

# **RABIES RESOURCE MANUAL**

**Prepared by:**

**Iowa Department of Agriculture and Land Stewardship**

**Iowa Department of Public Health**

**Iowa Veterinary Medical Association**



## Updates to this Document:

- This document was last updated on July 8, 2010
- This document will be reviewed and updated annually
- The most recent version of this document is available at:  
[www.idph.state.ia.us/adper/rabies.asp](http://www.idph.state.ia.us/adper/rabies.asp)

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# I. Background on Rabies, also known as Hydrophobia or Lyssa

(Source: IDPH Epi Manual)

## THE DISEASE AND ITS EPIDEMIOLOGY

### A. Agent

The virus that causes rabies is a rhabdovirus of the genus *Lyssavirus*.

### B. Clinical Description

#### ***Animal Rabies***

Rabies is primarily a disease of the central nervous system. Animals with rabies can appear normal, meek (“dumb rabies”), or may be aggressive (“furious rabies”). Animals with furious rabies often exhibit aggressive or unusually excited behavior; they may excessively salivate and attack other animals or humans. Dumb rabies may be more difficult to detect; animals may seem tame, wounded, or dazed. These animals have been described as acting disoriented or suffering from some paralysis, for example dogs may present with paralysis of the lower jaw and their tongue may be hanging out. While these behaviors are commonly reported, an animal’s behavior alone is *not* a reliable indicator of whether it has rabies. Rabies should be considered in mammals with signs or symptoms of encephalitis or myelitis, including autonomic instability, dysphagia, hydrophobia, paresis, and paresthesia.

#### ***Human Rabies***

Rabies is a fatal infection, which usually progresses over 2 – 21 days. A prodromal phase, lasting 2 – 10 days, is characterized by pain and numbness/tingling at the site of the bite (present in 50% – 80% of cases), and nonspecific complaints such as fatigue, headache and fever. Behavioral changes may also be apparent, including apprehension, anxiety, agitation, irritability, insomnia and depression. The prodromal phase is quickly followed by the neurologic phase, during which the patient may suffer disorientation and hallucinations; paralysis; episodes of terror and excitement; hydrophobia; hyperventilation; hypersalivation; and seizures. These symptoms are invariably followed by coma and death. Once symptoms have begun, the illness is almost always fatal.

Rabies should be considered in patients with signs or symptoms of encephalitis or myelitis, including autonomic instability, dysphagia, hydrophobia, paresis, and paresthesia, particularly if a nonspecific prodrome preceded the onset of these signs by three to four days. Progressive worsening of neurologic signs is characteristic of rabies and should be considered as a positive indicator for rabies. Laboratory tests to rule out common encephalitides (herpes, enteroviruses, arboviruses) should be performed. Negative results of these tests would increase the likelihood of rabies as the diagnosis. If a patient presents with symptoms similar to the ones described above, but the neurologic status does not change and the illness continues for longer than three weeks, rabies is unlikely as the diagnosis.

### C. Reservoirs

**All species of mammals** are susceptible to rabies infection.

### D. Modes of Transmission

Rabies is spread via the virus-laden saliva of an infected animal through a bite or saliva contact with mucous membranes or a fresh break in the skin. Breaks in the skin or mucous membrane exposure to nervous tissue (brain, spinal cord) of an infected animal also pose a transmission threat. Bites of some



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animals, such as bats, can inflict injury so minor that it goes undetected. Airborne spread (for example, in a cave with many bats, or in a laboratory through rabies virus or specimens) has occurred. Rabies is not transmitted through contact with blood, urine, skunk spray, or feces of an infected animal.

Person-to-person spread has been documented after organs and corneas were transplanted from rabies infected individuals. Two nonlaboratory-confirmed cases of person-to-person rabies transmission in Ethiopia have been described. The reported route of exposure in both cases was direct saliva contact (a bite and a kiss).

## E. Incubation period

### Animal Rabies

Depending on the animal, the incubation period may vary from a few weeks to a few years, but is typically 1 - 3 months. Some animals, such as dogs and cats, have been studied extensively. The incubation period of their disease is commonly three to five weeks.

### Human Rabies

The incubation period is usually 3 - 8 weeks, but can rarely range from as few as 9 days (although 9-day incubation periods have not been documented in the U.S. with native strains) to as many as 7 years. Less than 1 percent of human cases have an incubation period longer than 6 months. The incubation period is typically related to the site of exposure; *e.g.*, the incubation period is usually shorter if the virus is inoculated closer to the central nervous system or in a highly innervated area. The incubation period also depends on exposure severity (more virus results in a shorter incubation period) and the age of the exposed person (younger age generally results in a shorter incubation period).

