Povey, et. al., 1983*). Signs of distemper include any or all of the following, depending on the strain of virus infecting the animal: sneezing, coughing, anorexia, mucous discharge, fever, lethargy (in wild animals, this sometimes appears as a lack of fear of humans), CNS disorders, followed by “hard-pad”, then seizures and death. “Carnivore parvovirus isolates are known to be genetically closely related to each other; interspecies transmissions readily occur among carnivores.” (*Ikeda, Nakamura, et. al., 2002*).

Epidemic viral outbreaks kill large numbers of animals when populations are high and animals are living in close enough proximity to get the disease. Such an epidemic affected raccoons in Marin County in 1999, the year WildCare admitted 144 raccoons. In the following years, admissions dropped to a low of 46 animals in 2001, and remained low to date. As populations crash and recover, viruses mutate (*Ikeda, Nakamura, Miyazawa, et. al., 2002; Baumgartner, Alldinger, Beineke, et. al., 2003*) so it is likely that we will continue to see cases of viral diseases in lesser or greater numbers.

An extremely high percentage of viral diseases end in death to the animal. However, some successful treatments have been reported using the new influenza drug, Tamiflu, on enteric viral infections.

## **Canine Distemper (CDV)**

A Morbillivirus that affects a wide range of carnivores, including raccoons. The virus enters the respiratory system and spreads to lymphoid tissues. During the next week, the virus spreads throughout the lymph tissues of the body resulting in fever, leukopenia and immunosuppression. At 7-10 days post infection, if the animal mounts a successful immune response, the virus is cleared and recovery occurs. However, if immune response is so-so, the virus may persist resulting in chronic disease. This virus spreads to the central nervous system (among others). CNS abnormalities are often noted in this disease. (*Evans, 2000*).

## **Raccoon Parvovirus (RPV)**

Parvovirus species have adapted to a great number of carnivore species. The Raccoon strain is virtually indistinguishable from the Feline Panleukopenia Virus (FPV). The Aleutian Mink Disease Virus (AMDV) is a variant of FPV and RPV. (*Parish, 2004*). Peak symptoms appear 5-7 days from exposure. Raccoons die within 2 days of becoming symptomatic. Extreme diarrhea, subsequent dehydration and lethargy are the symptoms. Survival rates are rare to none and it is extremely contagious to other raccoons.

RPV can be contracted by inhaling or ingesting bodily fluid containing the virus of FPV or AMDV shed in feces or oral secretions. It is very resistant to environmental effects. There is wide variation in the severity of clinical disease from sub-clinical to peracute fatal disease. Usual signs of FPL infection are fever, profound depression, rapid and severe weight loss, dehydration followed by vomiting. Diarrhea follows 1-2 days later. Abdominal pain is usually present. Peracute disease is sudden onset of depression, vomiting and death within 12-24 hours. This virus

# raccoon health concerns

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## common zoonotic diseases

can remain contagious in the environment for up to two years in feces and urine. If you suspect RPV, contact your team leader immediately and quarantine the litter from others. Vaccines can be used as a preventative. (See Distemper Vaccines, p. 29.)

## viral infections

### Rabies

Rabies is a viral disease affecting the central nervous system. It is transmitted from one infected mammal to another, and is invariably fatal once symptoms appear. All mammals, including man, are susceptible to rabies, but human rabies is rare in the United States. In wildlife, rabies symptoms are commonly described as “out in daylight, drunken walking.” Affected animals are very weak, not aggressive. Death is imminent.

In California, skunks and bats are the most likely animals to carry the rabies virus, although rabies has also occurred with some regularity in dogs, cats, foxes, raccoons and livestock (*Bontá, 2001*). Six cases have been reported in California raccoons between 1992 and 2002, two of which were documented as importation. However, a raccoon rabies epidemic in states east of the Rocky Mountains has become so widespread that many states banned raccoon rehabilitation, requiring that all animals admitted be euthanized. Luckily, the majority of states have reversed this ban.

Rabies is generally contracted by a bite from a rabid animal, but can also be transmitted if a rabid animal scratches a person or if its saliva comes into contact with broken skin. In very rare cases, (such as in bat caves) inhalation of virus has been reported to cause infection. The disease eventually progresses to spasms of the throat and the muscles used for breathing, convulsions, delirium, paralysis and death. It is important to note that by the time any symptoms appear, rabies cannot be successfully treated. The time between exposure and the onset of symptoms is variable but averages two to twelve weeks in humans. Incubation periods of over one year have been reported.

Exposure of a human to a rabid animal does not always result in rabies. If preventive treatment is obtained promptly, nearly all cases of rabies will be prevented. However, if preventive treatment is not administered and signs of rabies develop, the disease is invariably fatal.

While raccoons are not considered a rabies-vector species in California by the California Department of Fish and Game at this time, the Marin County Health Department treats raccoons as a potential vector species, and requires rehabbers who handle rabies-vector species to receive the pre-exposure rabies vaccination. This consists of three injections in the upper arm given over a three-week period on day 1, day 7 and day 21. The injections are not painful and immunity can last for years. WildCare requires a “titer” check every two years. This is performed by a blood test, and will indicate if immunity is still sufficient. In the event a pre-vaccinated individual is bitten, they would receive two more injections and would be effectively immune to the disease. Anyone bitten by any mammal should promptly cleanse the bite wound with liberal amounts of soap and water, (*Kasper and White, 1998*) and seek medical help immediately.

# treating injuries and illnesses

## Caught by Dog or Caught by Cat:

Wounds from dogs tend to be crushing injuries, such as broken bones and bruising. Fractures may or may not be stabilized, depending on the fracture site.

Wounds from cats will tend to be puncture wounds and lacerations. All wounds should be thoroughly cleaned with either dilute Nolvasan (Chlorhexadine) or Betadine (Providine) solutions. Lacerations will be either sutured or should be treated with topical ointments (such as Silvadene ointment) as recommended by medical staff. Punctures must be flushed well and kept open for several days and may also be packed with triple antibiotic ointment such as BNP or Neosporin. Monitor closely for signs of infection and abscessing. Systemic antibiotics are usually required.

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**caught by  
dog or cat  
(CBD, CBC)**

## Abscesses

An abscess is a localized infection at which white blood cells and fluid (pus) accumulates under the skin. It is often the result of a puncture wound healing so that the skin closes over the wound before the infection can resolve. Pus builds up under the skin, causing a characteristic soft, warm, fluid lump to appear over the injury site. The original puncture is usually no longer visible.

