

DEALING WITH RABIES:

A GUIDE FOR OHIO VETERINARIANS



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Health**

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Purpose

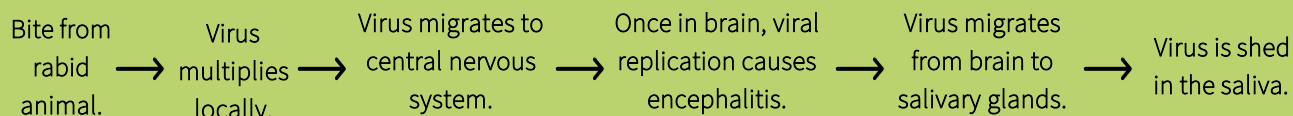
The purpose of this document is to provide an update on animal rabies in Ohio, define the veterinarian's role in animal bites and suspect rabid animals, provide guidance on the management of these cases, and answer frequently asked questions about animal bites and rabies. For additional information, including bat exposures, contact your [local health department](#) or the [Ohio Department of Health's \(ODH's\) Zoonotic Disease Program](#). Contact information and links can be found at the end of this document.

Rabies Basics

What is The Pathogenesis and Transmission of Rabies?

Rabies is a viral zoonotic disease in the genus *Lyssavirus* that can infect any mammal species, causing progressive encephalitis. Rabies is most commonly transmitted through a bite from a rabid animal but can also be transmitted through non-bite exposures when potentially infectious material comes into contact with scratches, open wounds, abrasions, or mucous membranes.

After inoculation, the virus replicates in muscle tissue and then migrates through the peripheral nerves to the central nervous system, eventually reaching the brain. Once in the brain, the virus rapidly multiplies causing damage to the brain tissue, resulting in a variety of progressively worsening neurologic signs that lead to death. From the brain the rabies virus migrates back out through the cranial nerves, reaching the salivary glands where it can be shed in saliva.



What is Considered Potentially Infectious Material?

The virus can be found in the **saliva, tears, brain, and nerve tissue** of an infected animal. Any direct contact with potentially infectious material through broken skin or mucous membranes is considered a rabies exposure. Exposure to neural tissue may occur when removing the head of a rabid animal without proper use of personal protective equipment (PPE). Refer to [Guidelines for Head Removal and Carcass Disposal](#) for PPE recommendations.

The virus is rapidly inactivated by ultraviolet light and desiccation and does not persist in the environment. Therefore, contact with the environment around a rabid animal, such as with bedding or water bowls, **does not** present a risk.

Rabies is not transmissible through:

- Blood.
- Urine.
- Feces.
- Skunk Spray.
- Intact skin.

What is The Incubation Period of Rabies?

The incubation period in domestic animals is usually between three and 12 weeks but can vary from several days up to six months. The variability in incubation time is dependent on several factors: the animal's vaccination status, the amount of virus inoculated, the rabies variant, the length of the neural path from the exposure site to the brain, and the severity of trauma which can expose more nerves.

Rabid animals can shed the virus in their saliva before developing clinical signs. Infected dogs, cats, and ferrets are not contagious until a few days prior to the onset of clinical signs, ultimately guiding the required quarantine period. Viral shedding and incubation periods are not as well established for other species (exotics, wildlife, hybrids). As a result, for rabies exposure cases involving these other species, euthanasia and testing are generally recommended. Please see [Management of Animals That Bite People](#) for more information.

What are The Rabies Vector Species in Ohio?

In the United States (U.S.), the majority of rabies cases are wildlife. Bats and wildlife species such as raccoons, coyotes, foxes, and skunks are considered major rabies vectors, though most mammals can be considered a rabies vector. The primary vector species are bats (33%), raccoons (30.3%), skunks (20.3%), and foxes (7.2%). Around 60 to 70 dogs and over 250 cats test positive for rabies every year, with nearly all cases acquiring the virus from wildlife. Other domestic animals that commonly test positive for rabies include horses, donkeys, and cattle. Recent prevalence data in the U.S. can be found on the Centers for Disease Control and Prevention (CDC)'s ["Is Rabies in Your State?" webpage](#).

Based on surveillance data in Ohio, bats and raccoons are the major rabies vector species likely to transmit rabies to humans and domestic animals. While all mammal bites and rabies exposures should be reported to the local health district where the exposure occurred and be referred for medical evaluation and treatment of any wounds, the risk of rabies varies by species (Table 1). Between 1980 and 2022, over 1,600 Ohio animals tested positive for rabies. The majority were bats (1,215), followed by raccoons (261), and skunks (213). Annual rabies cases in Ohio by county can be found on the [ODH Rabies webpage](#), by following the dropdown menus below "Rabies Basics."

Table 1. Rabies Exposure Risk by Species

High Risk	Moderate Risk	Low Risk	No Risk
Bats Raccoons Coyote Fox Bobcats Skunk Hybrid Wildlife Stray Cats and Dogs	Dogs Cats Ferrets Horses Livestock Groundhogs Primates	Squirrel Chipmunk Hamster Gerbil Other Small Rodents Rabbits Hedgehogs	Birds Reptiles Amphibians Fish Insects
Regarded as rabid unless the animal is proven negative by laboratory test.	Consider individually based on public health risk assessment.	Rarely requires post-exposure prophylaxis unless unusual circumstances.	Not susceptible to rabies.

What are Rabies Virus Variants?

There are several variants or strains of rabies that are genetically unique and named for the species that serve as their primary reservoir. Reservoir species maintain the virus through persistent transmission within their populations. All rabies variants can infect any mammal, including humans. Rabies infection is considered a spillover case when it is transmitted to a non-reservoir species.

The canine virus variant has been eliminated from the U.S. but remains a global problem and the threat of reintroduction into the U.S. persists. The bat virus variant is found in all states except for Hawaii. Other terrestrial species variants are confined to specific geographic regions of the country. See [CDC Wild Animals](#) for a map of all U.S. rabies virus variants. In Ohio, the predominant variants include the raccoon rabies variant in the northeastern part of the state, and the bat variant found throughout the state. Though those are two variant types in the state, rabies has spilled over to a number of other domestic and wild species.

Rabies as A Differential Diagnoses

Clinical signs of rabies are suggestive, but rarely definitive, and require laboratory diagnosis. Initial symptoms are non-specific and may include lethargy, vomiting, and anorexia. Clinical signs of rabies can vary widely between and within species. The most reliable clinical signs, regardless of species, are acute behavioral changes and unexplained progressive paralysis. Affected animals may seek solitude or usually calm animals may become aggressive. Some wild animals may lose their fear of humans, and nocturnal animals may be seen during daylight hours. See Table 2, below, for a list of additional clinical signs.

Table 2: Clinical Signs of Rabies

Clinical Signs of Rabies	
Lethargy	Cerebral dysfunction
Fever	Cranial nerve dysfunction
Vomiting	Ataxia
Anorexia	Weakness
Changes in behavior (irritability, hyperexcitability, nervousness, etc.)	Paralysis
Seizures	Aggression
Difficulty breathing or swallowing	Coma
Reactive to changes in light and/or noise	Death
Excessive salivation	Self-mutilation

* It is important to note that clinical signs are highly variable between species and between individuals of the same species.

In addition to the variability of clinical signs, rabies will manifest in two primary forms: the furious form and the paralytic form. In the furious form, aggression is pronounced in animals. This form of rabies can be found in all species but does not occur in all rabid animals. The paralytic form is manifested by ataxia and paralysis of the throat and masseter muscles leading to profuse salivation and dropping of the lower jaw. These animals may not be vicious or attempt to bite.

Table 3: Forms of Rabies

Furious Form	Paralytic Form
<ul style="list-style-type: none"> • Dangerous aggression (excitatory phase). • Irritable, self-harm. • Biting of objects, other animals, and humans. • Muscular incoordination. • Seizures. • Expression is alert and anxious, dilated pupils. • Reactive to noise or movement. 	<ul style="list-style-type: none"> • Partial or full-body paralysis. • Short or absent excitatory phase. • Ataxia. • Dropping of lower jaw. • Excessive salivation. • Inability to swallow. • Coma.

Differential Diagnosis of Rabies by Clinical Signs and Species

Clinical examination findings may be suggestive of apparent encephalitis but may be similar to several other diseases. In the early stages, rabies can be easily confused with other diseases or with individual aggressive tendencies. Furthermore, rabies may be overlooked as a differential diagnosis, especially in areas where the disease is uncommon, including Ohio. The following charts provide clinical abnormalities and differential diagnoses that may present similar to rabies. It's important to maintain rabies on your differential diagnosis list until a final diagnosis is made. The lists provided on the next page are not comprehensive and should only serve as a guide for diagnosis with a comprehensive medical evaluation.

Veterinarians who encounter a suspected case of rabies must report to their local health department.

Differential Diagnosis by Clinical Sign		
New, Atypical Aggression	<ul style="list-style-type: none"> • Behavioral (defensive, fear, territorial, etc.). • Cerebral hypoxia. • Cognitive dysfunction syndrome. 	<ul style="list-style-type: none"> • Intracranial neoplasia. • Metabolic disorders (hepatic, renal). • Neuroendocrine disturbances. • Trauma or pain. • Epilepsy.
Ataxia	<ul style="list-style-type: none"> • Primary central nervous system disease. • Metabolic encephalopathies. • Toxicity. 	<ul style="list-style-type: none"> • Neoplasia. • Auricular inflammation, polyp, etc. • Degenerative disease.
Seizures	<ul style="list-style-type: none"> • Toxicity. • Neoplasia. • Degenerative disease. • Congenital malformation. 	<ul style="list-style-type: none"> • Necrotizing meningoencephalitis. • Metabolic disorders. • Hypoglycemia.

