

STATE OF COLORADO

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Colorado Department
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Rabies Prevention and Control Policy Management of Domestic Animals Exposed to Rabies Updated July 1, 2011

Background

The prevention of rabies in domestic animals is a major component of human rabies prevention. Worldwide most human rabies cases result from exposure to domestic animals, primarily dogs. The introduction of mandatory rabies vaccination laws, enforcement of leash laws, and stray animal control in the U.S. have eliminated canine-to-canine transmission of rabies and reduced the occurrence of rabies in domestic pets. However, rabies persists in several independent enzootic cycles involving various wildlife species, and spillover infections from these wildlife reservoirs to domestic animals occur. Human exposures to terrestrial rabies reservoir species (RRS) such as bats, skunks, raccoons, and foxes are usually recognized and limited to one individual. In contrast, rabid domestic animals have often resulted in large numbers of people being exposed. Domestic animals that have been exposed to RRS must be assessed for risk of rabies infection and managed to prevent human exposures. Based on the current epidemiology of rabies in Colorado, the primary rabies exposure risk for pets in this state is to bats and skunks. Skunk rabies has reemerged in Colorado with a few sporadic cases in eastern Colorado spreading to widespread epizootics, currently all occurring east of the Rocky Mountains. While the variants of rabies virus adapted to raccoons and foxes are not present in Colorado at this time, raccoons and foxes are RRS in other parts of the United States, and thus are considered increased risk for carrying rabies. Contact with other wild animal species should still be evaluated on a case-by-case basis.

Basis of Recommendations/Statutory Authority

National recommendations for the management of domestic animals exposed to rabies are outlined in the *Compendium of Animal Rabies Prevention and Control* (available at www.nasphv.org), produced annually by the National Association of State Public Health Veterinarians (NASPHV). This policy varies from the *Compendium* by recommending additional rabies immunization and a modified 6-month quarantine for the management of exposed, unvaccinated animals. Statutory authority is provided under Title 25, Article 4, Part 601, Colorado Revised Statutes, 1973 as amended. The statute mandates the reporting of pet animals potentially exposed to rabies, provides authority for exposed pets to be treated and confined per health department protocol, and requires the animal owner be notified in writing of the conditions being imposed.

Definitions -- For the purpose of this policy the following definitions will be used:

1. **domestic animals** – pets or livestock mammals
2. **pet** - Any of the following mammals: dog (*Canis familiaris*), cat (*Felis domesticus*), or ferret (*Mustela putorius*). Other domestic animals that are not livestock mammals will be considered as meeting this definition, as determined on a case-by-case basis, by the State Public Health Veterinarian or designee at the Colorado Department of Public Health & Environment.
3. **livestock mammal** - Other non-wildlife mammal for which there is a U.S. Department of Agriculture approved injectable vaccine labeled for use in that species as listed in the current version of the NASPHV *Compendium of Animal Rabies Prevention and Control* (e.g. horses, cattle, sheep). Other livestock mammals will be considered as meeting this definition, as determined on a case-by-case basis, by the State Veterinarian or designee at the Colorado Department of Agriculture.

4. **currently vaccinated** – A pet with one documented rabies vaccine, if the vaccine was given >28 days but ≤12 months prior to the exposure, OR a pet with two or more documented rabies vaccines, if the most recent is current (i.e., administered within the time frame specified by the vaccine manufacturer—e.g. either one, three or four years). For the purposes of this policy an animal’s vaccination status is based on the vaccine used and date administered, not on whether the animal is current under the local rabies vaccination ordinances. See Table 1.

5. **expired vaccination** - A pet with two or more documented rabies vaccines, if the most recent is not current. See Table 1.

6. **high risk pets** – A pet with no documented rabies vaccines, OR a pet with one documented rabies vaccine given <28 days or >12 months prior to the exposure. See Table 1.

7. **home observation** – Pets placed under home observation are to be monitored by the owner for signs or symptoms consistent with rabies infection. During the observation period, the animal can leave the home property while under physical control of the owner.

8. **home quarantine** – Pets placed under home quarantine must be physically confined to the owner’s property for the duration of the quarantine period by a fence, chain, cage, other physical restraint, or confined indoors. Contact with people and other animals should be minimized. **An animal under home quarantine cannot leave the owner's property for any reason** except when being transported for veterinary medical care. Any bites to humans or any symptoms consistent with rabies must be reported to the health department. If the owner is unable or fails to confine the animal to their property, the pet should be impounded for the remainder of the quarantine period.