Abscesses must be treated aggressively. The abscess must be cleaned and flushed. If the site has not yet ruptured, it should be lanced and all exudates removed before flushing. It is important to keep the port open to promote drainage so the infection can heal from the inside out. If necessary a Penrose Drain will be surgically placed to maintain drainage for several days after lancing. Antibiotics must be given. If infection persists or worsens, consider the presence of resistant bacteria and adjust antibiotics according to medical staff.

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**abscesses**

## Hypothermia

Hypothermia is often seen in babies that have just come into care. They may also have been without their mothers for several days and are suffering from protein-calorie malnutrition, hypoglycemia and dehydration. **DO NOT FEED** until body temperature is near normal.

The normal body temperatures for raccoons is as follows (*Evans, 1986*):

1-2 weeks: 95-99 degrees Fahrenheit

2-4 weeks: 97-100 degrees Fahrenheit

4 weeks and older: 100-102 degrees Fahrenheit

Low body temperature is considered critical and must be addressed immediately. Initially, towels may be microwaved for 1 minute and wrapped around the animal while other preparations are being made. Very warm, subcutaneous fluids are helpful ONCE the animal begins to heat up. "At temperatures below 94 degrees, the young animal is unable to nurse and its internal organs are paralyzed. Additionally, metabolic acidosis and tissue hypoxia are frequently profound at this stage. Thus, fluid therapy or force feeding at temperatures below 94 degrees serves only to distend the gastrointestinal tract and cause life-threatening bloat." (*Evans, 1986*). Provide a hot water bottle or heating pad set on low. The condition of the animal should be monitored closely.

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**hypothermia**

# treating injuries and illnesses

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## parasite infections

### Parasite infections

**Baylisascaris procyonis:** Strongid T is an anthelmintic (worm-killing medication) given orally every two weeks until release. This is the best protection for the caregivers who could otherwise come in contact with *Baylisascaris procyonis*, the raccoon roundworm.

**Scabies:** Also called mange, this parasite is caused by a subdermal mite. Treatment with Ivermectin kills the mite.

**Fleas:** Advantage or other commercial product used for cats will effectively control fleas.

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## upper respiratory infections (URI)

### Upper Respiratory Infections (Bacterial)

Sniffing or audible breathing may be a sign of an upper respiratory infection, in infants, it is often the result of untreated aspiration which introduces bacteria into the lungs. URI should be treated aggressively as raccoons are highly susceptible to pneumonia. Heat and humidity are extremely important. An incubator is ideal (set at about 80 degrees). Half of cage can be set on a “low” heating pad in addition to a hot water bottle. (Fill a latex exam glove with water and microwave until very hot to the touch but not scalding. Don't fill it all the way; it should be pliable to encourage snuggling.) Wrap the heated glove or hot water bottle in a towel and position the animal on it sternally to heat the chest. A course of antibiotics should begin as soon as possible and a diuretic may be useful. Upper respiratory infections may also be an indication of distemper.

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## viral infections

### Viral Infections

**Hemorrhagic Gastroenteritis:** With the development of human influenza vaccines, new experimental approaches are also being taken in treating viruses that affect wildlife. One of these is being tested by Dr. Jack Broadhurst, DVM, and represents a new approach to treating hemorrhagic gastroenteritis (RPV) in raccoons. This new approach uses a human drug (Tamiflu by Roche) in the treatment of Raccoon Parvovirus. Rather than attacking the virus directly, the drug is designed to suppress the production of viral neuraminidase, an enzyme used by both the virus and GI bacteria to invade and destroy the host GI tract. Once the mucosal and submucosal tissues of the GI tract have been destroyed, opportunistic bacteria and their toxins invade the body to cause endotoxic shock and death.

Successful treatment uses a course of Tamiflu to suppress the production of neuraminidase while a course of antibiotics controls the bacterial infection. The use of both enzyme suppressant and bacterial control may buy the animal enough time to mount an effective response to the virus itself.

**Canine Distemper:** In some cases supportive care has allowed an animal to recover, but cases are so rare that euthanasia is recommended once the disease is diagnosed.

**Rabies:** This is invariably fatal and there is no treatment. Because of its potential threat to humans, suspected cases should be reported and submitted for testing.

# treating injuries and illnesses

## distemper vaccines and preventive anthelmintics

### Distemper, Parvovirus Vaccines and Worming

**Distemper and Parvovirus** are viral, and not susceptible to antibiotics. Once diagnosed, distemper is so rarely treatable that for humane reasons, the animal should be euthanized. Parvovirus may be treatable if identified and treated soon enough. Prevention is the best course of action. Currently, rehab animals at WildCare undergo a vaccine protocol that includes feline panleucopenia, ferret distemper and mink enteritis vaccines over a period of six weeks. We use PURE-VAX™ Ferret Distemper vaccine from Merial to vaccinate against canine distemper. To provide resistance to Raccoon Parvovirus, we use Distox-Plus from Schering-Plough (a mink enteritis vaccine) and Felovax PCT from Fort Dodge (a feline infectious enteritis vaccine).

Vaccinations begin when the animal reaches about 700 grams. At this age we can be fairly certain the vaccines will not conflict with any immunity still present from the mother. Young animals should not be moved into outdoor runs until they have completed two of each of the three vaccines.

Injections are given sub-cutaneously (SQ) on the animal's back between the shoulder blades at three-week intervals. (See Raccoon Vaccination Schedule below). Volunteers who have not been trained to give injections must schedule appointments to bring the animals in to WildCare or enlist the help of another team member to help give the injection.

**Rabies:** Although raccoons are considered a possible rabies vector species, by the Marin County Health Department, there is almost no current evidence of rabies in raccoons in California so they are currently not being vaccinated for this virus.

Worming is done at two-week intervals as long as the animal is in care. Pyrantel Pamoate is the preferred anthelmintic to kill *Baylisascaris procyonis* adult worms and larvae. Strongid T and Nemex are some of its brand names.