Differential Diagnosis of Rabies by Species		
Small Animal	<ul style="list-style-type: none"> • Canine distemper. • Encephalitis. • Heat-related illness. • Hepatic encephalopathy. • Hypoglycemia. • Neoplasia. 	<ul style="list-style-type: none"> • Metabolic disorders. • Pseudorabies. • Thiamine deficiency (cats). • Tick paralysis. • Toxicity (medications, heavy metals, plants, cyanotoxins, etc.). • <i>Sarcocystis neurona</i>.
Equine	<ul style="list-style-type: none"> • Colic. • Equine arboviral encephalitis. • Heat-related illness. • Hepatic encephalopathy. 	<ul style="list-style-type: none"> • Neoplasia. • Protozoal myeloencephalitis. • Toxicity. • Septicemia.
Cattle and livestock	<ul style="list-style-type: none"> • Bovine encephalitis. • Bovine spongiform encephalopathy. • Heat-related illness. • Hepatic encephalopathy. • Hypocalcemia. • Hypomagnesemia. 	<ul style="list-style-type: none"> • Listeriosis. • Neoplasia. • Nervous Ketosis. • Pseudorabies. • Toxicity (plant, algae, heavy metals, medications, organophosphate, etc.).

Veterinarians who encounter a suspected case of rabies must report to their local health department.

Rabies Exposures and Reporting

What is Considered a Rabies Exposure?

Rabies is typically transmitted to humans and other animals through a bite, however, other types of exposures to [potentially infectious material](#) do occur. For a list of common exposures/non-exposures (excluding exposures to bats), see Table 4, below. For more information on rabies exposures, visit ODH's [Rabies Post-Exposure Risk Assessment Tool](#).

Table 4. Rabies exposures

Risk of Exposure	No Risk of Exposure
<ul style="list-style-type: none">• Animal bite that broke the skin.• An animal licked a fresh, open wound.• Neural tissue of saliva came into contact with mucous membranes (including a wet scratch).• Direct, bare-skinned contact with the bat and cannot rule out that a bite has occurred.• In a room with a bat and is unable to articulate whether an exposure took place (e.g., a deeply sleeping person awakens to find a bat in the same room; a bat was in a room with a previously unattended young child or an individual mentally impaired due to medication, illness, or intoxication when the exposure occurred).• A person received an organ transplant from an infected donor.• A sample has been aerosolized within a lab setting and no or inadequate PPE was used.	<ul style="list-style-type: none">• A person/animal touched something a rabid animal touched.• Saliva from the animal came into contact with intact skin or contact was a dry scratch.• A person/animal was in the same room as the rabid animal (bats are an exception).• Properly cooked meat or pasteurized milk from a rabid animal was ingested.• Petting a rabid animal.• A person/animal had contact with urine, feces, blood, or skunk spray of a rabid animal.• An animal ate or drank from a bowl after a rabid animal did.• Inhalation, such as when spelunking.

How Should Bites and Rabies Exposures be Reported?

In Ohio, whenever a person is bitten by a dog or other non-mammal, the bite must be reported to the [local health department](#) where the bite occurred within 24 hours, regardless of the bite scenario or vaccination status of the animal [Ohio Administrative Code ([OAC](#)) 3701-3-28]. The report can be made by the individual bitten or any physician or veterinarian with knowledge of the bite.

Potential exposure of domestic animals to potentially rabid animals, especially [rabies vector species](#), should be reported to the local health department as well. Such examples include a cat that caught a bat or a dog that is believed to have gotten into a fight with a raccoon. See [Management of Animals that Have Potentially been Exposed to Rabies](#) for details on managing these cases.

Animal bites must be reported to the local health department, regardless of the bite scenario or vaccination status of the animal.

Information typically requested by the local health department for animal bite reporting:

- Date of the incident.
- Location where the incident occurred.
- Species and description of the animal.
- Owner of the animal and their contact information if available.
- Person exposed and their contact information.
- Rabies vaccination status of the animal, if known.
- Circumstances surrounding the incident; if a bite, what precipitated the event if known.

The public health official will decide if and how to quarantine animals and will determine when testing is needed.

Questions concerning pets suspected of being exposed to rabies can be directed to the local health department or ODH's Zoonotic Disease Program: (614) 752-1029 or zoonoses@odh.ohio.gov.

Should Suspected Rabid Animals be Reported in Ohio?

Veterinarians are required to report any suspected animal rabies cases or animals with symptoms or behavior that is suggestive of rabies to the [local health department](#) where the animal lives or was found [[OAC 3701-3-30](#)]. Reporting is only indicated if rabies is considered a likely differential, in which case this must be reported to the health district within 24 hours. A veterinarian with a suspected rabid animal is to confine the animal until further direction from the local health department.

What is The Local Health Department's Role and Responsibility?

In the state of Ohio, the local health department is the legal authority that enforces rabies vaccination (if applicable), quarantine, euthanasia, and rabies testing. The local health department conducts risk assessments for people and animals involved in an exposure to ensure appropriate recommendations are made, while considering several factors including the species of animal involved, the risk of rabies in that geographic location and in that species, the likelihood that this animal was exposed to rabies (lifestyle, housing, etc.), and the circumstances surrounding the exposure.

What is The Veterinarian's Role and Responsibility?

Report rabies exposures, bites, and suspected rabid animals to the local health department. See [How Should Bites and Rabies Exposures be Reported?](#) and [Should Suspected Rabid Animals be Reported in Ohio?](#) for more information.

A veterinarian does not have the authority to order a quarantine but can confine a suspect rabid animal while awaiting further direction from the public health official. Quarantine orders after a bite to a human or rabies exposure to a are issued by the local health department.

Euthanasia for rabies testing can typically only be conducted with the owner's consent or by order of the public health official. In the event that no owner is available, and the animal is suffering, the Ohio Veterinary Practice Act gives veterinarians the authority to euthanize at their discretion with appropriate documentation of cause. Veterinarians may be asked to euthanize bats involved in exposure events. For guidance on euthanizing bats, see [Appendix D](#).

If an animal involved in a bite or rabies exposure dies or is euthanized, the head must be submitted for rabies testing regardless of the animal's vaccination status [\[OAC 3701-3-29\]](#).

Rabies Vaccination of Animals

Rabies Vaccination is Required for Which Species?

Ohio has no **statewide** rabies law requiring rabies vaccinations. Rather, Ohio law gives local governments the authority to enact rabies vaccination regulations. Please reach out to your local health department for **local rabies ordinances**.

NOTE: When a State-level requirement for rabies vaccination does not apply, it is the veterinarian's responsibility to know whether or not local jurisdictions (i.e., either city or county) have rabies vaccination requirements in place.

There are certain situations in which the State of Ohio **does** require vaccinations of dogs or cats. They include:

- Dogs or cats imported from other states or countries [\[OAC 901:1-17-05\]](#).
- Dogs, cats, or ferrets being released from quarantine for either biting a human or being potentially exposed to rabies virus (contact with wild mammal) [\[OAC 3701-3-29\]](#) [\[ORC 955.26\]](#).
- Dogs or cats staying in a Division of Parks and Watercraft and Division of Forestry campgrounds [\[OAC 1501:46-9-10\]](#) [\[OAC 1501:3-3-08\]](#).
- Dogs in State Parks must wear a tag as proof of rabies vaccination [\[OAC 1501:46-3-34\]](#).
- Dogs registered as a "dangerous dog" [\[ORC 955.22\]](#).
- Dogs in outdoor dining areas of food service operations [\[OAC 3717-1-08.5\]](#).
- Pets that visit or reside in residential care facilities [\[OAC 3701-16-11\]](#).
- Counties mentioned in the [Director's Journal Entry \(2019\)](#). The Director's Journal Entry was created in response to raccoon variant rabies entering the state and covers several eastern Ohio counties. Updated journal entries and laws can be found on ODH's Zoonotic Disease Program [webpage](#).

NOTE: While there may be no State or local requirements for rabies vaccination, there **are** state laws that govern what happens to dogs or cats that are exposed (or potentially exposed) to rabies based on their vaccination status.

Even if rabies vaccination is not required at the State or local level, vaccination of all dogs/cats **is strongly recommended.**

Which Ohio Health Districts have Rabies Vaccination Requirements?

Many practices will service clients from more than one health district, and the regulations, if present, will vary with respect to when vaccination is required, and which veterinary personnel can administer the vaccine. It is recommended to contact the [local health department](#) near your practice to become familiar with the requirements.

In 2023, a survey conducted by ODH's Zoonotic Disease Program found that 40 of 110 (36%) local health departments require rabies vaccination of dogs, 34 (31%) require vaccination of cats, 25 (22%) require vaccination of ferrets, and two (1.8%) require vaccination of horses. [Appendix A](#) and the ODH Zoonotic Disease Program's [Rabies webpage](#) provides visuals of rabies vaccination requirement survey responses by local health department. The [Director's Journal Entry](#) supersedes local ordinances and requires the vaccination of dogs and cats in affected counties.

Can Owners Vaccinate Their Own Pets?

Parenteral rabies vaccines should be administered by or under the supervision of a licensed veterinarian. Rabies vaccines may be purchased and administered by non-veterinary staff in Ohio.

Owner-administered vaccination is strongly discouraged as there is no accountability to determine if lay-vaccinated animals are currently vaccinated or were properly vaccinated. **Such animals are considered unvaccinated when assessing a public health risk.** This may result in extended quarantine periods or possibly euthanasia depending on the circumstances.

Proof of vaccination is confirmed by a valid rabies vaccination certificate (National Association of State Public Health Veterinarians (NASPHV) [Form 51](#)) that is signed by the veterinarian responsible for the proper storage and administration of the vaccine. Most communities with mandatory rabies vaccination ordinances require that vaccination be given by or under the supervision of a veterinarian.

Can Rabies Vaccine Be Administered to Off-Label Species and Wild Hybrids?

The use of U.S. Department of Agriculture (USDA)-licensed rabies vaccines in other species, including wildlife and wild hybrids, is considered extra-label use. Animal rabies vaccines have been safely used in numerous domestic and wild animal species. Efficacy, however, has not been established in species other than those listed on the product label. Rabies vaccine can be administered to valuable or at-risk animals and will likely afford them some protection. However, for the purposes of assessing the public health risk of an animal acquiring or transmitting rabies, non-approved species and wild hybrids are considered to be unvaccinated.