## F. Period of Communicability or Infectious Period

### Animal Rabies

Animals are not infectious until virus is present in their saliva, which happens around the time of clinical onset of illness. Dogs, cats and ferrets may shed virus in their saliva for 3 – 7 days before the onset of clinical signs, and continue to shed virus until death. The shedding/communicability period for most wild animals has not been determined, although skunks may shed virus up to 18 days before death. Carcasses of animals with rabies may contain infectious virus, depending on temperature and environmental conditions. Rabies virus may persist in a frozen carcass for many weeks; drying and sunlight rapidly deactivate rabies virus. Dried saliva does not contain live rabies virus.

### Human Rabies

The period during which a patient is potentially infectious may begin up to 1 week before symptom onset and last until death. Saliva is considered potentially infectious, as are cerebrospinal fluid and organs (although viral concentrations in humans are 3 – 4 times lower than in dogs).

## G. Epidemiology

### Animal rabies

Animal rabies exists in most parts of the world. In the United States, Hawaii is the only state that has never reported an indigenously-acquired rabies case in humans or animals. In the U.S., domestic species accounted for 7% of all rabid animals reported in 2008. The number of reported rabid domestic animals increased among cats and cattle and decreased among dogs, horses, sheep, and goats during 2008. In 2008, cases of rabies in cats increased 12.2% compared with the number



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reported in 2007. The number of rabies cases reported in cats is routinely 3-4 times that of rabies reported in cattle or dogs. In 2008 approximately 1% of cats and 0.3% of dogs tested for rabies were found positive.

### **Human Rabies**

Worldwide an estimated 35,000–40,000 human rabies deaths occur each year. The vast majority of these deaths occur in developing countries. In the United States from 1995 through 2006, there were 37 human cases, of which 36 were fatal. Four cases were the result of solid tissue organ transplantation; 28 cases were associated with bat variants; one was associated with the raccoon variant; and eight were associated with the canine variant. The most recent human cases of rabies in Iowa occurred in 1951 and 2002. The 2002 case was caused by the bat strain of rabies virus.

## **ASSESSING THE NEED FOR HUMAN POST-EXPOSURE PROPHYLAXIS (PEP)**

Assessing the need to provide post-exposure prophylaxis to humans exposed to animals suspected to have rabies should be determined by asking a series of questions. Each question needs to be answered to determine if PEP needs to be initiated. The questions to ask include:

- 1) Is the animal species known to carry rabies?
- 2) Did an actual exposure occur?
- 3) Can the animal be tested or quarantined?

### **Question 1. Is the animal species known to carry rabies?**

#### **Wild Animals:**

In wild animals the rabies risk varies by species:

- High-risk animals are those that are known to commonly carry rabies. In Iowa, these include skunks, bats, raccoons, foxes, and coyotes.
- Medium-risk animals have very rarely been found to carry rabies in Iowa and may include large rodents such as beaver, muskrat, and woodchuck.
- Low-risk animals are those that almost never carry rabies when they are demonstrating normal behavior. These include small rodents, squirrels, opossum, and lagomorphs (rabbits). If these species are acting abnormally you should consider them potentially rabid.

#### **Dogs, Cats, Ferrets, Horses and Livestock:**

Dogs, cats, ferrets, horses, and livestock periodically test positive for rabies each year in Iowa.

#### **Other Species:**

Contact CADE for consultation. Call 800-362-2736 during business hours or 515-323-4360 after hours.

### **Question 1 Interpretation:**

If it has been determined that the animal involved is a potential carrier of rabies, the clinician should move to the second question. (Whether or not an animal has been vaccinated is **immaterial to assessment** because, though vaccination decreases the risk of the animal being rabid, it is not a guarantee.)



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## **Question 2. Did an exposure actually occur?**

Rabies is primarily transmitted through saliva or neural tissue contact to open wounds (including through bites) or mucous membranes. The virus will not cross intact skin. Review the following lists to determine if a rabies exposure has occurred.

*Salivary exposures could include:*

- Bites
- Saliva contact to mucous membranes
- Saliva contamination of an open wound

*Non-salivary exposures could include:*

- Neural tissue contact to an open wound or mucous membrane (ie. if a person shoots an animal in the head and is splattered with brain material in eyes, nose, or mouth)
- Organ transplants from patients who died of undiagnosed rabies infection
- Exposure to large amounts of aerosolized rabies virus (e.g., explorers of caves colonized by rabid bats).