Raccoon Vaccination Schedule				
Week 1*	Week 2	Week 3	Week 5	Week 6
Feline Enteritis #1 Mink Enteritis #1	Canine #1	Feline Enteritis #2 Mink Enteritis #2	Canine #2	Feline Enteritis #3

\*Begin at about 700 grams weight

Raccoon Anthelmintic Schedule						
Week 1**	Week 3	Week 5	Week 7	Week 9	Week 11	Week 13
Weigh Strongid	Weigh Strongid	Weigh Strongid	Weigh Strongid	Weigh Strongid	Weigh Strongid	Weigh Strongid

\*\*Begin at about 400 grams weight

# releasing human-reared raccoons

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## about releasing raccoons

### About Releasing Raccoon

Ideally, raccoons raised in foster care should not have to return to WildCare cages from the home site as long as all the development criteria have been met and you have the approval of WildCare's Animal Care Director. This lowers the risk of disease contamination among larger groups. However, if you cannot house them all the way to release age, you should still monitor your group within the larger cages at WildCare frequently, and notify med staff if you notice any problems developing with your group or any of the others. You should also plan to participate in their release when the larger group is ready to go.

CDF&G requires that raccoons admitted as adults must be released within 1 mile of the territory from which they came. All raccoons (adult or human-reared juveniles) must be released within the County they came from. Identify your release site at least one month prior to the estimated release date. Get permissions if necessary and make tentative arrangements with the property owner or government agency.

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## release criteria for raccoons

### Release Criteria For Raccoons

Raccoons are ready for release when they can meet the following criteria:

- They have been a part of the releaseable group of at least two and preferably six individuals for at least two weeks.
- All animals in the group should be healthy, parasite-free and able to compete successfully with their littermates for food.
- All animals in the group should have completed their required series of inoculations.
- All animals in the group should have been housed outdoors, be able to live hunt and kill prey and have remained healthy with no medical support from humans for at least two weeks before release.
- Their permanent canine teeth should be well developed
- They should be able to recognize their natural foods.
- They should be as well fed as possible, with a good layer of fat to help them through the transition to life in the wild.
- They should be at least four months old and weigh no less than 6 pounds.

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## release sites

### Release Sites

**Trees and Water.** A stream, lake, marsh, swamp or other permanent source of water where the raccoon can hunt for resident prey must be on the site. Those seasonal streams in California which are nothing more than rain runoffs are not acceptable, unless they lead to permanent water sources without traversing human habitation. Trees, seclusion and plenty of cover vegetation should be located well away from roads and human habitation—ideally 2-3 miles from the nearest road or house. Oak woodlands are ideal, as the mast crop (acorns) supports many levels on the food chain. Sites can be on private (with permission) or public land.

Avoid prime nesting areas for native waterfowl or areas near game and poultry farms. Avoid areas that are already overpopulated with raccoons. Human-reared young animals will not be able to compete with a dense population of

# releasing human-reared raccoons

established locals. Consult with WildCare Staff for any other areas that CDF&G has indicated raccoons could have a negative impact on endangered species.

## Release Procedures

If possible, release groups back to the area they were found. Even though it may seem a better option to release them “out in the country,” the truth is that urban and suburban areas provide more food and shelter than “the country.” In the country, a raccoon may need up to ten miles to find enough food; in the city, a raccoon may need less than 1/4 mile to find sufficient habitat. In some areas, raccoons can be slow-released from a release cage on private property. This is the ideal and preferred method, but in the Bay Area, it is a luxury we very rarely have. The following guidelines refer to the other option: hard releases.

Identify your release spot before you set out with screaming raccoons in the car. Computer programs that provide satellite views of the area the babies came from can be very helpful here. Check the weather forecast and wait for a predicted period of at least 3 days without rain or dramatic drops in temperature. If possible, release raccoons as long as possible before the rains begin, so they have the best chance of acclimating before the harsher weather.

The evening before the release, be sure all animals are very well fed. Wear sturdy shoes and old clothing suitable for hiking. Prepare one medium-sized carrier kennel for each 2-3 animals by putting a large absorbent towel on the bottom of the kennel. Bring heavy welder’s gloves and a camera if you want to photograph the release.

You will want to release the animals at dusk or just before, so capture them in the late afternoon, to minimize the time they spend in the kennels or vehicle. Don’t feed them before you capture them and don’t put food in the kennels. Arrange for help if you will be releasing more than two animals. Ideally you’ll arrange to have one person for each kennel, so you can hike a good distance if necessary.

Once at the site, position the kennels under a tree, pointing toward the tree and the water source and away from you and the road. Open the kennel doors and discover that the animals you had to wrestle into the kennels from their cages now prefer the kennels. If you’ll wait quietly out of sight for a short time, curiosity will get the better of at least one intrepid individual, and it will venture out to see what’s up. Once one has ventured out, the rest should soon follow. If it is getting late and one timid soul is still hunkered down in his kennel, you may have to tip the kennel and “pour” him out. Be sure you are wearing the heavy gloves and take care not to try to handle him unless it is absolutely essential. Even human-reared animals can be very unpredictable when they are frightened or uncertain.

Dry your eyes and bring the equipment and refuse back to the vehicle. Complete any notes on the animal records and the disposition and location. When you return the cards to WildCare, log the disposition out of the intake logs and put the cards in the basket to be filed.

Then wish them well and pat yourself on the back for doing your best to give these orphans a second chance.

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## release procedures

# appendix a: raccoon intake protocol

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## initial intake

$\pi$  Perform a thorough visual and manual exam as done for all other species. Be sure to note lumps, wounds, and palpate for fractures. If necessary, warm slowly by wrapping in towels heated in a microwave.

Once the animal is warm, stimulate for urine and/or feces. Note color of urine as guideline for dehydration. Note the following on patient record:

- initials of examiner(s)
- time of exam
- sex of the animal(s)
- weight
- mouth (i.e., moist, dry, any other observations)
- teeth (white, discolored, age-appropriate development)
- gums (bleeding, sign of infection, pink, pale)
- eyes (open, closed, clear, goopy)
- ears (open, closed, clean, dirty, any obstructions)
- nose (moist, dry, discharge)
- belly size (kidnapped)
- muscle tone
- fur condition
- ectoparasites
- anus (note possible diarrhea, or other observations)
- lungs (clear, raspy)
- intake or normal temperature\*

Take temperature immediately if animal feels warm or cold. Within the next three days, take the temperature and record it as a non-stress normal. Normal temperature of older juveniles and adults is 100.5° to 101.5°. Temperature of neonates and young raccoons will be lower by as much as 2 to 3 degrees. NEVER give food orally to a cold animal. (See Hypothermia, page 26.)