9. **strict quarantine** - The animal must be isolated at a secured facility agreeable to the health department and local agency responsible for animal control

10. **Rabies reservoir species (RSS)** - The primary reservoir species responsible for maintaining rabies are bats, skunks, foxes, and raccoons (as well as mongooses in Puerto Rico).

Table 1. Classification of rabies susceptibility for dogs, cats, and ferrets exposed to rabies reservoir species (RRS).

Number of previous rabies vaccinations*	Timing of most recent rabies vaccination	Status
0	--	High risk
1	Less than 28 days prior to exposure	High risk
	12 or more months prior to exposure	High risk
2 or more	Between 28 days and 12 months prior to exposure	Currently vaccinated
	Up-to-date** at time of exposure	Currently vaccinated
	Not up-to-date** at time of exposure	Expired vaccination

* Vaccination history must be verified by review of a valid rabies vaccination certificate or consultation with the pet’s veterinarian.

** “Up to date” means that the most recent vaccination was given within the time frame specified by the vaccine manufacturer (typically one, three, or four years). A summary of these specifications is outlined in the current edition of the “Compendium of Animal Rabies Prevention and Control,” which is regularly updated by the National Association of State Public Health Veterinarians.

Risk Assessment

The risk of a domestic animal contracting rabies after contact with a RRS can be assessed with three questions:

1. Was the RRS rabid?
2. Is the exposed pet susceptible to rabies?
3. Did sufficient contact occur between the two animals to allow the transmission of rabies virus?

An affirmative answer to all three questions suggests a high risk of rabies virus transmission and subsequent development of rabies in the exposed animal. Conversely, a negative answer to any one question would suggest no rabies risk to the exposed animal.

Determination of Rabies Status

In all situations the RRS involved should be captured safely, to avoid human exposure, and submitted for rabies testing as per written Department policy. A negative direct fluorescent antibody (DFA) test for rabies excludes the risk of rabies exposure. Any animal that is DFA positive for rabies will be considered rabid. A bat, skunk, raccoon, or fox that was unable to be tested (escaped, discarded, was eaten or the skull was damaged, and no brain tissue was available for testing) will be considered as high risk of being infected with rabies. Other wild animal species that are unable to be tested should be evaluated on a case-by-case basis.

Determination of Susceptibility

A pet's susceptibility to rabies infection depends on its rabies vaccination status. For the purposes of this policy, a pet will fall into one of three vaccination categories: currently vaccinated, expired vaccination, or high risk pet as defined above. Vaccination history must be verified by review of a valid rabies vaccination certificate or consultation with the pet's veterinarian. Verbal vaccination history from the owner is not sufficient evidence. Additionally, Colorado law, 25-4-607, C.R.S., requires rabies vaccinations be performed by a licensed veterinarian. Thus owner-administered rabies vaccine is not recognized.

Serology – Serologic testing **cannot** determine whether an animal is adequately protected or if booster vaccinations are needed. **Rabies virus antibody titers are indicative of a response to vaccination or infection with rabies.** Although a rabies virus neutralizing antibody titer of 0.5 IU/ml may indicate an adequate immune response to vaccination, the presence of neutralizing antibodies has NOT been correlated with protection from rabies virus infection. Animals with antibody levels in excess of 0.5 IU/ml have succumbed to rabies following exposure to rabies virus, while previously vaccinated animals with antibody titers below this level have survived viral challenge. Therefore, serologic evidence of circulating rabies virus antibodies does not constitute proof of current vaccination when managing rabies exposures or determining the need for rabies booster vaccinations in domestic animals.

Determination of Exposure

Rabies virus is present in the saliva and nervous system tissue (brain, spinal cord) of infected animals. The primary method of rabies virus transmission is a bite from a rabid animal. Transmission can also occur through the contact of saliva or nervous system tissue of a rabid animal with mucous membranes (eyes, mouth or nose), a fresh cut or wound. The absence of a visible bite wound following contact with a wild animal does not exclude the possibility that the pet was exposed to rabies. Due to the minute puncture wounds inflicted by bat teeth, bat bites can be difficult to visualize, even on persons or animals known to have been bitten. This can also be a concern in ruling out bites to domestic animals, as puncture wounds are difficult to see on haired skin and some bites inflict very limited injury. In addition, dogs could become exposed by biting into a rabid animal's spinal cord. Contact with urine, feces (guano), blood, or with a carcass that is dry and mummified or has no remaining brain tissue due to decomposition or maggot infestation does not constitute a rabies exposure.