Regarding wolf hybrids, the American Veterinary Medical Association (AVMA) Professional Liability Trust, which carries malpractice insurance for most veterinarians, [takes the position](#) that if there is no state or local law against keeping wolf hybrids as pets, the Trust would consider vaccination a discretionary use of a biologic. The Trust further cautions veterinarians to inform owners that the vaccine is not licensed for use in wolf hybrids and no studies have proven efficacy of the vaccine in the animals. Veterinarians are also reminded to enter their discussion with the client in the animal's record and have the client initial it.

What Criteria Constitute “Currently Vaccinated” Against Rabies?

An animal is not considered immunized until 28 days after its initial vaccination. Regardless of the age of the animal at its first rabies vaccine, a booster vaccine should be administered within one year of the initial dose even if using a vaccine with a longer duration of immunity. Thereafter the vaccine interval can be based on the label directions. If an animal's vaccination history is unknown assume it has never been vaccinated.

A previously vaccinated animal is considered currently vaccinated immediately after a booster, even if it was overdue. A **3-year vaccine** can be used in animals that are overdue returning them to their regular vaccination schedule.

Are Rabies Vaccine Waivers Permitted in Ohio?

Some local health districts may allow waivers for their rabies vaccination requirements if a veterinarian can document a legitimate medical reason why the animal should not be vaccinated. If an animal has a history of vaccine-associated adverse events, then decisions concerning rabies vaccination should be made as part of a valid veterinarian-client-patient relationship with consideration of the risks and benefits of not vaccinating. Pre-treatment may mitigate the risk of mild or moderate adverse reactions.

Can Rabies Serology Be Used as a Substitute for Vaccination?

No. Titers do not directly correlate with protection because other immunologic factors also play a role in preventing rabies, and our abilities to measure and interpret those other factors are not well-developed. Rabies virus antibody titers are indicative of a response to a vaccine or infection. Therefore, evidence of circulating rabies virus antibodies should not be used as a substitute for vaccination.

Titers are required by some countries prior to animal import to verify previous vaccination. See [Rabies Vaccination Requirements for Import and Export](#) for more information.

Should an Ill Animal be Vaccinated?

There is no evidence to suggest that vaccinating an ill animal would increase the risk of adverse events compared to vaccinating a healthy animal. Those who are immunocompromised may not have a full immunologic response to the vaccine. Any veterinarian who is delaying the rabies vaccination of an ill animal should ensure proper vaccination as soon as possible.

Are There Any Adverse Reactions to The Rabies Vaccine?

Reported adverse reactions include vomiting, injection site swelling, lethargy, and hypersensitivity. Severe adverse events are rare, though anaphylaxis has been reported. Animals with a previous history of anaphylaxis can be medically managed and should be observed after vaccination. Refer to the vaccine product insert for more information about adverse reactions.

All adverse events should be reported to the vaccine manufacturer and the USDA Animal and Plant Health Inspection Service's (APHIS's) Center for Veterinary Biologics at [Adverse Event Reporting](#).

What if Someone is Exposed to the Parenteral Rabies Vaccine?

The parenteral rabies vaccine contains inactivated virus and is not capable of causing rabies infection in humans or animals. Needle stick injuries should receive basic wound care. Contact your physician with any questions or concerns.

Are Rabies Certificates Required for Documentation?

Yes. Animals vaccinated for rabies should receive an accompanying certificate [Form 51](#) (or an equivalent form), as recommended by NASPHV. Computer-generated forms containing the same information as [Form 51](#) are acceptable. The form must be completed in full and signed by the veterinarian who administered or supervised the vaccination. When a veterinarian signs a rabies certificate, they are assuring that the vaccine is stored and administered appropriately.

How Long Must a Copy of The Signed Rabies Certificate be Maintained by the Practice?

In general, veterinary medical records shall be kept for three years following discharge of the animal from veterinary care [\[OAC 4741-1-21\(C\)\]](#).

A veterinarian participating in a city or general health district-sponsored vaccination clinic shall maintain a copy of a vaccination record for a period of the labeled duration of the vaccine, but not less than three years [\[OAC 4741-1-22\(A\)\]](#).

Can Proof of Rabies Vaccination be Provided to A Third Party?

Patient information should stay between the practice and the client unless requested by a local or state government, a court order, or permission is given by the client. The public health investigation of a bite or rabies exposure event warrants the release of rabies vaccine information and other requested medical information to the public health authority with or without consent from the owner.

Oral Rabies Vaccination Campaign

To control the spread of raccoon variant rabies in Ohio, ODH in conjunction with USDA-APHIS Wildlife Services distribute oral rabies vaccines throughout Eastern Ohio using helicopters and ground vehicles. For additional information on the oral rabies vaccine campaign, visit [Ohio Oral Rabies Vaccine Campaign](#).

What if an Animal was Exposed to the Oral Rabies Vaccine?

People living in areas where baiting is scheduled should keep their dogs confined and allowed outside under supervision for a few days to prevent them from finding and eating the vaccine bait. Most baits will be consumed by wildlife within a few days. The vaccine is contained in a blister pack covered in a waxy green coating made of vegetable fats, wax, and a sugar vanilla coating. Ingesting the vaccine will not harm pets, although eating a large number may temporarily cause vomiting or diarrhea due to the sweet attractant coating. For questions or to report a severe reaction, contact the ODH Rabies Information line at (888) 574-6656.

What if a Human was Exposed to the Oral Rabies Vaccine?

The oral rabies vaccine is a recombinant vaccine, utilizing a live human adenovirus type 5 as the vaccine vector. The vaccine does not contain live rabies virus and is not capable of transmitting rabies. In rare cases, typically when the carrier virus comes in contact with broken skin, immunocompromised persons may be susceptible to a cold-like infection. Persons who contact a vaccine bait should be encouraged to wash their hands, and gloves should be worn if baits need to be picked up or removed from an area. Call the ODH Rabies Information Line at (888) 574-6656 for any questions or to report bait contacts.

Bite Prevention

While most cases of rabies occur in wildlife, most human exposures are the result of dogs and cats. In every state except Hawaii, all dog bites are required to be reported. According to the CDC, an estimated 4.7 million dog bites occur in the U.S. each year. Bites from cats and other species are more difficult to estimate, though it is known that all bites, including dog bites, are underreported.

Animal bites are to be reported to the [local health department](#), regardless of the bite scenario or vaccination status of the animal.

Local health districts in Ohio investigate approximately 20,000 bites and exposure incidents annually. The annual bite and exposure report can be found here: [How Many Animal Bites are Reported in Ohio?](#)

Dog bites can be prevented through education and responsible pet ownership. For more resources and tools about bite prevention see [AVMA Dog Bite Prevention](#).

Management of Animals that Bite People

The management of animals that have bitten or potentially exposed a person to rabies is the authority of the local health district where the exposure occurred. All rabies exposure must be reported to the local public health officials so that a risk assessment can be completed. Typical outcomes are summarized in Table 5 though it is important to note that management of individual animals will depend on the species, the circumstances of the exposure, the epidemiology of rabies in the area, the exposing animal's history and current health status, and the animal's potential for exposure to rabies.

Table 5. General Management Recommendations for Animals that Have Bitten a Person in Ohio

	Dogs, Cats, and Ferrets*	Livestock, Horses	Wild / Exotic Mammals, Hybrids, and Bats	Domestic / Wild Lagomorphs, Small Rodents, and Pocket Pets
Quarantine Period	10 days**	At the discretion of public health, may recommend a 14-day quarantine period.	At the discretion of public health, may rarely recommend an extended quarantine period.	At the discretion of public health, rarely quarantined.
Euthanasia & Testing	If currently displaying signs consistent with rabies, becomes ill, or dies for any reason during the 10-day quarantine period.	If currently displaying signs consistent with rabies, becomes ill, or dies for any reason during the observation period.	Recommended.	Not necessary unless displaying signs consistent with rabies; considered a low-risk rabies vector.

*This quarantine period is mandatory for dogs, cats, and ferrets regardless of vaccination status. Must be current on rabies vaccination before release of quarantine (vaccination performed on day 10 if previously unvaccinated or overdue).

** [OAC 3701-3-29](#)

How is Quarantine Defined?

Quarantine is defined as the separation and restriction of the activities of healthy animals that are known or believed to have been exposed to a case of rabies. Most often quarantines can be done at home with routine care and handling, but unnecessary contact with humans and any contact with non-quarantine animals should be avoided. A quarantine may also be done at a pound or kennel at the owner's expense.