Give body temperature SQ fluids (5% of body weight). Give the first feeding of warm pedialyte to begin gastro-intestinal hydration.

If fleas or ticks are observed and animal is otherwise healthy, dust with flea powder. If weak or injured, wait until the animal is stable to apply powder.

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## boxing young raccoons

### Boxing Young Raccoons

If placing heating pad in box, be sure to wrap well with towel or a pillow case to prevent young ones crawling onto heating pad. Make sure heating pad is on “low” and covers only half the bottom of the box, so that the animal can move off the heat if it becomes too hot. Place one more towel on the heating pad before placing animals in box. Be careful not to stuff another big towel on top of animals since this may cause suffocation. Place a hand towel loosely on top or just cover the box. Place in foster care area. Call Team Leader.



# appendix a: raccoon intake protocol

## Feeding Schedule

Note the time of the next scheduled feeding of Pedialyte:KMR on the med board and card so that it can be done if foster care volunteer is unable to pick up before that time. The usual amount of time will be two hours after SQ and first pedialyte feed.

The following ratios indicate amount of Pedialyte to one part of **already mixed** KMR. For example, 5:1 indicated 5 parts Pedialyte to one part of already mixed KMR. Try to get 3-4% of body weight into the animal. See “About Diets and Feeding,” on page 14 for ways to encourage swallowing.

Feeding	Ratio electrolytes to KMR	Timing
First	100% electrolytes	On intake
Second	5:1 electrolytes:KMR	2 hours after intake
Third	4:1 electrolytes:KMR	2 hours after previous feeding
Fourth	3:1 electrolytes:KMR	2-4 hours*
Fifth	2:1 electrolytes:KMR	2-4 hours*
Sixth	1:1 electrolytes:KMR	2-4 hours*

\*The goal of the transitional diet is to move them to the appropriate caloric intake as quickly as they are able to tolerate it. During the transition, monitor the animal closely for bloat, dehydration, diarrhea, etc. After transition, feeding should be maintained at full strength KMR reconstituted with water. (See Kilocalorie Feeding Chart, Appendix C).

## Medications

Medications should be clearly labeled with the name of medication, strength and date it was provided to the foster care giver.

Write the prescription on the patient record in a manner that will enable the foster care provider to increase the dose as the animal gains weight.

Schedule fecal exam within three days of intake if animal is older than three weeks, or within three days after animal turns three weeks.

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## feeding schedule

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## medications

# appendix b: raccoon development guidelines

**birth to two weeks**  
**60-225 grams**



## Birth to Two Weeks:

**Weight: average 70-200 grams (range 60-225 grams)**(Taylor, 2004)

**Development:** Silver-colored sparse fur; mask and tail rings barely visible. Eyes and ears closed. Blunt muzzle with no teeth. Able to crawl; activity is mainly to eat, sleep and eliminate (with stimulation). No response to sound or sight. Umbilicus drops off at about four days.

**Housing:** Regular Cardboard Carrier in quiet room. Line the bottom with a moderate amount of newspaper, then line and cover with towels. Drape a towel over the outside of box to reduce the amount of stress. Test the heating pad for accuracy. The heating pad must always be set on 'low' and should only be under approximately half of the carrier. If it were to become too hot, that baby has the opportunity to move to a cooler area of the enclosure (Fosco, 1998).

**Diet, feeding, husbandry:** KMR. Supplement with full-fat yogurt in formula at least once a week (MacLeod & Perlman, 2003). Weigh daily and feed 5% of body weight 6X daily, (i.e., 7am-10:30am-2pm-5pm-8:30pm-12am) (Marcum, 1993). Use "Four Paws" large squirrel nipple on a 6cc syringe to control rate of formula flow and prevent aspiration. Normal feces are firm and bright yellow; stimulate and burp after each feeding.

**two to four weeks**  
**175-400 grams**



## Two to Four Weeks:

**Weight: average 200-300 grams (range 175-400 grams)**(Taylor, 2004)

**Development:** Mask is fully haired. Overall fur more dense and tail rings prominent. Characteristic vocalizations present. Should be increasingly active. At 20-22 days eyes open (usually one at a time). Ears open, detach from head and become more upright; ear canals open, but still no response to sound or sight. Deciduous (baby) teeth begin to erupt at about one month (MacClintock,1981; Evans,1985). Will begin to walk.

**Housing:** Regular Cardboard Carrier or small plastic kennel in quiet room. Line the bottom with a moderate amount of newspaper, then line and cover with towels. Drape a towel over the outside of box to reduce stress. Test the heating pad for accuracy. The heating pad must always be set on 'low' and should only be under approximately half of the carrier. If it were to become too hot, that baby has the opportunity to move to a cooler area of the enclosure (Fosco, 1998).

**Diet, feeding, husbandry:** KMR. Supplement with full-fat yogurt in formula at least once a week (MacLeod & Perlman, 2003). Weigh daily and feed 5% of body weight 5X daily, (i.e., 7am-11:30am-4pm-8pm-12am)(Marcum, 1993) using a regular baby or premie nipple on a bottle. Normal feces are firm and bright yellow; stimulate and burp after each feeding. Get a fecal exam before beginning anthelmintics.

# appendix b: raccoon development guidelines

## Four to Six Weeks:

**Weight: average 300-550 grams (range 250-700 grams)** (Taylor, 2004)

**Development:** Guard hairs appear. Partially visual, hearing and interpretation of sound developing rapidly. Deciduous incisors prominent; premolars erupt at 1½ months. Coordination improving, beginning to climb.

**Housing:** Two adjoining medium plastic kennels or medium-large plastic kennel with natural toys, things to climb on and a heavy water bowl. Can be outdoors during the day in warm/shaded protected area such as deck and brought in at night. Once fully furred, supplemental heat should be gradually discontinued. Unless health concerns are an issue, offer heating pad only at night for 3 to 4 days before removing completely.

**Diet, feeding, husbandry:** KMR. Supplement with full-fat yogurt at least once a week (MacLeod & Perlman, 2003). Weigh weekly. Feed 5% of body weight 4X daily with longer fast at night, (i.e., 7am-12pm-5pm-11pm.) (Marcum, 1993). Monitor for self-elimination and discontinue stimulation and burping. Begin leaving bits of solid food in kennel for exploration; begin offering pieces of weaning food before bottle feeds. Normal feces are firm and bright yellow (White, 1989). Consult med staff to begin worming at 400 grams.