*Situations that are not considered rabies exposures and do not indicate PEP:*

- Petting a rabid animal
- Contact with blood, urine, scent of skunks, and feces

Bats pose a unique problem. The bite of a bat can be so small that it may be undetected. In addition to the exposures listed above, review the following lists to determine if a rabies exposure has occurred.

*Additional situations that are also considered potential exposures include:*

- People that awaken from sleep to find a bat in the room they are sleeping in
- A bat is found in a room with children or incapacitated individuals without supervision
- If a person has direct physical contact with a bat and cannot definitely say they were not bitten (i.e. a bat flies into a person's arm)

*A situation that is not considered an exposure includes:*

- People that are awake and find themselves in a room with a bat and can state that they were not bitten by the bat

## **Question 2 Interpretation:**

If it has been determined that a potential exposure occurred, the clinician should move to the third question to determine if the animal involved can be tested or quarantined.

## **Question 3. Can the animal be tested or quarantined?**

### **Bats**

If available, the bat should be tested for rabies. If the bat is unavailable for testing, PEP is recommended.

### **Wild Animals**

High risk animals should be euthanized and submitted for rabies testing. In cases in which the animals are unavailable for testing, they should be assumed rabid and PEP is recommended.



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All medium-risk animals and any low-risk animal behaving abnormally. If the animal is available, it should be submitted for testing. If the animal is not available, PEP should be considered and the exposed person should consult with their personal physician to make the determination.

### **Dogs, Cats or Ferrets**

Dogs, cats and ferrets that have bitten or exposed a human to their saliva and appear healthy may be quarantined for 10 days in lieu of euthanasia and testing. If at any time during the quarantine period, a dog, cat, or ferret shows signs of rabies, the animal should be immediately euthanized and tested.

Dogs, cats and ferrets that are incubating rabies will begin to exhibit signs of the disease very soon after they begin shedding virus in saliva. If an animal remains healthy during the 10-day quarantine, it could not have been shedding rabies virus in its saliva at the time of the bite or saliva exposure. This does not guarantee that the animal is not incubating rabies; it only indicates that the animal was not infectious at the time in which the human was exposed.

A dog, cat, or ferret that is not available for observation or testing should be considered potentially rabid and PEP is recommended. If capture of the dog, cat, or ferret is likely in the near future, prophylaxis may be delayed up to 72 hours. If the animal is not located within 72 hours PEP should be initiated.

### **Other Animal Species**

For exposure to other animal species, recommendations are made on a case-by-case basis. Contact IDPH for consultation.

## **HUMAN POST-EXPOSURE PROPHYLAXIS PROTOCOL**

### **Severe Bites above the Shoulder**

If a patient is bitten above the shoulder, IDPH recommends starting PEP immediately. The closer the point of exposure is to the brain, the shorter the distance in which the virus must travel, therefore potentially resulting in a shorter disease incubation period.

If the animal subsequently tests negative for rabies, or if the animal is quarantined and is healthy at the end of 10 days (quarantines can only be conducted in dogs, cats, and ferrets) Post Exposure Prophylaxis can be discontinued at that time. If Post Exposure Prophylaxis is discontinued before the series is completed and the patient is exposed again in the future, the entire Post Exposure Prophylaxis series should be administered. If the Post Exposure Prophylaxis series is completed and the patient is exposed again in the future, only two doses of rabies vaccine on days 0 and 3 should be administered.

### **Human Post Exposure Prophylaxis**

- Immediately and thoroughly wash all bite wounds and scratches with soap and water. Simple wound cleaning has been shown to markedly reduce the risk of rabies.
  - Tetanus prophylaxis should be considered
  - Risk of bacterial infections should be assessed and addressed.
1. Treatment of persons who have **not previously received rabies vaccine or have not previously received rabies post-exposure treatment.**



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a. **Immunocompetent patients:**

- **Four** 1-mL vaccine doses of HDCV or PCECV should be administered intramuscularly to previously unvaccinated persons as soon as possible after exposure on days 0, 3, 7, and 14 (day 0 is the day the post exposure prophylaxis is started).
- One dose of rabies immunoglobulin (HRIG), 20 IU/kg, should also be administered on day 0.
  - o If anatomically feasible, the full dose of HRIG should be thoroughly infiltrated in the area around the wound. The rest should be administered intramuscularly at a different site than the vaccine.
  - o If HRIG is not given with the first post-exposure dose of vaccine, it must be given within eight days after the first dose of vaccine.

b. **Immunocompromised patients:**

- **Five** 1-mL vaccine doses of HDCV or PCECV should be administered intramuscularly to previously unvaccinated persons as soon as possible after exposure on days 0, 3, 7, 14, **and 28**.
- One dose of rabies immunoglobulin (HRIG), 20 IU/kg, should also be administered on day 0.
  - o If anatomically feasible, the full dose of HRIG should be thoroughly infiltrated in the area around the wound. The rest should be administered intramuscularly at a different site than the vaccine.
  - o If HRIG is not given with the first post-exposure dose of vaccine, it must be given within eight days after the first dose of vaccine.