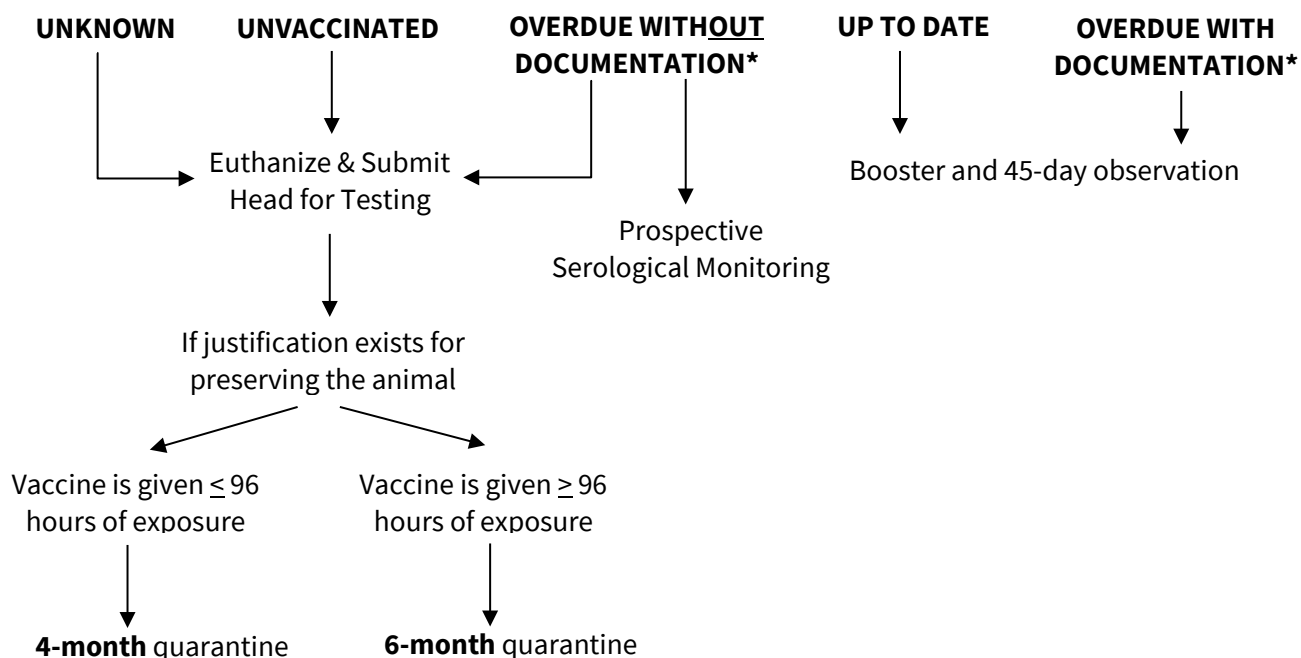
Management of Animals that Have Potentially Been Exposed to Rabies

Any mammal bitten by a known rabid mammal, or that had reasonable probability to have been bitten by a wild carnivorous mammal or bat that is not available for rabies testing, is to be regarded as having been exposed to the rabies virus. All animals should seek veterinary care for assessment and possible treatment. Wound care is important and proper cleansing and disinfection can reduce the risk of rabies. While no post-exposure prophylaxis vaccination protocol similar to that recommended for humans has been proven to be effective in animals prompt vaccination, including a booster for those already vaccinated, can reduce the risk of contracting rabies.

Dogs and Cats

The local health department will decide how to manage these animals based on their current vaccination status. Consideration will be given to whether the rabies exposure was provoked or unprovoked. If the biting animal in question is available, a negative rabies test result can release the exposed animal(s) from quarantine.

Figure 1: Management of Cats and Dogs Exposed to Rabies in Ohio by Vaccination Status



* See [“What Criteria Constitute “Currently Vaccinated” Against Rabies?”](#) and [“Are Rabies Certificates Required for Documentation?”](#) for more information.

Prospective Serologic Monitoring (PSM) for Dogs and Cats

If approved by the local health department as an appropriate alternative and at the expense of the owner, serology can be used to determine if a cat or dog with unknown vaccination status or overdue without documentation had previously been vaccinated.

Paired blood samples should be sent at the same time for testing. The first should be collected immediately before administration of a rabies vaccine (**day 0**) and the second should be collected on **day 5** (but no later than **day 7**). A detailed protocol for performing PSM can be found on the NASPHV website, [Prospective Serological Monitoring Protocol](#). If PSM is performed, the animal must be placed in quarantine until results are received. If the animal shows adequate anamnestic response, then they will be quarantined for 45 days, but if an inadequate anamnestic response is observed, the animal will be quarantined for **4 to 6 months**.

Ferrets, Livestock, and Horses

At the discretion of the public health official, livestock and horses exposed to rabies may be quarantined or euthanized based on an [assessment of risk](#) and vaccination status.

Herbivore to herbivore transmission in a herd is not common and this will be taken into consideration when managing other animals associated with one who was exposed or infected. If the biting animal is available, a negative laboratory test result can release the exposed animal(s) from quarantine.

Table 6. Outcome for Ferrets, Livestock, and Horses Based on Rabies Vaccination Status

Rabies Vaccine Status	Ferrets, Livestock & Horses
Unvaccinated or Unknown	Euthanize and submit head for testing.
	If justification for preserving the animal exists, six-month quarantine.
Up to Date	Booster and 45-day observation.
Overdue	Assess case-by-case in consultation with ODH.

Other Domestic and Wild or Exotic Animals

At the discretion of the public health official, exposed animals in this classification may be quarantined or euthanized based on an [assessment of risk](#). These cases are evaluated on a case-by-case basis. If the biting animal is available, a negative test result can release the exposed animal(s) from quarantine.

Risk Assessment

The local health district will conduct a rabies exposure risk assessment considering several factors including the species of animal involved, the risk of rabies in that geographic location and in that species, the likelihood that this animal was exposed to rabies (lifestyle, housing, etc.), and the circumstances surrounding the exposure.

Pre-exposure Prophylaxis (PrEP)

Who Should Get Rabies PrEP and What Is It?

For people whose jobs or recreational activities place them at higher risk for exposure to the rabies virus, rabies PrEP may be recommended. This includes veterinarians and their staff, and others who work directly with animals that could have rabies, or those who travel to parts of the world where rabies is common and access to medical care is limited. Activities such as preparing specimens for rabies testing should be done by those who have received PrEP and are wearing gloves, eyewear, and a protective apron.

Rabies PrEP simplifies the management of post-exposure treatment by eliminating the need for human rabies immune globulin (HRIG) and decreasing the number of rabies vaccine doses needed. Rabies PrEP may also offer partial immunity to persons whose post-exposure prophylaxis (PEP) is delayed and provide some protection to persons at risk for unrecognized exposures to rabies. It does not eliminate the need for treatment following a possible exposure. PEP uses the same rabies vaccine as PrEP, so if you've received a rabies vaccine for any reason after 1980, you are considered immunized.

What is the PrEP protocol?

There are two types of [rabies vaccines](#) available in the U.S. that can be used for PrEP. Either vaccine may be used, and it is recommended that the vaccine series be initiated and completed with the same vaccine product. Pre-exposure vaccination involves the administration of 1.0mL given intramuscularly in the deltoid area on days 0 and 7.

Where Can I Receive Rabies PrEP?

Rabies PrEP can be obtained through physicians, especially those who specialize in travel medicine (e.g., Passport Health or travel immunization clinics) or occupational health, from pharmacies with an authorized provider prescription (e.g., Walgreens, Little Clinics, Rite-Aid, etc.), local health departments, infusion centers, or emergency rooms. Reach out to your [local health department](#) for a complete list of what may be available near you. It is recommended to call ahead and set up an appointment and confirm availability.

Do I need a titer or booster? What are the next steps?

Titer checks and the need for additional boosters will be determined by the [risk category](#) of the individual. Most veterinarians and veterinary staff are in risk category 3. It is recommended to assess your risk category to evaluate titer recommendations. Individuals in category 3 are recommended to receive a one-time titer check after one year and up to three years following the initial 2-dose vaccination series. Alternatively, a 1-dose booster between 3 weeks and 3 years following the first vaccine in the 2-dose vaccination series can be administered in lieu of a titer. No additional titers are needed for this risk category. Those at higher risk of rabies exposure due to work or recreational activities may be encouraged to have their titers checked at more regular intervals. For more information on the updated rabies PrEP guidance, see the [updated Advisory Committee on Immunization Practices \(ACIP\) guidance](#).

For a titer check, a blood sample must be drawn and serum from that sample must be submitted to a laboratory that performs Rapid Fluorescent Focus Inhibition Test (RFFIT). This is the only accepted test for accurately determining rabies virus-neutralizing antibody levels. A list of laboratories that perform RFFIT can be found on the [CDC](#) website. Typically, an antibody titer level less than 0.5 IU/mL indicates that a booster is recommended. The RFFIT test is not a guarantee of protection, and it should not be used in place of post-exposure prophylaxis when a rabies exposure occurs.

Rabies Testing of Animals in Ohio

Where Do I Send Samples for Rabies Testing and How Much Does It Cost?

The Ohio Department of Health Laboratory (ODHL) is the only laboratory in the state of Ohio that performs rabies testing on animals. Operating hours are Monday – Friday from 8 a.m. – 5 p.m. excluding holidays and weekends. Results are typically reported one business day following receipt of the sample. The state absorbs the fee for testing and shipping for approved samples when sent through the local health department. If a veterinary clinical would like to ship samples directly to the laboratory, contact your [local health department](#) for shipping instructions and courier information.

If shipping directly to ODHL (as opposed to shipping through the local health department), samples should be shipped overnight. The lab does not accept specimens after 5 p.m., on weekends, or holidays. For more information about shipping a sample, contact the ODHL at (888) 634-5227.

Exceptions: A fee will be charged for shipping and testing of small rodents or non-rabies vector species. The fee may be waived by the State Public Health Veterinarian depending on the scenario. For more information on what samples are considered “approved” contact the [ODH Zoonotic Disease Program](#).

Shipping and testing are free. Your local health department can assist with shipping or provide courier information.

Ohio Department of Health
Bureau of Public Health Laboratory
8995 East Main Street, Building 22
Reynoldsburg, OH 43068

How Should the Sample be Collected?

Animals should be humanely euthanized without damaging the skull. Only veterinarians or trained staff with rabies PrEP should perform euthanasia or decapitations of rabies-suspect animals. The brain must be relatively fresh and in good condition, as the test cannot be reliably performed if different regions of the brain cannot be identified.

Table 7. Rabies Specimens to Collect Based on Size

Animal Size	Samples to Submit
Small Animals (bats, rodents, etc.)	Whole Body
Medium Animals (dogs, cats, raccoons, etc.)	Head Only
	The head must be removed before submission. Do not remove the brain, as the sections required for testing are easily damaged.
Large Animals (horses and livestock)	Brain Only
	The Ohio Department of Agriculture (ODA) Animal Disease and Diagnostic Laboratory (ADDL) will accept the entire head, remove the brain, and send the brain to ODHL for rabies testing. Work with your local health department or contact ODA ADDL at (614) 728-6220 for assistance.