**four to six weeks**  
**250-700 grams**



## Six to Eight Weeks:

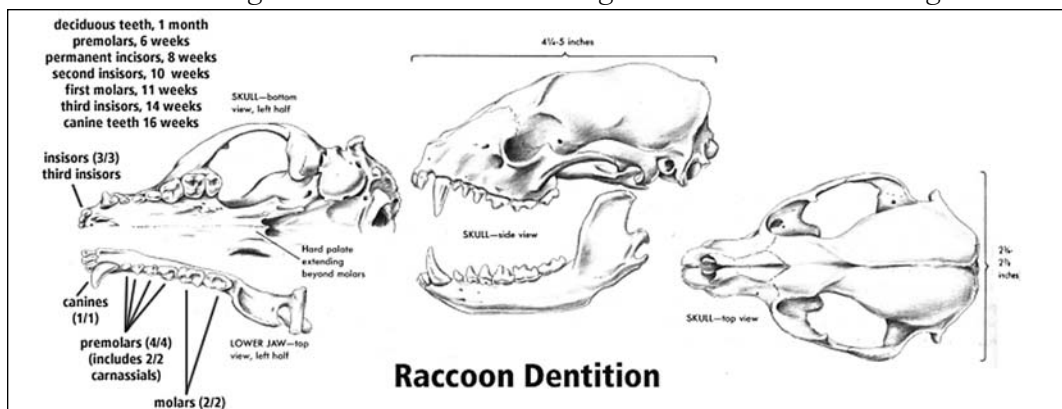
**Weight: average 550-850 grams (range 430-1200 grams)** (Taylor, 2004)

**Development:** First permanent incisors replace deciduous teeth. Vision and hearing is becoming well developed. Beginning to urinate and defecate in latrine area of cage. Should become slightly feisty when handled; very curious and playful—running, climbing, pouncing, wrestling, growling.

**Housing:** Outdoors. Two adjoining large plastic kennels or puppy pen with nest box and latrine area or box. Provide large water bowl, climbing branches (with soft straw underneath to land on), logs, bones, swing, pool and other natural toys and stimulus.

**Diet, feeding, husbandry:** KMR. Supplement with soaked puppy kibble, grapes, persimmon, etc. to creatively encourage self-feeding. Weigh weekly and feed 5% of body weight 4X daily with one feed in bowl, (i.e., bottle feed at 7am-12pm, bowl feed at 5pm-bottle feed at 11pm). Every effort should be made to minimize tactile contact from this point on. Introduce new foods slowly and monitor stools for diet-change-induced diarrhea. Normal feces are firm and will darken and become larger as more solid food is ingested. Continue worming schedule.

**six to eight weeks**  
**430-1200 grams**



# appendix b: raccoon development guidelines

**eight to  
twelve weeks  
650-2500  
grams**



## Eight to Twelve Weeks:

**Weight: average 850-1850 grams (range 650-2500 grams)** (Taylor, 2004)

**Development:** Weaning age. Permanent teeth erupt: 2<sup>nd</sup> incisors (10 weeks), 1<sup>st</sup> molars (11 weeks) (MacClintock, 1981; Evans, 1985). Distinct color patterns are obvious. They are very active, aware, fast and curious. Good coordination and hand control; agile climbers, learning to use rear foot inversion. At 10 weeks wild raccoons begin foraging with mother but may still nurse up to 16 weeks.

Beginning to be apprehensive of humans until caregiver's voice is heard.

**Housing:** Outdoors. Large cage with nest box, latrine area or box and hunting pool. Provide large water bowl, branches, logs, bones, swing or hammock and other natural toys and stimulus that will allow the animals to move vertically as well as horizontally. Minimum Standard requirements (Miller, 2000) suggest 30-sq. feet per animal; a 4' x 6' x 8' wood and wire cage enclosed on all sides, including top and bottom would be adequate for 4-5 animals. The enclosure should be covered in predator-proofed 1/4" hardware cloth and have a shaded area. If there is the possibility of rain, tarpaper can be used over part of the cage.

**Diet, feeding, husbandry:** Bottle feeding should be decreased from QID (four times a day) to TID (three times a day) to BID (two times a day) and then, aggressively discontinued as self-feeding is observed. An assortment of fruit, science diet, and cut up whole meats such as mice, chicks or smelt should be made available. (Martin, 1951). (See Natural Diet and Weaning for creative ideas.) Feeding may be encouraged with an egg (raw if farm raised and salmonella free) (Dicke, 2000) or palatable canned dog or cat food. Weight should be regularly monitored and all contact should be perceived as a negative and unappealing interaction. By 10 weeks, any HEALTHY resistant animals should be given 48 hours to self-feed, after which a creative course of action may be required to wean (Fosco, 1998). Animals not weaning should be paired with slightly older conspecifics. Minimize voice contact from this point on! Begin vaccination schedule at 700grams. Normal feces for weaned animals are firm and resemble small dog feces. (See Weaning, p. 16-17)

**12-17 weeks  
2.9-10  
pounds**



## 12-17 Weeks:

**Weight: average 4-6 pounds (range 2.9-10 pounds)** (Taylor, 2004)

**Development:** Growth, Skill and Social Development. Permanent teeth erupt: 3<sup>rd</sup> incisors (14 weeks) Canine (16 weeks) Guard hairs prominent. Absolute minimal interaction with human caregivers during this period will help animals switch to a nocturnal habit with main activity periods being just after dark and just before dawn. By the end of this period, attempted handling should be difficult, requiring two people and heavy gloves. Defensive postures, growling, snarling, and fear of humans should be noticeable.

**Housing:** Outdoors as for 8-12 weeks. Large cage with nest box, latrine area or box and hunting pool. Provide large water bowl, branches, logs, bones, swing or hammock and other natural toys and stimulus that will allow the animals to move vertically as well as horizontally. (Heising, 2001). Minimum Standard requirements (Miller, 2000) suggest 30-sq. feet per animal; a 4' x 6' x 8' wood and wire cage enclosed on all sides, including top and bottom would be adequate for 4-5 animals. The enclosure should be covered in predator-proofed 1/4" hardware

# appendix b: raccoon development guidelines

cloth and have a shaded area. If there is the possibility of rain, tar paper can be used over part of the cage.