**How is immunocompromised defined in terms of rabies vaccination?**

The decision of whether individuals are immunocompromised should be determined by a physician. However, to assist with this determination, persons with the below conditions may need to receive **five** doses of rabies vaccine (consult with their healthcare provider).

A. Persons with immunocompromising conditions or on specific medications (non-HIV)

Examples include but are not limited to:

- 1) Congenital immunodeficiency
- 2) Leukemia
- 3) Lymphoma
- 4) Generalized malignancy
- 5) Therapy with alkylating agents, antimetabolites, radiation, or large amounts of corticosteroids.
- 6) Antimalarial medications

B. Persons with HIV infection

Both symptomatic and asymptomatic patients with HIV infection

C. Persons with conditions that cause limited immune deficits

Examples include but are not limited to:

- 1) Renal failure
- 2) Diabetes (uncontrolled)





There are currently no USDA licensed biologics for post-exposure prophylaxis of previously unvaccinated domestic animals, and there is evidence that the use of vaccine alone will not reliably prevent the disease in these animals.

Dogs, cats, and ferrets that are **currently vaccinated** should be revaccinated immediately, kept under the owner's control, and observed for 45 days. Any illness in an isolated or confined animal should be reported immediately to the local health department. If signs suggestive of rabies develop, the animal should be euthanized and the head shipped for testing.

## Livestock

All species of livestock are susceptible to rabies; cattle and horses are the most frequently reported infected species.

Livestock exposed to a rabid animal and **currently vaccinated with a vaccine approved by USDA for that species** should be revaccinated immediately and observed for 45 days.

Unvaccinated livestock should be euthanized immediately. If the animal is **not euthanized** it should be kept under close observation for 6 months. Any illness in an animal under observation should be reported immediately to the local health department and veterinarian. If signs suggestive of rabies develop, the animal should be humanely euthanized and the head removed by a licensed veterinarian and shipped for testing.

Multiple rabid animals in a herd or herbivore-to-herbivore transmission are uncommon; therefore, restricting the rest of the herd if a single animal has been exposed to or infected by rabies is usually not necessary.

Handling and consumption of tissues from exposed animals may carry a risk for rabies transmission. Risk factors depend in part on the site(s) of exposure, amount of virus present, severity of wounds, and whether sufficient contaminated tissue has been excised. If an exposed animal is to be slaughtered for consumption, it should be done immediately after exposure and all tissues should be cooked thoroughly. Persons handling exposed animals, carcasses, and tissues should use barrier precautions. Historically, federal guidelines for meat inspectors required that any animal known to have been exposed to rabies within 8 months be rejected for slaughter. USDA Food and Inspection Service (FSIS) meat inspectors should be notified if such exposures occur in food animals prior to slaughter.

Rabies virus may be widely distributed in tissues of infected animals. Tissues and products from a rabid animal should not be used for human or animal consumption. Pasteurization temperatures will inactivate rabies virus, therefore, inadvertently drinking pasteurized milk or eating thoroughly cooked animal products does not constitute a rabies exposure.

## Other Animals

Other mammals exposed to a rabid animal should be euthanized immediately. Animals maintained in USDA-licensed research facilities or accredited zoological parks should be evaluated on a case-by-case basis.



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Source: The Compendium of Animal Rabies Prevention and Control, 2008 National Association of State Public Health Veterinarians, Inc. (NASPHV)  
<http://www.nasphv.org/documentsCompendia.html>

## PREVENTIVE MEASURES

### Environmental Measures

Human rabies control relies on controlling rabies in the animal population, therefore animal quarantine regulations and vaccination laws should be enforced. In Iowa, all dogs over 6 months of age are required to be vaccinated against rabies by a licensed veterinarian. The state department of agriculture and land stewardship recognizes the standards set forth in the Compendium of Animal Rabies Prevention and Control Guidelines. Currently, there are approved rabies vaccines for use in dogs and other animals that are as young as 3 months of age. Rabies vaccination is strongly encouraged in all companion animals (including horses) and valuable livestock.