Tissue must be fresh and maintained at refrigerator temperatures. Do not submit maggot-infested or extremely decomposed specimens or specimens fixed in formalin. Do not freeze as this can rupture cells making testing more difficult. If the sample is already frozen do not defrost before shipping, as this further accelerates decomposition. Instead, ship it frozen and note the circumstances on the submission form. Frozen specimens may have delayed testing.

If assistance with brain removal for large animals is needed, The Ohio Department of Agriculture (ODA), Animal Disease and Diagnostic Lab (ADDL) will accept the entire head, remove the brain, and transport the brain to ODHL for rabies testing. For more information on fees, shipping, and submission forms, contact ODA ADDL at (614) 728-6220 or visit their website at [Test and Fees Search](#).

See [Appendix B](#) for recommendations on head removal, PPE, and carcass disposal.

How Should the Sample be Handled and Packaged?

Animal heads or brain tissue should be **kept refrigerated but not frozen**, ideally at 2-8°C. The specimen should be double bagged using plastic (sturdy Ziploc type bag or biohazard bag) and each bag should be sealed separately (primary packaging). If the specimen has any sharp protruding parts such as shattered bone, wrap it in several layers of newspaper first.

Place the double-bagged specimen in an insulated container, Styrofoam works well, (secondary packaging) and surround the specimen with refrigerated or frozen cold packs and further insulation (do not use damaged or leaking cold packs, dry ice, or wet ice). Absorbent material should be included to collect any leakage and moisture from the cold packs. If more than one sample is shipped together, each should be bagged and tagged separately for identification. Seal the insulated container securely with tape and place it in a box suitable for shipping (rigid outer packaging). This is considered a Category B biohazard by the Department of Transportation which has [specific requirements](#) for labeling and packaging.

Utilize the eLIMS portal to complete the ODHL Rabies Test Submission Form. If you do not have an account with eLIMS, contact ODHL at **(888) ODH-LABS** or email ODHLabs@odh.ohio.gov. Print the requisition form and include it with each specimen submitted. If the form is submitted within the shipping container, be sure it is sealed in a separate waterproof bag to prevent damage from liquids and condensation. If necessary, securely affix it in an envelope to the outside of the container.

See [Appendix C](#) for additional recommendations on specimen packaging and shipping.

What Are the Recommendations for Shipping Rabies Samples to ODHL?

To arrange shipping with no charges, please contact your local health district to obtain shipping instructions and courier information. Be sure to include a copy of the eLIMS Requisition Form. Samples should be shipped overnight when the following day is a business day or be directly hand-delivered to the lab during normal business hours. To avoid extended time in transport which could damage the sample if the cold chain is not maintained, it is recommended to keep samples refrigerated over a weekend or holiday and ship on the next business day.

What is eLIMS and How Do I Receive Results?

eLIMS is an electronic ordering and results reporting system. The eLIMS portal replaces the previously utilized Rabies Submission Form to streamline submissions and report results in real time. All rabies submissions must be entered through the eLIMS portal. A copy of the Submission, or Requisition Form, must accompany the specimen when shipped. If you do not have an account with eLIMS, contact the ODH Laboratory at **(888) ODH-LABS** or email ODHLabs@odh.ohio.gov.

Results will be reported through the eLIMS system, and an email will be sent to the email address on file when the results are ready to be viewed. All positive and indeterminate results will receive a phone call notification to the local health department or submitter on file. Work with your local health department to determine appropriate public health action as an outcome of positive or indeterminate results. Visit ODH's [eLIMS webpage](#) for additional frequently asked questions on the eLIMS system.

How Do I Interpret The dFA Results?

Three test results can be reported from ODHL: positive, negative, and unsatisfactory / indeterminant. Unsatisfactory results often result from missing, damaged, or decomposed samples where positive status cannot be ruled out. For public health recommendations, unsatisfactory results generate the same recommendations as positive results. Work with your local health department for any unsatisfactory or positive test results to perform a rabies risk assessment and identify any potential exposures.

Will ODHL Return the Head After Testing?

ODHL does not typically return the heads to the submitter, but exceptions can be made on a case-by-case basis. Specimens are severely disfigured during testing and for owners, this is often more traumatic than the knowledge of decapitation. Though strongly discouraged, special arrangements can be made in advance for return provided the submitter pays for shipping and handling. If there is a desire for the head to be returned, it must be identified on the submission paperwork before shipping. If the animal tests positive or unsatisfactory/indeterminant, the head will not be returned under any circumstances.

Rabies Vaccination Requirements for Import and Export

Animal health requirements vary widely and are not limited to rabies vaccination. [USDA-APHIS Pet Travel](#) and [USDA-APHIS Animal Travel](#) provide information on health assurance, diagnostic, and vaccination requirements for all species traveling interstate or internationally. Airlines also have health requirements for animals and the specific airline should be contacted to obtain this information.

Interstate Import of Dogs and Cats into Ohio

All dogs or cats imported into Ohio must be accompanied by a “Certificate of Veterinary Inspection” (CVI) and must be currently vaccinated against rabies in accordance with the latest version of the [Compendium on Animal Rabies Prevention and Control](#). Cats and dogs in transit through Ohio should “be accompanied by a currently valid [NASPHV Form 51](#), rabies vaccination certificate.” [\[OAC 901:1-17-05\(A\)\]](#).

Interstate Export of Dogs and Cats from Ohio

Contact the receiving state’s Department of Agriculture or [USDA-APHIS Pet Travel](#) for specific requirements. It is always recommended to have a copy of current health record including proof of vaccination status when traveling or moving to another state.

International Import into The United States

The importation of animals into the U.S. is regulated by both the USDA and the CDC. For more information on specific requirements visit, [CDC Bringing Pet Dogs Into The United States](#), and [USDA-APHIS Animal Travel](#). For rabies specifically, the CDC requires proof of rabies vaccination and in some cases, serology depending on what countries the dog has been in. Neither are required for cats entering the country. It is important to note that in addition to

U.S. import requirements animals must also meet all the import requirements for the destination state.

International Export to Other Countries

Each country has its own regulations and requirements for the importation of animals. USDA-APHIS Veterinary Services (VS) should be contacted for specific requirements [USDA-APHIS Animal Travel](#). Completing all the requirements for an animal to leave the U.S. can take days, weeks, or months. For rabies specifically, some countries require more than one rabies vaccination and/or serology completed in a specific amount of time following vaccination.

Important Contacts for Rabies Information

Local Health Districts in Ohio

Ohio Department of Health, Bureau of Infectious Diseases, Zoonotic Disease Program

246 N. High St.
Columbus, OH 43215
Phone: (614) 752-1029
Fax: (614) 564-2437
Zoonoses@odh.ohio.gov

Ohio Department of Health Bureau of Public Health Laboratory

8995 E. Main Street, Building 22
Reynoldsburg, OH 43068
Phone: (888) 634-5227
Fax: (614) 387-1505
odhlabs@odh.ohio.gov

Ohio Department of Agriculture, Division of Animal Health, Animal Disease and Diagnostic Laboratory

8995 E. Main St. Reynoldsburg, OH 43068
Phone: (614) 728-6220
Fax: (614) 728-6310
animal@agri.ohio.gov

USDA-APHIS Import and Export Services

12927 Stonecreek Dr.
Pickerington, OH 43147
(614) 856-4735
vspsoh@aphis.usda.gov

Additional Resources

Post-exposure Prophylaxis in Humans:

[Use of a Reduced \(4-Dose\) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies: Recommendations of the Advisory Committee on Immunization Practices](#)

Pre-exposure Prophylaxis in Humans:

[Use of a Modified Preexposure Prophylaxis Vaccination Schedule to Prevent Human Rabies: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022](#)

Traveling and Associated Rabies Risk and Prevention:

[CDC Traveler's Health: General Recommendations for Vaccination & Immunoprophylaxis](#)

[CDC Traveler's Health: Yellow Book – Chapter 4 “Rabies”](#)

Hybrids Species:

[AVMA Position on Canine Hybrids](#)

[AVMA Wolf and Wolf-dog Crosses Not Eligible to be Added to Dog Vaccine Labels](#)

Ohio Revised Codes and Administrative Codes Regarding Rabies:

[OAC 3701-3-29 Biting animal to be confined; veterinarian to report](#)

[OAC 3701-3-28 Report of bite of dog or other mammal](#)

[OAC 3701-3-30 Report of suspected rabid mammal](#)

[ORC 955.26 Rabies Quarantine](#)

Rabies in Animals:

[NASPHV Rabies Compendium, 2016 Maine Rabies Management Guide, 2017](#)

[Ohio Department of Health Infectious Disease Manual Section 3 \(Rabies\)](#)