**Diet, feeding, husbandry:** Animals should be eating from a dish or feeding area and completely weaned from formula by 12 weeks of age. Normal feces are firm and resemble small dog feces; watch for diarrhea, as this can indicate some health change. Hunting and foraging skills should be encouraged with live goldfish or bait minnows, crawfish, insects, snails and worms, mice, clams, oysters and other shellfish, unbroken eggs, acorns, hidden food and other creative foraging opportunities. Feed at night to minimize wasps and flies, and to encourage nocturnal behavior. At this point, evaluate the group of animals you have. If it looks like one or more will significantly hold back the group from a timely release, make arrangements immediately to transfer it (them) to a more appropriate group for socialization before release. Locate and make arrangements for an appropriate release site now. Don't wait until the day before they need to go to start looking and calling around!

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## Four to Five Months: (17-22 weeks):

**Weight: average 6-8 pounds (range 5-15 pounds)** (Taylor, 2004)

**Development:** Release age assessment. Raccoons should be released in the group they were reared with in groups (Lerman, 1982) of at least two and preferably six individuals. All animals should be healthy, parasite-free and able to compete successfully with their littermates for food. All animals should have completed their required series of inoculations. They should have been housed outdoors, be able to live hunt and kill prey and have remained healthy with no support from humans for at least a month before release. Their teeth should be well developed and they should be able to recognize their natural foods. They should be as well fed as possible, with a good layer of fat to help them through the transition to life in the wild. A fat, healthy four-month old 6-lb raccoon can be released with older heavier animals, as long as the smaller ones can demonstrate the same skills as the bigger ones (Fosco, 1998).

**Diet, feeding, housing and husbandry:** Same as for 12-17 weeks until all animals in the group can go together. Some may have to be held back a week or two while until the rest are ready. However, more advanced animals shouldn't be held back more than a week or two. If this seems like a possibility, arrangements should be made to transfer them to a more advanced group prior to releasing them all together. This should be done at an earlier stage, so the advanced animals can socialize with the different group for several weeks prior to release. (See Releasing Human-Reared Raccoons, page 28)

**four to five  
months  
(17-22  
weeks)  
5-15 pounds**



# appendix c: kilocalorie feeding chart

Weight		Calorie Req.		CC Stomach Capacity	KMR Daily (in ml)	Healthy Growth (2x Basal)		
		Basal	2X Growth			cc 4X day	cc 5X day	cc 6X day
Kg	Grams							
0.05	50	7.40	14.80	2.50	17.84	***	***	2.97
0.075	75	10.03	20.06	3.75	24.17	***	***	4.03
0.1	100	12.45	24.90	5.00	30.00	***	***	5.00
0.125	125	14.72	29.43	6.25	35.46	***	7.09	5.91
0.15	150	16.87	33.74	7.50	40.66	***	8.13	6.78
0.175	175	18.94	37.88	8.75	45.64	***	9.13	7.61
0.2	200	20.93	41.87	10.00	50.45	***	10.09	8.41
0.21	210	21.72	43.43	10.50	52.33	***	10.47	8.72
0.22	220	22.49	44.97	11.00	54.18	***	10.84	9.03
0.23	230	23.25	46.50	11.50	56.02	***	11.20	9.34
0.24	240	24.00	48.00	12.00	57.84	***	11.57	9.64
0.25	250	24.75	49.50	12.50	59.64	14.91	11.93	9.94
0.275	275	26.58	53.17	13.75	64.05	16.01	12.81	10.68
0.3	300	28.38	56.75	15.00	68.37	17.09	13.67	11.40
0.325	325	30.13	60.26	16.25	72.60	18.15	14.52	12.10
0.375	375	33.54	67.09	18.75	80.83	20.21	16.17	13.47
0.4	400	35.21	70.42	20.00	84.84	21.21	16.97	14.14
0.5	500	41.62	83.24	25.00	100.29	25.07	20.06	16.72
0.6	600	47.72	95.44	30.00	114.99	28.75	23.00	19.17
0.7	700	53.57	107.14	35.00	129.08	32.27	25.82	21.51
0.8	800	59.21	118.43	40.00	142.68	35.67	28.54	23.78
0.9	900	64.68	129.36	45.00	155.86	38.96	31.17	25.98
1	1000	70.00	140.00	50.00	168.67	42.17	33.73	28.11
1.1	1100	75.19	150.37	55.00	181.17	45.29	36.23	30.20
1.2	1200	80.26	160.51	60.00	193.39	48.35	38.68	32.23
1.3	1300	85.22	170.45	65.00	205.36	51.34	41.07	34.23
1.4	1400	90.09	180.19	70.00	217.09	54.27	43.42	36.18
1.5	1500	94.88	189.76	75.00	228.62	57.16	45.72	38.10

\*\*\* Indicates the minimum caloric requirements cannot be met with this feeding frequency.

## How to Use this Chart (Marcum, 1993)

The chart above is meant to be used as a guide only (see Amounts to Feed on page 14). Weigh the animal periodically. Refer to the chart above to find the quantity of KMR to feed based on the frequency of feedings. KMR Daily amount assumes a formula consisting of 1 part KMR Powder to 2 parts water that delivers 0.83 kcals/cc (based on information from PetAg on March 15, 2003).

The Basal Calorie Requirement is calculated by the metabolic formula for placental mammals:  $70 \times (\text{wt in Kg})^{0.75}$ .

*Note: As of March 2003, the information provided here differs from the IWRC IAB Course Manual which is in the process of being reevaluated. The basal calorie formulas agree, but the growth factor recommended by the IWRC for growing mammals (4X) is not possible to achieve using the caloric values of KMR. Until this issue is resolved, we will continue to use the guidelines established by Debbie Marcum that have proven successful to date.*

# appendix d: common abbreviations and measurements

## Medical Abbreviations

SID	once a day
BID	twice a day
TID	three times a day
QID	four times a day
Q	every (can mean once a day)
QD	every day
EOD	every other day
Q3D	once every three days
Q2H	every two hours
PRN	as needed
UFN	until further notice

IC	intracardial (into the heart)
IM	intramuscular (into the muscle)
IP	intraperitoneal (in the abdominal cavity)
IO	intraosseous (within the bone)
IV	intravenous (into the vein)
PO	per os (by mouth)
SQ	subcutaneous (under the skin)
BAR	bright, alert, responsive
NAI	no apparent injuries
NAR	not alert or responsive
QAR	quiet, alert and responsive
CBC	caught by cat
CBD	caught by dog
FFN	fell from nest
HW	hit window
NOTS	no one to sign (MHS form)
LRS	lactated Ringer's solution
ICU	intensive care unit
TX	treatment
FX	fracture
DX	diagnosis
PE	physical exam