### Education

Offer the following advice to the public to help prevent rabies:

- Vaccinate pets; dogs are required by law to be vaccinated. Although not required by law, cat, ferret, horse and valuable livestock vaccinations are recommended.
- Do not feed or handle wild or stray animals. Avoid sick animals or those that act strangely.
- Do not touch or handle dead animals.
- Contact local animal control officer with questions about the capture of an animal or handling of a carcass.
- Cover garbage cans and keep pet food indoors, so wild animals are not attracted.
- Do not keep wild animals as pets, which is often illegal as well as dangerous.
- Never handle bats. A bat bite or scratch may be small and go unnoticed. People who awaken to find a bat in the room or children awake or asleep with a bat in a room may require PEP.
- Recommend that travelers to developing countries with endemic rabies receive pre-exposure prophylaxis if they will be visiting in situations where exposure is likely (e.g., camping, hiking, backpacking, or away from areas where treatment for a bite wound is available). Travelers should be warned to avoid petting or otherwise having contact with stray animals.

*Note: For more information about international travel and rabies, contact the CDC Traveler's Health Office at (877) 394-8747 or via the internet at <http://www.cdc.gov/travel>*

## HUMAN PRE-EXPOSURE VACCINATION

Pre-exposure vaccination is recommended for persons in the following categories:

- Veterinarians
- Animal handlers
- Laboratory workers who handle rabies virus
- Persons living in or visiting countries where rabies is endemic
- Others whose occupations or hobbies bring them into contact with potentially rabid animals

### Pre-Exposure Vaccination Protocol:

Three 1.0 ml injections of vaccine given intramuscularly on each of days 0, 7, and 21 or 28.



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NOTE: Pre-exposure vaccination does **NOT** eliminate the need for prompt post-exposure prophylaxis. If persons who have completed the pre-exposure vaccination series are subsequently exposed to rabies, the following protocol should be followed (as stated on page 7):

- Two IM doses (1.0 ml each) of vaccine, on days 0 and 3. Human Rabies Immune Globulin should NOT be administered.

### **Monitoring Pre-Exposure Vaccination Titers:**

Persons who work with live rabies virus in research laboratories or vaccine production facilities and are under continuous risk of unapparent rabies virus exposure should have their serum rabies antibody titer measured every 6 months. Acceptable antibody level is 1:5 titer by the rapid fluorescent focus inhibition test (RFFIT) technique. See the list of laboratories performing the serologic test below. If the antibody level is less than 1:5, booster doses of vaccines should be administered to maintain a serum titer corresponding to at least complete neutralization at a 1:5 serum dilution by RFFIT.

Persons who frequently come in contact with potentially rabid animals, such as **veterinarians, veterinary technicians, animals control officers, or wildlife officers**, should have a serum sample tested for rabies antibody every **2 years**. If their antibody level is less than complete neutralization at a 1:5 serum dilution by the RFFIT, the person should receive a single booster dose of vaccine.

### **Laboratories that perform the Rapid Fluorescent Focus Inhibition Test (the CDC recognized test for assessing human antibody levels)**

**INTERPRETATION:** A titer of 1:5 is considered adequate.

**SHIPPING INFORMATION:** Please send the following information with your specimen:

1. Address of person or institution responsible for receiving the results and billing information.
2. Complete vaccination history if possible.
3. All serum samples that are potentially pathogenic to humans should be labeled or marked with red tape or sticker.

**SEND SAMPLES TO** (any one of the following):

#### **K-State Rabies Laboratory**

Manhattan/K-State Innovation Center  
2005 Research Park Circle  
Manhattan, KS 66502  
Main telephone: (785) 532-4483  
Fax: (785) 532-4522 or (785) 532-4474  
Email: [rabies@vet.k-state.edu](mailto:rabies@vet.k-state.edu)  
Web address: <http://www.vet.ksu.edu/rabies>

#### **Atlanta Health Associates**

309 Pirkle Ferry Road, Suite D300  
Cumming, GA 30040  
(770) 205-9091 or (800) 717-5612  
FAX: (770) 204-9021



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Web address: <http://www.atlantahealth.net/>

**Auburn University College of Veterinary Medicine**

**Note: Only animal specimens tested.**

Dept. of Pathobiology, Virology Lab

261 Greene Hall

Auburn University, AL 36849-5519

(334) 844-2659

Web address:

[http://www.vetmed.auburn.edu/uploads/6b/61/6b61faa8c3b81bcdc55ef2f6ffbd7ece/RFFITform\\_10\\_09.pdf](http://www.vetmed.auburn.edu/uploads/6b/61/6b61faa8c3b81bcdc55ef2f6ffbd7ece/RFFITform_10_09.pdf)

## INDIGENT PATIENT PROGRAMS

Patient assistance programs that provide medications to uninsured or underinsured patients are available for rabies vaccine and Immune globulin.

