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Colorado Department
of Public Health
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Rabies Prevention and Control Policy Management of Domestic Animals Exposed to Rabies Updated November 3, 2009

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 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 will be to bats and skunks.

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 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 will be considered currently vaccinated if the primary vaccination was administered at least 30 days previously and the animal is currently vaccinated in accordance with the *Compendium*. For the purposes of this policy an animal's vaccination status is based on the duration of the vaccine used and date administered, not on whether the animal is current under the local rabies vaccination ordinances.

5. **not vaccinated** – A pet that has never been vaccinated or an adult animal (>18 months of age) that was vaccinated only once and is overdue for booster doses will be considered “not vaccinated” and susceptible to rabies infection.

6. **expired vaccination** -- A pet that has had two or more documented vaccinations in its life but is currently overdue for a booster will be considered previously immunized but with an “expired vaccination” status. Although antibody levels may have declined, booster doses would be expected to result in a rapid rise in antibody titers and protect the animal.

7. **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 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.

8. **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.

Risk Assessment

The risk of a domestic pet 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. Skunk rabies has reemerged in Colorado with the few sporadic cases in eastern Colorado spreading to widespread epizootics, currently all occurring east of the Rocky Mountains.

Determination of Rabies Status

In all situations the RRS involved should be captured safely, to avoid human exposure, and submitted for rabies analysis as per written Department policy. A negative direct fluorescent antibody (DFA) test for rabies excludes the risk of rabies exposure. A bat or skunk that is DFA positive for rabies or 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 rabid.

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, unvaccinated or an expired vaccination 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 – A rabies virus neutralizing antibody titer of 0.5 IU/ml has been accepted as evidence that an animal had an adequate immune response to vaccination, however, the level of neutralizing antibodies has NOT been correlated with protection. 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. Serologic testing **cannot** determine whether an animal is protected or if booster vaccinations are needed.

Determination of Exposure

Rabies virus is present in the saliva and nerve 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 introduction of saliva or nerve tissue into mucous membranes (eyes, mouth and nose) or a fresh cut or wound. 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. The absence of a visible bite wound following contact with a bat does not exclude the possibility that the pet was exposed to rabies. 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 bat and pet had sufficient contact for rabies virus transmission to occur can be difficult. To ensure
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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 dead skunk in yard with dog).

For the purposes of this policy, a pet will be considered **not** exposed when physical or observed evidence of contact is lacking. This includes 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 should 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 should be vaccinated immediately after exposure, placed under a 90 day home quarantine, and re-vaccinated in 30 days.

Unvaccinated 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 strict quarantine will be required. During the first 90 days of the 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 be 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.