## WildCare Disposition Abbreviations

AWOL	absent without leave (escaped)
CONS	consultation
DOA	dead on arrival
DON	donated
EXP	expired
EU	euthanized
REL	released
TR or TRANS	transferred

## Conversions

1000 milligrams (mg)	= 1 gram (g)
1000 grams (g)	= 1 kilogram (kg)
1000 milliliters (ml)	= 1 liter
1 milliliter (ml)	= 1 cubic centimeter (cc)
1 pound (lb)	= 16 ounces (oz)
1 cup (c)	= 8 ounces (oz)
454 grams (g)	= 1 pound (lb)
28.37 grams (g)	= 1 ounce (oz)
1000 grams (g)	= 35.27 ounces (oz)
2.2 pounds (lb)	= 1 kilogram (kg)
1 drop	= .05ml or $\frac{1}{20}$ ml
1 liter	= 2.11 pints
5 milliliters (ml)	= 1 teaspoon (tsp)
1 teaspoon (tsp)	= $\frac{1}{6}$ fluid ounce (fl oz)
15 milliliters (ml)	= 1 tablespoon (tbsp)
1 tablespoon (tbsp)	= $\frac{1}{2}$ fluid ounce (fl oz)
2 tablespoons	= 1 fluid ounce (fl oz)
65 milligrams (mg)	= 1 grain (gr)

# appendix e: imprinting-taming-habituation

The following is quoted from a handout received during the presentation of a paper by Kirstine M. Thorne at the NWRA Symposium '98, Bellevue, Washington

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## **imprinting**    **Imprinting**

Imprinting is a rapid learning process that takes place early in the life of a social animal and establishes a behavior pattern involving recognition and attraction to identifiable attributes.

- Rapid dramatic form of learning that does not require reward or reinforcement.
- Irreversible learned behavior.
- Common in birds.
- Offspring learn the characteristics of their parents and thus their co-specifics through imprinting.
- Can occur during cross fostering.

Imprinting permanently establishes in the mind of the young animal a more-or-less specific attachment to whatever it has most contact with during the critical learning period.

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## **habituation**    **Habituation**

Habituation is the act or process of making an animal accustomed to, or familiar with, stimuli either through use or experience.

- Short term learning process that does not require reward or punishment.
- Semi-reversible learned behavior.
- Common in both birds and mammals.
- Wild and captive animals become habituated to noises and activities in their daily surroundings.
- Can occur in rehabilitation housing sites.

Habituation is a reversible learning process wherein through repetition and/or exposure, an animal learns not to respond to given factors because it receives neither reward nor punishment.

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## **tameness**    **Tameness**

Tameness changes an animal from a wild state to a state where the animal does not have or does not show the qualities or characteristics of a wild state (such as fierceness or timidity).

- Learning process that involves rewards such as feeding and handling.
- Semi-reversible learned behavior.
- Common in social birds and mammals.
- Behavior that modifies social attachment and courtship predilections.
- Can occur during raising and rehabilitation activities.

Tameness is a state in which a wild animal can be managed by a human handler. It is a social attachment that can affect breeding preferences.



# appendix f: commonly used medications

The medications and prescriptions listed below are not meant to be used to prescribe treatment, but to understand why they were prescribed by the medical team and to help recalculate increased dosages as an animal gains weight.

To recalculate a dosage prescribed by the med staff, **be sure you know the strength of the medication you were given, as medications may come in several different strengths.** Once certain of the strength, calculate the prescribed dosage for weight then divide by strength per ml. The result you get should be a slightly larger dose than it was when the animal weighed less. Use the calculations in parentheses to double check that you are in the right range.

## Analgesics

## analgesics

**Aspirin:** Used to reduce inflammation and pain. Prescription is 20mg/5lb Q8H as needed.

**Buprenex:** (Buprenorphine) Used for pain relief that lasts a relatively long time. Prescription is 0.01-0.05 mg/kg SQ or IM Q6-12 hours.

**Diazepam:** (Valium) Used as a sedative and pain relief. Prescription is 1mg/lb Q8H as needed.

**Metacam:** (Meloxicam) An NSAID used to reduce inflammation and pain. Prescription is 0.1-0.2mg/kg IM or PO SID as needed. (*At strength of 1.5mg/ml, a 250-gram raccoon would receive 0.02cc.*)

## Anthelmintics, parasiticides (Wormers)

## anthelmintics parasiticides

**Droncit:** (Praziquantel) Used for tapeworm. Prescription is 7.5mg/kg PO one time. (*At strength of 56.8mg/ml, a 250-gram raccoon would receive 0.03cc.*)

**Flagyl:** (Metronidazole) Commonly used for protozoan infections such as cryptosporidium or giardia causing diarrhea and irritable bowel problems. Prescription is 44mg/kg loading dose, then 22mg/kg BID x 5. (*At strength of 50mg/ml, a 250-gram raccoon would receive 0.22cc loading, then 0.11cc BID x 5*)

**Ivermectin:** Used to kill lungworm and scabies (mange) mites. Prescription is 0.3mg/kg PO one time. Repeat in 14-days. (*At strength of 100mg/ml, a 250-gram raccoon would receive 0.0007cc.*)

*Note about Ivermectin: the veterinary formulation we use of this drug was developed for use on large animals, so dosages for small animals is miniscule and difficult to administer. For this reason, we generally dilute the oral drug with sterile water to a 10% dilution by mixing 0.1cc Ivermectin with 0.9cc water, then calculate the prescription based on a strength of 10mg/ml. (At this strength of 10mg/ml, a 250 gram raccoon would receive 0.07cc)*

**Panacur:** Anthelmintic used to kill lungworm. Prescription is 50mg/kg PO SID x 3. (*At strength of 100mg/ml, a 250-gram raccoon would receive 0.125cc.*)

**Strongid T:** Anthelmintic used for gastrointestinal parasites including Baylisascaris. Prescription is 1cc per 8lbs, or 0.125cc/lb one time. (This is the equivalent of .275ml/kg.) Can be repeated every 14 days. (*A dosage of 0.275cc/kg for a 250-gram raccoon would be 0.07cc.*)

**Baycox:** (Toltrazuril) Paraciticide used to treat coccidia in birds and piglets. Prescription is 20mg/kg PO one time. (*At strength of 25mg/ml a 500-gram raccoon would receive 0.40cc*)

# appendix f: commonly used medications

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## **antifungal**    Antifungal

**Lamisil Ointment:** Used successfully for ringworm. (*Dicke 2003*)

**Clotrimazole Ointment:** Used to treat fungal infections such a ringworm. Apply to affected area BID until culture is negative or hair grows back.