Sanofi Pasteur's Patient Assistance Program (providing Imogam<sup>®</sup> Rabies-HT and Imovax<sup>®</sup> Rabies as well as other vaccines) is now administered through the Franklin Group. A healthcare professional or patient can either contact the Franklin Group directly, or call the customer service team (1-800-VACCINE) who will transfer them to the Franklin Group. The Franklin Group will review the application against the eligibility criteria. For more information about the program or to request an application, please contact the Sanofi Pasteur, Inc. Patient Assistance Program (Franklin Group) at 1 (866) 801-5655.

Novartis' Patient Assistance Program for RabAvert<sup>®</sup> is managed through RX for Hope and can be accessed at 800-244-7668. Instructions and request forms are also available at the Rx for Hope website <https://www.rxhope.com/PAP/info/PAPList.aspx?drugid=319&fieldType=drugid>.



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## II. Animal Rabies Testing Resources in Iowa

There are two laboratories in Iowa that provide animal rabies testing services: University of Iowa Hygienic Laboratory and Iowa State University Veterinary Diagnostic Laboratory.

### University of Iowa Hygienic Laboratory (UHL):

UHL is the designated state public health laboratory in Iowa. UHL receives state funding enabling them to provide free testing services for diseases of public health concern. Therefore, UHL will test potentially rabid animals that have exposed humans free of charge. UHL does not provide testing for animal to animal exposures; therefore those samples should be submitted to Iowa State University Veterinary Diagnostic Laboratory.

### Iowa State University Veterinary Diagnostic Laboratory (ISU VDL):

ISU VDL has historically provided animal rabies testing as a service to veterinarians who may be ruling out rabies as one of several differential diagnosis. However, in recent years ISU VDL has received an increasing number of requests for rabies testing of domestic, livestock, and wildlife species where the submitter is only requesting rabies testing without additional diagnostics. While ISU VDL is willing and able to provide that service to the public, healthcare, and veterinary communities, they do not receive any state or federal funding to support testing. Therefore, ISU VDL must charge for the testing to cover their operating expenses. ISU VDL will provide rabies testing for cases of animal and/or human exposure.

### Specimen Submission and Transportation:

#### Specimen Preservation:

- If the specimen will not be submitted for testing immediately, it should be refrigerated until transported or shipped.
- **DO NOT FREEZE THE SPECIMEN**

#### Specimen Transport:

- **Private vehicle is the fastest and preferred way to get the specimen to the laboratory.**
  - Double bag the specimen
  - Place the specimen in a hard sided container, such as a Styrofoam cooler
  - Place ice packs around the double bagged specimen to keep it cool during transport
  - Include the appropriate Rabies Test Request Form from UHL or ISU
  - Call the appropriate laboratory before departure
- Commercial courier service, such as FedEx, can also be used.
  - Double bag the specimen
  - Place the double bagged specimen in a hard sided container, such as a Styrofoam cooler.
  - Place ice packs around the double bagged specimen to keep it cool -DO NOT FREEZE.
  - Place the completed Rabies Test Request Form in a separate plastic bag to prevent it from becoming wet or contaminated. Place the bagged Rabies Test Request Form in the hard sided container.
    - Firmly secure the lid of the hard sided container.
    - Package (place in a box) the hard sided container and ship.
    - Ship via **overnight courier**.

*NOTE: Improper packaging and/or delayed delivery may compromise the integrity of the brain material rendering the specimen unsatisfactory for testing.*

**Specimen submission guidelines:**

- **Large/medium animals-** If only requesting rabies testing, a veterinarian needs to remove the head and only the head should be submitted for testing\*.
- **Bats-** Try not to crush the skull of the bat. Submit the entire animal.
- **Small animals (mice, squirrels, etc):** Submitting the entire animal is preferred.