Determining whether a RRS and pet had sufficient contact for rabies virus transmission to occur can be difficult. To ensure an accurate exposure assessment is made, a thorough interview must be conducted with the pet owner and other witnesses at the time the incident is reported. Information to be obtained should include: date, time and location of the interaction, whether direct physical contact was observed or how close the animals were (estimate distance), presence of puncture wounds or blood on the RRS or pet, and the presence of saliva or injuries on the RRS. It is not uncommon for an owner, when they become aware of possible ramifications such as quarantine of their pet, to minimize the potential risk by altering details of the interaction during subsequent interviews.

For the purposes of this policy, a pet is considered exposed if there was direct physical contact with a RRS (bat was attached to the pet, bat was in the pet's mouth, pet ate all or part of the bat) OR the circumstances strongly indicate physical contact occurred (dog standing next to bat barking at it, cat stalking or playing with the bat, finding a dead bat where a cat usually deposits its prey, saliva or bite wounds on the RRS, finding a partially consumed bat or other RRS, finding a dead

skunk in the yard with a dog).

For situations in which physical or observed evidence of contact between the RRS and pet is lacking, but contact cannot be ruled out, determining whether exposure is likely to have occurred is at the discretion of public health authority. Examples of when a pet is NOT considered exposed include: a pet in the vicinity of a bat but unaware of its presence; a bat found on the property but the pet was in another area; a dead RRS found in a place the pet couldn't access; a live, roosting bat on the property exhibiting normal behavior or other evidence that suggests contact was unlikely (elderly or debilitated pet).

Management of Exposed Pets

Post-Exposure Prophylaxis (PEP) in Pets -- Human rabies PEP, consisting of protective antibodies from rabies immune globulin (RIG) and a series of inactivated rabies virus vaccine injections, is highly protective when administered to humans after exposure. **An effective PEP regimen in domestic animals has not been established.** In challenge studies, immunization of pets with only vaccine after exposure has generally provided poor protection to large viral challenges, though regimens that include RIG have shown more promise. Unfortunately, no RIG products for animals are licensed and human RIG is expensive, supplies are limited, and the risk of a severe reaction exists. PEP in an unvaccinated, exposed pet therefore, cannot be relied on solely to protect the owners and community.

Exposure to RRS -- If the determination is made by the local health department or animal control agency that a pet had adequate exposure to a RRS, the disposition of that pet will depend on its vaccination status as outlined below. If the pet exhibits any signs or symptoms suggestive of rabies during the required observation/quarantine period, the owner must notify the health department and arrange for an immediate veterinary examination. All incurred costs, including vaccinations, boarding and veterinary charges, are the owner's responsibility.

Currently Vaccinated Pets – The exposed pet shall be immediately re-vaccinated and placed under home observation for 45 days.

Pets with Expired Vaccinations -- Animals that have 2 or more documented rabies vaccinations shall be vaccinated immediately after exposure, placed under a 90 day home quarantine, and re-vaccinated in 30 days after the initial dose.

High Risk Pets -- The owner should be counseled on the risk of the animal developing rabies and euthanasia of the exposed animal should be recommended as the preferred course of action. If the owner is unwilling to do this, a mandatory 180-day quarantine will be required. The first 90 days of the quarantine is a strict quarantine (the animal must be isolated at a secured facility agreeable to the health department and local agency responsible for animal control). The home property is NOT acceptable for this phase of the quarantine. Rabies vaccine should be administered to the animal immediately after exposure and again 21 and 60 days later. If the animal remains healthy and exhibits no signs or symptoms consistent with rabies at 90 days, it is released to the owner to complete the second half of the 180-day confinement period under home quarantine.

Exposure to Non-RRS Wild Mammal – If a pet is exposed to a wild mammal that is not a rabies reservoir species, but in which spill over infections has been documented (e.g. bobcat, coyote), consultation with CDPHE by local animal control or local public health officials should occur to determine quarantine conditions, on a case-by-case basis.

Livestock Mammal – Cases of rabies in livestock occur in states with endemic terrestrial mammal rabies, primarily skunks. In 2009, a cow and horse tested positive for rabies in El Paso County during skunk rabies epizootics in the immediate area. In the U.S., the likelihood of recognized contact between an insectivorous bat and livestock would be remote. In the event of a suspected or confirmed exposure to livestock mammal(s) in Colorado, the recommendations outlined in the *Compendium* should be applied, in consultation with and the Colorado Department of Agriculture.

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