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## **antimicrobials** **/antibiotics**    Antimicrobials/Antibiotics

**Albon:** (Sulfadimethoxine) Used to treat coccidia. Prescription is one loading dose at 25mg/lb PO; then SID x 4 at 12.5mg/lb. (*At strength of 50mg/ml a 250-gram raccoon would receive 0.28cc loading dose, then 0.14cc SID x 4.*)

**Amoxicillin:** Commonly used antibiotic. Good for fresh or superficial wounds. Prescription is 20mg/kg, BID x 5 to start. (*At strength of 50mg/ml, a 250-gram raccoon would receive 0.1cc*)

**Baytril:** (Enrofloxacin) Used when other antibiotics have proven inadequate. Prescription is 2.5-15mg/kg IM or PO usually given as 1 injection followed by oral dosing BID x 7. (*At strength of 22.7mg/ml, a 250-gram raccoon would receive 0.11cc*)

**Cepha Droxil:** (Cefa) Commonly used antibiotic in tabs or liquid for large open wounds. Also used as the next step when infection is not responding to TMS. Prescription is 30mg/kg, BID or TID x 7. (*At strength of 30mg/ml, a 250-gram raccoon would receive 0.15cc*)

**Clavamox:** Commonly used antibiotic. Also good for upper respiratory infections and resistant infections. Prescription is 20mg/kg, TID x 7. (*At strength of 62.5mg/ml a 250-gram raccoon would receive 0.08cc.*)

**Penicillin G Procaine** (Pen G): Commonly used injectible antibiotic when giving oral meds is impossible.

**Tri-Methoprim Sulfa** (TMS): Commonly used antibiotic in baby animals. Especially useful for respiratory infections such as aspiration induced congestion. Prescription is 25mg/kg, BID x 7 to start. (*At strength of 48mg/ml, a 250-gram raccoon would receive 0.13cc*)

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## **anti-** Anti-inflammatory **inflammatories**

**Dexamethasone:** Used to reduce inflammation. Common treatment for shock and severe head trauma. Should be given with fluids as either a one-time “shock” dose (4mg/kg) or a tapered course.

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## **anti-viral**    Anti-Viral

**Tamiflu:** Used to inhibit the viral enzyme neuraminidase in Hemorrhagic Enteritis diseases. Prescription is 1mg/lb every 12 hours for 10 treatments. (*At a strength of 12mg/cc, a 2-lb raccoon would receive 0.1cc.*)

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## **fluid therapy**    Fluid Therapy

**Electrolytes** (Pedialyte or Bounce-Back): Oral fluid replacement, used on intake to transition an animal to a new diet. Pedialyte or its equivalent is also frequently used to help stabilize digestive-related disorders such as diarrhea or anorexia resulting from dehydration. An emergency hydrating solution can also be

# appendix f: commonly used medications

made from 2 cups water to ½ tsp. baking soda, ½ tsp. salt, 3½ tbsps. sugar, ¼ tsp. salt substitute (Potassium)

**Lactated Ringers Solution:** Isotonic fluid replacement solution useful in dehydrated, debilitated and weak animals. This may be administered as a subcutaneous or intravenous injection. Other isotonic solutions for raccoons are LRS with 2½% dextrose and 0.9% Sodium Chloride. All IV (SQ) fluids must be refrigerated after opening and should not be used for subcutaneous injection after 1 week. they may be used orally for 3 weeks after opening. always warm fluids before injecting.

## **Gastrointestinal Support**

**Kaopectate:** (Kaolin-Pectin) Sometimes used to stabilize G-I tract in weaning-associated diarrhea. Prescription is 1-2ml/kg PO QID as needed. (A 250-gram raccoon would get 0.25 to 0.5cc.)

**Pepto-Bismol:** (Bismuth subsalicylate) Used to soothe G-I tract and reduce nausea and diarrhea. Prescription is 1-2ml/kg PO TID-QID as needed. (A 250-gram raccoon would get 0.25 to 0.5cc.)

**Simethecone** (Infant Gas Relief Drugs): Recent findings have shown this to be helpful in cases of mild bloat and related symptoms of air in the G-I tract. At strength of 20mg/0.3ml, prescription is 0.05cc for animals 60grams or less; 0.10cc for animals 60 grams or more. Repeat 4 to 5 times daily as necessary.

**Pro-biotics** (yogurt, Benebac, Acidophilus): Probiotics are recommended to replace beneficial bacteria found naturally in the mother's milk. They should be given to very young and/or weak animals, and to those that are on antibiotics or immuno-compromised in any way. Whole-milk yogurt (goat's milk is preferred) contains live active cultures of s. thermophilus, Lactobacillus bulgaricus, Lactobacillus acidophilus and Lactobacillus bifidus and can be used at the rate of 1 tblsp. to 1 pint of formula. If not available Bene-bac™ can be given once a week as long as needed (0.2cc/kg).

## **Immune System Support**

**Levamisole:** Used to boost the immune system. Prescription is 0.02cc/lb SQ one time (or 2.75mg/lb). Treatment can be repeated in 10-14 days. (At strength of 136.5mg/ml, a 250-gram raccoon would receive 0.002cc). It can be diluted with sterile saline to a 10% solution (see Ivermectin note).

**Vitamin B:** Used to boost the immune system. Prescription is 1-2mg/kg IM one time. (At strength of 50mg/ml, a 250-gram raccoon would receive 0.005 to 0.01cc). It can be diluted with sterile saline to a 10% solution (see Ivermectin note).

**Vitamin C:** Used to boost the immune system. Prescription is 20mg/kg IM one time. (At strength of 250mg/ml, a 250-gram raccoon would receive 0.02cc).

**Vitamins A&D:** Used to improve skin condition. Prescription is 20,000units/kg IM one time. (At strength of 500,000units/ml, a 250-gram raccoon would receive 0.01cc).

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**gastro-  
intestinal  
support**

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**immune  
system  
support**

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