**\*If a veterinarian is requesting other diagnostics from ISU VDL all appropriate samples should also be included. In some cases, this may mean that the entire animal should be submitted.**

**Laboratory Contact Information:**

**UHL:**

319-335-4500 or 800-421-4692 (answered all hours)

**ISU VDL:**

During business hours call 515-294-1950 – after hours call 515-290-1969



### III. Quarantine Authority and Enforcement

#### Authority to mandate that an animal be placed in quarantine:

*(Dogs, cats, and ferrets are the only animals that can be quarantined according to national recommendations.)*

#### State of Iowa Law:

##### **351.39 Confinement .**

If a local board of health receives information that an animal has bitten a person or that a dog or animal is suspected of having rabies, the board shall order the owner to confine such animal in the manner it directs. If the owner fails to confine such animal in the manner directed, the animal shall be apprehended and impounded by such board, and after ten days the board may humanely destroy the animal. If such animal is returned to its owner, the owner shall pay the cost of impoundment. This section shall not apply if a police service dog or a horse used by a law enforcement agency and acting in the performance of its duties has bitten a person.

[C66, 71, 73, 75, 77, 79, 81, §351.39]

2001 Acts, ch 19, §1; 2001 Acts, ch 176, §68

##### **351.36 Enforcement.**

Local health and law enforcement officials shall enforce the provisions of sections [351.33](#) to [351.43](#) relating to vaccination and impoundment of dogs. Such public officials shall not be responsible for any accident or disease of a dog resulting from the enforcement of the provisions of said sections.

[C66, 71, 73, 75, 77, 79, 81, §351.36]

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#### Quarantine Enforcement

Several years ago, the Iowa Department of Public Health surveyed counties to get a better understanding of how they respond to potential rabies exposure cases. While some counties had extremely detailed protocols for addressing rabies exposure situations, others did not.

Most counties responded that animal bites were addressed by one the following entities:

- Local public health
- Local environmental health
- County sheriff's department
- Local law enforcement
- Local animal control

In addition, most counties responded that depending upon the circumstances of the exposures, they may allow animal owners to conduct in-home quarantines but also mandate out-of-the-home quarantines as well. Some of the factors they use to determine which type of quarantine to mandate include:

##### In-Home Quarantine:

- Animal's rabies vaccinations are current
- Owners are cooperative and seem trustworthy

- Owners have the ability to confine animal to the property to prevent escape or exposure to other humans or animals. Such as leash control or fenced yard.

Many counties also have processes in place to follow-up with the owner at the end of 10 days:

- Some counties require the owner to schedule a veterinary visit at the end of 10 days so that the veterinarian can verify that the animal is alive and is not showing symptoms that could be consistent with rabies.
- In other counties, public health, environmental health, or law enforcement will visit the home to make sure the animal is still alive and is not showing clinical symptoms.
- Several counties also indicated that they call the owner at the end of the 10 days to verify verbally that the animal is alive and not showing clinical signs.

Out-of-the-Home Quarantine:

- Not current on rabies vaccinations
- Owners are not cooperative
- Owners do not have the ability to satisfactorily confine the animal