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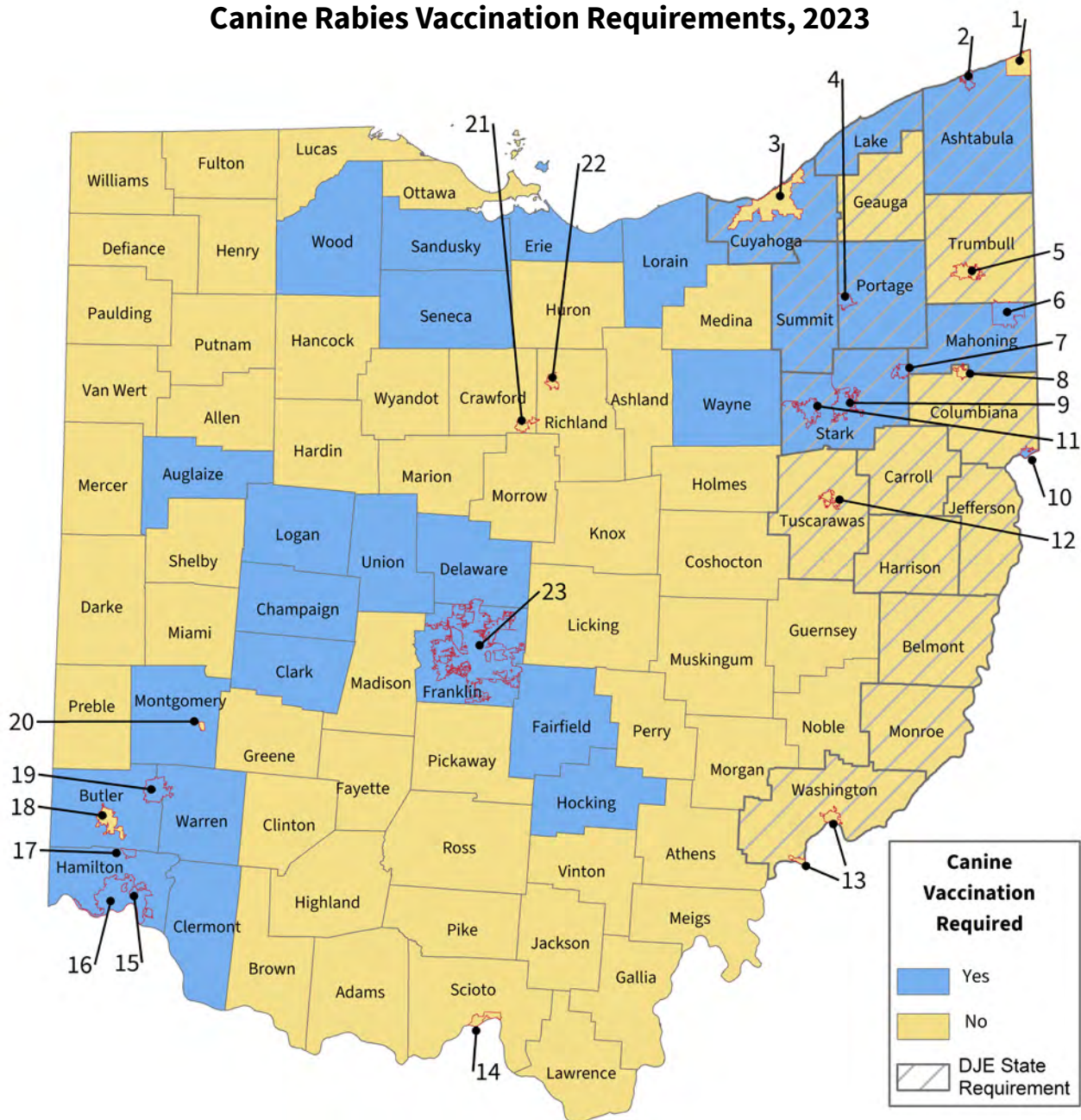
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Appendices

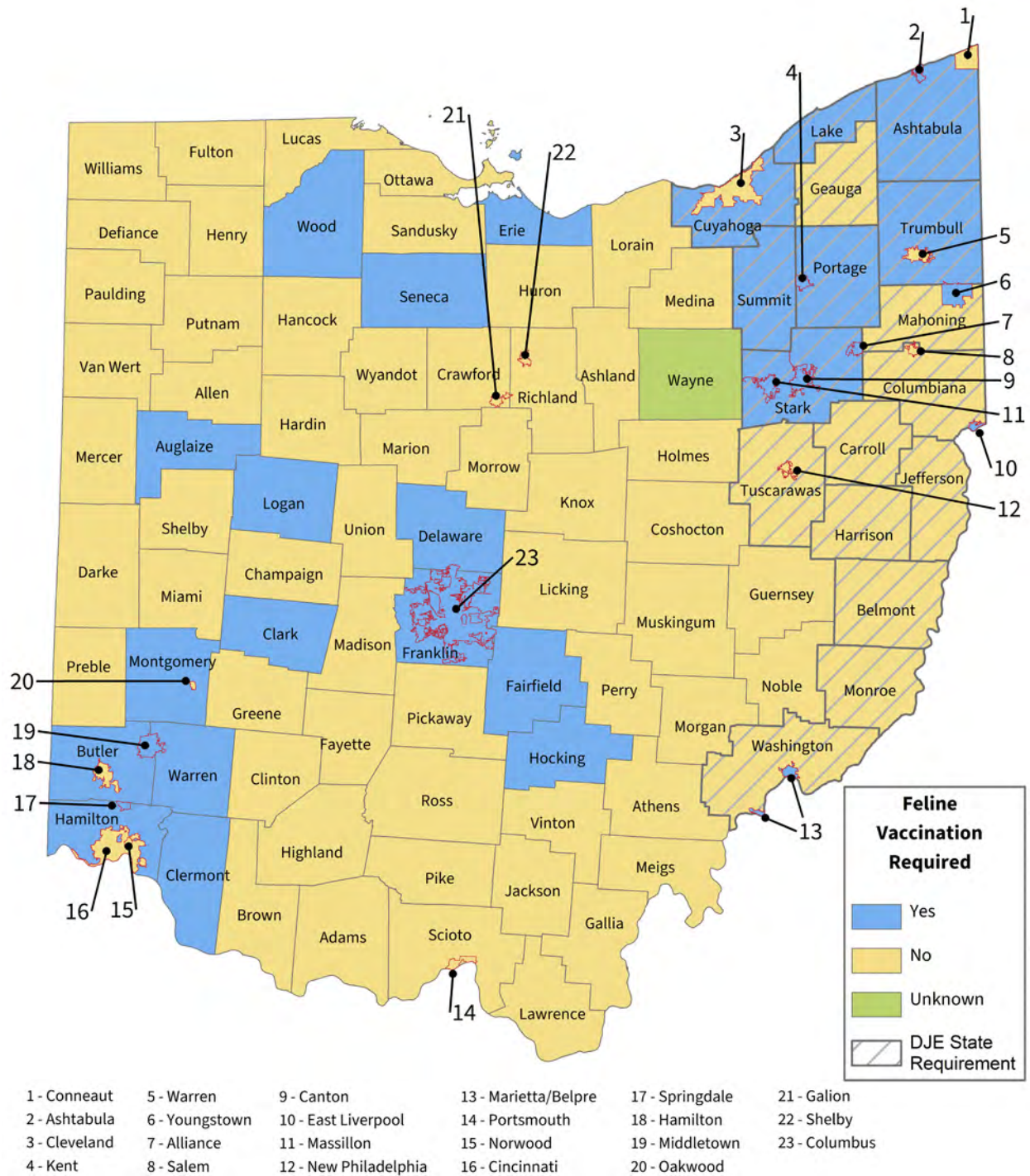
Appendix A: Survey Responses of Rabies Vaccination Requirements by Local Health Department

Those seeking specific jurisdictional requirements are encouraged to contact their [local health department](#).

Canine Rabies Vaccination Requirements, 2023



Feline Rabies Vaccination Requirements, 2023



DJE State Requirement refers to counties where feline vaccination is required by state law via [Director's Journal Entry \(DJE\)](#).

Ferret Rabies Vaccination Requirements, 2023



- | | | | | | |
|---------------|----------------|-----------------------|----------------------|-----------------|---------------|
| 1 - Conneaut | 5 - Warren | 9 - Canton | 13 - Marietta/Belpre | 17 - Springdale | 21 - Galion |
| 2 - Ashtabula | 6 - Youngstown | 10 - East Liverpool | 14 - Portsmouth | 18 - Hamilton | 22 - Shelby |
| 3 - Cleveland | 7 - Alliance | 11 - Massillon | 15 - Norwood | 19 - Middletown | 23 - Columbus |
| 4 - Kent | 8 - Salem | 12 - New Philadelphia | 16 - Cincinnati | 20 - Oakwood | |

Equine Rabies Vaccination Requirements, 2023



- | | | | | | |
|---------------|----------------|-----------------------|----------------------|-----------------|---------------|
| 1 - Conneaut | 5 - Warren | 9 - Canton | 13 - Marietta/Belpre | 17 - Springdale | 21 - Galion |
| 2 - Ashtabula | 6 - Youngstown | 10 - East Liverpool | 14 - Portsmouth | 18 - Hamilton | 22 - Shelby |
| 3 - Cleveland | 7 - Alliance | 11 - Massillon | 15 - Norwood | 19 - Middletown | 23 - Columbus |
| 4 - Kent | 8 - Salem | 12 - New Philadelphia | 16 - Cincinnati | 20 - Oakwood | |

Local Rabies Vaccination Requirements, Ohio, 2023

County	Local Health Department	Rabies Vaccine Required			
		Canine	Feline	Ferret	Equine
Adams	Adams County Health Department	No	No	No	No
Allen	Allen County Public Health	No	No	No	No
Ashland	Ashland County-City Health Department	No	No	No	No
Ashtabula*	Ashtabula City Health Department	Yes	Yes	Yes	No
	Ashtabula County Health Department	Yes	Yes	Unknown	Unknown
	Conneaut City Health Department	No	No	No	No
Athens	Athens County Health Department	No	No	No	No
Auglaize	Auglaize County Health Department	Yes	Yes	Yes	No
Belmont*	Belmont County Health Department	No	No	No	No
Brown	Brown County Health Department	No	No	No	No
Butler	Butler County Health Department	Yes	Yes	Yes	No
	City of Hamilton Health Department	No	No	No	No
	Middletown City Health District	Yes	Yes	Yes	No
Carroll*	Carroll County General Health District	No	No	No	No
Champaign	Champaign Health District	Yes	No	No	No
Clark	Clark County Combined Health District	Yes	Yes	Yes	Yes
Clermont	Clermont County Health District	Yes	Yes	Yes	No
Clinton	Clinton County Health District	No	No	No	No
Columbiana*	Columbiana County General Health District	No	No	No	No
	East Liverpool City Health District	Yes	Yes	No	Unknown
	Salem City Health District	No	No	No	No
Coshocton	Coshocton County Health Department	No	No	No	No
Crawford	Crawford County Public Health	No	No	No	No
	Galion City Health Department	No	No	No	No
Cuyahoga*	Cleveland Department of Public Health	No	No	No	No
	Cuyahoga County Board of Health	Yes	Yes	Yes	No
Darke	Darke County General Health District	No	No	No	No

County	Local Health Department	Rabies Vaccine Required			
		Canine	Feline	Ferret	Equine
Defiance	Defiance County General Health District	No	No	No	No
Delaware	Delaware General Health District	Yes	Yes	Yes	No
Erie	Erie County Health	Yes	Yes	Yes	No
Fairfield	Fairfield Department of Health	Yes	Yes	Yes	No
Fayette	Fayette County Public Health	No	No	No	No
Franklin	Columbus Public Health	Yes	Yes	Yes	No
	Franklin County Public Health	Yes	Yes	Yes	No
Fulton	Fulton County Health Department	No	No	No	No
Gallia	Gallia County Health Department	No	No	No	No
Geauga*	Geauga County Health District	No	No	No	No
Greene	Greene County Public Health	No	No	No	No
Guernsey	Cambridge Guernsey County Health Department	No	No	No	No
Hamilton	Cincinnati Health Department	Yes	No	No	No
	Hamilton County Public Health	Yes	Yes	Yes	No
	Norwood City Health Department	Yes	No	No	No
	Springdale City Health Department	Yes	Yes	No	No
Hancock	Hancock Public Health	No	No	No	No
Hardin	Kenton-Hardin Health Department	No	No	No	No
Harrison*	Harrison County Health Department	No	No	Unknown	Unknown
Henry	Henry County Health Department	No	No	No	No
Highland	Highland County Health Department	No	No	No	No
Hocking	Hocking County Health Department	Yes	Yes	No	Unknown
Holmes	Holmes County General Health District	No	No	No	No
Huron	Huron County Public Health	No	No	No	No
Jackson	Jackson County Health Department	No	No	No	No
Jefferson*	Jefferson County General Health District	No	No	No	No
Knox	Knox County Health Department	No	No	No	No
Lake*	Lake County General Health District	Yes	Yes	Yes	No
Lawrence	Lawrence County Health Department	No	No	No	No
Licking	Licking County Health Department	No	No	No	No

County	Local Health Department	Rabies Vaccine Required			
		Canine	Feline	Ferret	Equine
Logan	Logan County Health District	Yes	Yes	Yes	No
Lorain	Lorain County Public Health	Yes	No	No	No
Lucas	Toledo-Lucas County Health Department	No	No	No	No
Madison	Madison County Public Health	No	No	No	No
Mahoning*	Mahoning County District Board of Health	Yes	No	Yes	No
	Youngstown City Health Department	Yes	Yes	Yes	No
Marion	Marion Public Health	No	No	No	No
Medina	Medina County Health Department	No	No	No	No
Meigs	Meigs County Health Department	No	No	No	No
Mercer	Mercer County Health District	No	No	No	No
Miami	Miami County Public Health	No	No	No	No
Monroe*	Monroe County Health Department	No	No	No	No
Montgomery	Oakwood City Health Department	No	No	No	No
	Public Health - Dayton and Montgomery County	Yes	Yes	Yes	No
Morgan	Morgan County Health Department	No	No	No	No
Morrow	Morrow County Health District	No	No	No	No
Muskingum	Zanesville-Muskingum County Health Department	No	No	No	No
Noble	Noble County Health Department	No	No	No	No
Ottawa	Ottawa County Health Department	No	No	No	No
Paulding	Paulding County Health Department	No	No	No	No
Perry	Perry County Health Department	No	No	No	No
Pickaway	Pickaway County General Health District	No	No	No	No
Pike	Pike County General Health District	No	No	No	No
Portage*	Kent City Health Department	Yes	Yes	No	No
	Portage County Combined General Health District	Yes	Yes	No	No
Preble	Preble County Public Health	No	No	No	No
Putnam	Putnam County Health Department	No	No	No	No
Richland	Richland Public Health	No	No	No	No
	Shelby City Health Department	No	No	No	No

County	Local Health Department	Rabies Vaccine Required			
		Canine	Feline	Ferret	Equine
Ross	Ross County Health District	No	No	No	No
Sandusky	Sandusky County Health Department	Yes	No	No	No
Scioto	Portsmouth City Health Department	No	No	No	No
	Scioto County Health Department	No	No	No	No
Seneca	Seneca County General Health District	Yes	Yes	Yes	Unknown
Shelby	Sidney-Shelby County Health Department	No	No	No	No
Stark*	Alliance City Health Department	Yes	Yes	No	No
	Canton City Public Health	Yes	Yes	No	No
	Massillon City Health Department	Yes	Yes	Yes	No
	Stark County Combined General Health District	Yes	Yes	No	No
Summit*	Summit County Public Health	Yes	Yes	Yes	No
Trumbull*	Trumbull County Combined Health District	No	Yes	Yes	No
	Warren City Health District	No	No	No	Unknown
Tuscarawas*	New Philadelphia City Health Department	No	No	No	No
	Tuscarawas County Health Department	No	No	Yes	Yes
Union	Union County Health Department	Yes	No	Yes	No
Van Wert	Van Wert County Health Department	No	No	No	No
Vinton	Vinton County Health Department	No	No	No	No
Warren	Warren County Health District	Yes	Yes	Yes	No
Washington*	Marietta City Health Department	No	Yes	No	No
	Washington County Health Department	No	No	No	No
Wayne	Wayne County Health Department	Yes	Unknown	Unknown	Unknown
Williams	Williams County Health District	No	No	No	No
Wood	Wood County Health Department	Yes	Yes	Yes	No
Wyandot	Wyandot County Public Health	No	No	No	No

Data collected from survey completed by all local health departments in 2023.

* Counties where canine and feline vaccination is required by state law via [Director's Journal Entry \(DJE\)](#).

Appendix B: Guidelines for Head Removal and Carcass Disposal

Removal of Heads for Rabies Testing

Decapitation of rabies suspects should be performed by those with proper training and who have already received rabies pre-exposure prophylaxis (PrEP). Although there has never been a case of human rabies associated with decapitation, the brain, spinal cord, salivary glands, and saliva may contain rabies virus that could be infectious. Precautions should be taken to avoid direct contact with skin, splashing into mucous membranes, and exercise caution with the use of sharp instruments. Hatchets and power saws may aerosolize infectious material and are not recommended for routine decapitations.

Personal Protective Equipment (PPE)

Protective covering for clothing should cover bare arms and include a surgical gown, plastic apron, or coveralls. Hands should be protected with gloves which may also be worn under heavyweight autopsy gloves. Face and eye protection should be worn, and a full-face shield is recommended. The animal should be placed in a tub or another area that can be properly disinfected. Alternatively, plastic sheeting can be placed under the animal, or the animal can be decapitated after being placed inside a body bag to catch the draining fluids. A sharp knife or scalpel will be needed.

Methods

- With the animal in dorsal recumbency and the head extended, incise the skin immediately caudal to the larynx.
- The trachea should be sectioned and the muscles and associated soft tissue bisected to the level of the spinal cord.
- The head can be flexed, extended, or rotated to identify the atlanto-occipital joint so that the ligaments can be incised.
- Hyper-extend the head to expose the spinal cord for cutting and then sever the rest of the skin and soft tissue.
- An alternative method is to complete a circumferential incision to the level of the spinal cord followed by rotation of the head to sever the cord. If there is not adequate exposure to the spinal cord, continue locating and severing the vertebral ligaments.
- The head should be allowed to drain before placing it in a bag for packaging. All contact surfaces and instruments should be thoroughly cleaned and disinfected. Tools, cages, and other potentially contaminated surfaces can be disinfected with a 10% solution of sodium hypochlorite (household bleach) in water. A 10% solution of bleach is 1:9 bleach to water.

Carcass Disposal

Because the rabies virus is primarily concentrated in the brain and salivary glands, only the head is considered medical waste. The remaining carcass can be disposed of by any legal means available in that locality. The carcass should be double-bagged before transport. If the animal were positive, incineration would inactivate the virus and the remains would not be infectious. If the animal is to be buried, ensure that scavengers cannot recover the body. If the ground is too frozen for excavation, the body should not be left outside; the cold temperatures can preserve the virus for extended periods of time.

Appendix C: Shipping Guidelines for Animal Rabies Specimens

Specimen Collection

Do not submit live animals. The animal should be humanely euthanized without damage to the head. The head must be removed from the body and submitted intact for examination.

However, the entire body of a bat may be submitted. For livestock samples, the [Ohio Department of Agriculture, Animal Disease and Diagnostic Laboratory](#) may be contacted for brain removal. Do NOT freeze the specimen. The specimen should be kept cold, preferably at 4°C/39.2°F. The specimens must be sent to the lab in an appropriate specimen shipping container (see specifics below).

Note: Water-repellent gloves, protective clothing, and goggles should be worn for safety when handling the specimen. Carcasses should be disposed of in accordance with local and state laws.

Shipping Materials

The shipper is responsible for the proper packaging and labeling of diagnostic specimens.

Materials:

- Outer cardboard box.
- Insulated container (larger/heavier heads will require boxes with thicker walls).
- Two biohazard bags; if biohazard bags are not available, heavy plastic bags may be used but they must be double bagged and individually sealed to prevent leakage.
- Ice packs (store frozen until needed).
- If available, absorbent sheets (newspaper may be used) to be placed in bags along with the specimen.
- One zip-lock bag for the eLIMS Rabies Requisition Form (see [“What is eLIMS and How Do I Receive Results?”](#) for more details).



Packing Instructions

- Place specimen in bag and seal.
- When shipping more than one specimen in the same container, make sure that each specimen is individually bagged and clearly marked (masking tape works well as a makeshift label).
- If sharp objects protrude from the specimen (i.e. bone fragments), wrap the specimen in several layers of newspaper before putting the specimen into a plastic bag.
- Place the bagged specimen(s) into another biohazard/garbage bag and seal.
- Do not use glass, wire, tag fasteners, or other materials that could puncture packaging or cause injury.
- A fully completed Rabies Requisition Form must be included for each specimen submitted.
- Place the form in a Ziploc bag. If necessary, securely affix it in an envelope to the outside of the container.
- Seal the container securely with tape.
- Wash hands.
- Disinfect all materials contaminated in the specimen preparation process with a 10% solution of sodium hypochlorite in water.
- Follow the Department of Transportation's guidance for [labeling](#) and additional shipping guidelines.

Note: Next-day delivery is preferred for all specimens.

Shipping

Specimens should be hand delivered or sent overnight by courier service to ODHL between **8 a.m. and 5 p.m. Monday through Friday**. Do **not** ship on Fridays or before holidays as there may be no one at the lab to accept the delivery. If the specimen cannot be shipped out immediately, keep the specimen refrigerated. **Do not freeze** the specimen. Freezing the specimen will cause a delay in testing and an unsatisfactory result or untestable specimen.

Note: There is no after-hours or weekend access to the laboratory facility to drop off specimens.

References and Additional Information

1. eLIMS Account Set-Up and Information: ODHLabs@odh.ohio.gov; 1-888-ODH-LABS.
2. [American Veterinary Medical Association, Training for Packaging and Shipping Lab Specimens](#).

Appendix D: Bat Euthanasia Guidelines

Purpose

To provide guidance for public health professionals and veterinarians who perform euthanasia on bats for public health testing purposes. The “American Veterinary Medical Association (AVMA) [Guidelines for the Euthanasia of Animals: 2020 Edition](#),” recognizes using an overdose of inhalant anesthetics in addition to a number of other methods, as an acceptable means of euthanasia in small animals.

While there is little objective information in the literature regarding humane techniques for euthanasia in bats, the basic principles of euthanasia apply. Death must be as painless and distress-free as possible. Any technique chosen must induce loss of consciousness as quickly as possible, followed by cardiac and respiratory arrest, and must also be reliable, irreversible, and most importantly, safe for humans.

The AVMA euthanasia guidelines recognize the inherent lack of control over free-ranging wildlife, and that the quickest and most humane means of terminating the life of free-ranging wildlife may not always meet all criteria established. Moreover, the method chosen will often be situation-specific. The procedures as well as other considerations are detailed below. It is recommended that local health departments establish a relationship with a local veterinary clinic if a live animal is submitted and humane euthanasia is unattainable. Live animals will not be accepted at the state lab.

Background Information

Animal Handling

Any bat may be infected with rabies; therefore, bats should **never** be handled with bare hands. Non-permeable gloves (i.e., nitrile or leather work gloves) must be worn when handling bats. All personnel handling bats should be vaccinated against rabies and be properly trained in the use of euthanasia techniques. If a vaccinated person is not accessible, then a person with previous experience is preferred.

Personnel must be provided with appropriate personal protective equipment (PPE) which may include rabies vaccination (pre-exposure prophylaxis), gloves, and proper ventilation or scavenging system when using inhalant anesthetics. Extra precautions should also be taken, especially with waste anesthetic gas; as a result, personnel should not be pregnant, and ideally, not of childbearing age. Caution and an extra cage should be used if these ideal circumstances cannot be met while performing euthanasia on a bat that must be tested.

Isoflurane and other inhalant anesthetics

Inhalant anesthetics, such as isoflurane, are general inhalation anesthetic drugs produced in liquid form and administered by vaporization. They are not controlled substances; therefore, no Drug Enforcement Administration (DEA) license is needed to order the chemicals, however, a Terminal Distributor of Dangerous Drugs (TDDD) license from the Ohio Board of Pharmacy is

required. Procedures should be in place to reduce worker exposure to isoflurane and other inhalant anesthetics, particularly those pregnant or having existing respiratory conditions. The company's Material Safety Data Sheet must be reviewed before use to ensure that appropriate measures are taken to maintain the safety and health of individuals.

Rabies Vaccination and Titers

All personnel handling bats should receive rabies pre-exposure prophylaxis (PrEP) more than 28 days prior. Please refer to the [Advisory Committee for Immunization Practices \(ACIP\)](#) for the most updated PrEP vaccine schedule.

Acceptable Methods of Euthanasia

- Inhalant Agents
 - Inhalant anesthetic overdose (e.g., halothane, enflurane, isoflurane, sevoflurane, methoxyflurane, desflurane)
 - Only option for non-veterinarians with TDDD license. See the procedure below for the method if unable to vaporize inhalant anesthetics in a controlled manner.
- Injectable Agents
 - Barbiturates – intravenous or intraperitoneal.
 - Limitation: DEA controlled substances must be licensed to administer.
 - Dissociative agent combinations – intravenous or intraperitoneal.
 - e.g., ketamine/diazepam or ketamine/xylazine.
 - Limitation: DEA controlled substances must be licensed to administer.
- Combination of Agents
 - Inhalant anesthetics to anesthetize, followed by injectable agents.
 - Carbon Dioxide (CO₂ at 70% or higher concentrations), followed by injectable agents.
 - Compressed gas cylinders are the only acceptable source.
 - Insectivorous bats may be resistant, so this method should be paired with an injectable.

Unacceptable Methods of Euthanasia

The following methods are considered unacceptable for either humane, risk of rabies exposure, or sample quality considerations.

- Exhaust fumes, diethyl ether, or other unapproved gases.
- Freezing, with or without anesthesia.
- Drowning, with or without anesthesia.
- Decapitation (due to concern for rabies exposure).
- Blunt force trauma or gunshot.
- Thoracic compression.
- Cooling to induce torpor (a state of physical or mental inactivity) followed by freezing.

Examples of Recommended Euthanasia Techniques

Individuals who are trained in euthanasia procedures may have developed their own effective methods for achieving compassionate euthanasia of bats. Any technique used to euthanize bats should be safe for the individuals conducting the euthanasia and result in a quick and humane death for the animal. The procedures listed below are presented as examples for individuals who may lack experience with this species but are willing to complete the task.

Chamber Anesthesia with Injectable Euthanasia or Chamber Euthanasia

1. Place the container that contains the bat in an anesthesia induction chamber.
 - a. A bat collected in a box with holes may be placed in an anesthesia induction chamber without the need to remove it from the original container. If the container or box that contains the bat does not have holes or cannot be punctured to create small holes (less than ½ inch in diameter), the container may need to be opened or the bat removed and placed into the induction chamber.
2. Seal and fill the anesthesia induction chamber with an inhalant anesthetic.
3. Turn the gas off and leave the bat inside the chamber to allow for sufficient time to achieve anesthesia.
4. With gloved hands, remove the bat from the chamber and container.
5. Restrain the anesthetized bat in dorsal recumbency (i.e., abdomen facing up). Using one of the injectable agents listed above, administer intraperitoneally.
 - a. Intraperitoneal injection technique: Draw an imaginary line between that bat's stifles (knees) and insert the needle at a 30-degree angle along the line on the bat's right side, close to the midline. Advance your needle about ½ centimeter into the abdomen and draw back on the needle. If fluid enters the syringe, reposition, and draw back again. If no fluid is aspirated, inject the solution (injectable agents listed above).
6. Alternatively, the bat may be left in the chamber for sufficient time for the anesthetic gas to cause euthanasia.
7. If CO₂ is used to induce anesthesia in a bat, an injectable euthanasia agent should be used to ensure death.
8. Confirmation of death can be evaluated by corneal reflex, percutaneous cardiac puncture, lack of pulse, absence of breath, movement, and reaction to stimuli. If it is not dead, repeat the above instructions.

Container Method with Overdose of Isoflurane Procedure

1. Use a clear glass, plastic container, or heavy-duty bag that can be completely sealed, such as a “Tupperware®” or “Rubbermaid®” container or a large Ziploc® bag as the chamber.
 - a. The container or bag should be large enough to completely seal with the bat collection box inside of it. Alternatively, use a smaller sealable container that you can place the bat into directly.
2. Soak a piece of cotton or gauze by pouring a small amount (several drops) of the liquid inhalant anesthetic (up to 5ml or 1 teaspoon) on the cotton. Alternatively, an eye dropper can be used to decant the anesthetic.
 - a. Larger chambers may require additional anesthetic to sufficiently cause euthanasia.
3. Place the bat collection box and the anesthetic-soaked cotton ball into the designated chamber.
 - a. If the chamber is not large enough to house the bat collection box, place the anesthetic-soaked cotton ball in the container and close it for a minute to allow anesthetic gas to build in the container. Quickly place the bat into the container and close the lid.
 - When placing the bat in the container, make sure the bat does not contact the anesthetic agent directly. The cotton ball can be placed in an empty plastic syringe case to protect the bat from direct contact if needed.
4. Leave the bat in the chamber to allow sufficient time for the anesthetic gas to cause euthanasia; keep it in the chamber for 20-30 minutes to ensure death.
 - a. Be cautious when opening the container to remove the bat.
5. Confirmation of death can be evaluated by corneal reflex, percutaneous cardiac puncture, lack of pulse, absence of breath, movement, and reaction to stimuli. If it is not dead, repeat the above instructions.
6. When finished, and after having removed the deceased bat from the container, open the container away from all personnel (this can be done outdoors), and let the remaining anesthetic evaporate from the container and from the cotton or gauze.
 - a. Keep the deceased bat at ~4°C/39.2°F (including when shipped to the laboratory for testing).
7. Once the gas has evaporated, the cotton or gauze should be placed in a Ziploc® bag and then discarded with regular solid waste.
8. The container can then be disinfected with any common household disinfectant.
9. Wash your hands with soap and water when finished.

For more information, please visit:

- American Veterinary Medical Association
<https://www.avma.org/kb/policies/documents/euthanasia.pdf>
- Occupational Safety and Health Administration <https://www.osha.gov/chemicaldata/>.
 - https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=21684.
- Centers for Disease Control and Prevention and the National Institute for Occupational Safety and Health
<https://www.cdc.gov/niosh/index.htm>
- Food and Drug Administration
https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/017624s036lbl.pdf

Bat Euthanasia Guidelines References

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