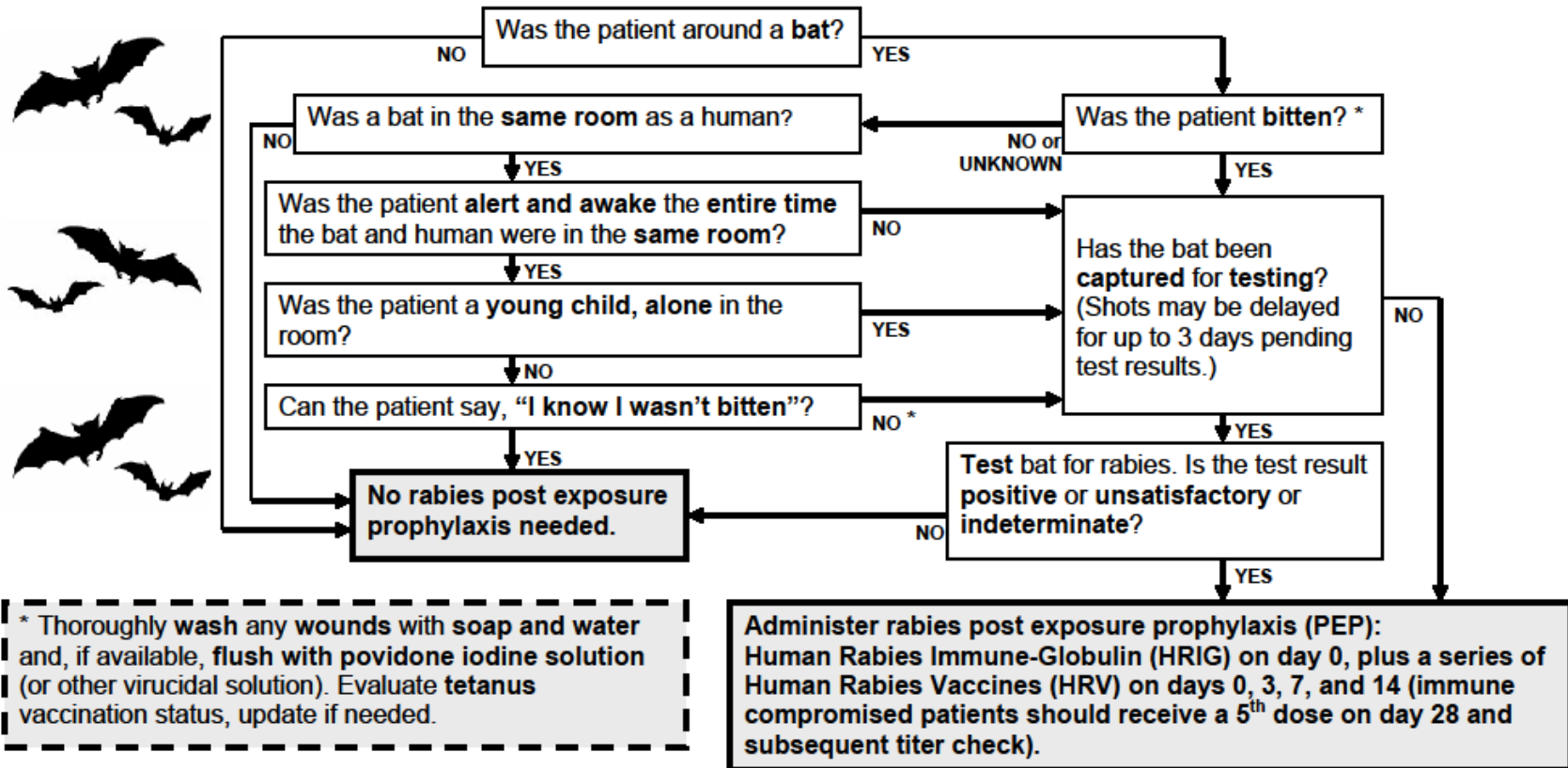
Most counties responded that when they mandate out-of-the-home quarantines, the animals are typically housed in one of the following:

- A local animal shelter or humane society, with which the county holds a contract for service.
- A local veterinary clinic, with which the county holds a contract for service.

Most counties responded that expenses related to the quarantine and / or testing of owned animals were the responsibility of the animal owner. Expenses accrued during the quarantine and / or testing of stray animals were the responsibility of the local board of health in most counties.

V. Exposure flow charts (all mammals and bats)

**Rabies Exposure Management for Bat-related Incidents (FAQ's on reverse)**



Iowa Department of Public Health, Center for Acute Disease Epidemiology (CADE)  
 Business hours consultations: 800-362-2736 After hours consultations: 515-323-4360

Updated 5/21/2010

## Recommendations for Managing Human Rabies Exposure\*

For **Bat** Exposures see *Rabies Exposure Management for Bat-related Incidents Flow Chart*, available at [www.idph.state.ia.us/adper/common/pdf/cade/rabies\\_exposure\\_bats.pdf](http://www.idph.state.ia.us/adper/common/pdf/cade/rabies_exposure_bats.pdf)



Animal Species	Situation	Rabies Post Exposure Prophylaxis (PEP) Recommendations
Dogs, cats, ferrets	Animal available for testing or 10 day confinement and observation	If the animal is exhibiting symptoms consistent with rabies, immediately euthanize and test. If the animal is not exhibiting symptoms, a 10 day confinement period can be instituted. If the animal exhibits signs of rabies during the 10 day confinement period, it should be euthanized immediately and tested. If results are positive, unsuitable or indeterminate administer PEP immediately. If the animal does not exhibit clinical signs during the 10 day confinement period, PEP is not recommended, since the animal was not excreting virus at the time of the bite or saliva exposure.
	Animal unavailable (waiting up to 72 hours to capture the animal may be reasonable, assuming the correct animal can be identified)	If the animal is not available for confinement or testing, administer PEP. (If the animal is captured later contact IDPH at 800-362-2736.)
Horses or other farm animals	If the animal exhibits signs of rabies or dies suddenly, test the animal for rabies.	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate, administer PEP.
	All other cases, contact IDPH for guidance.	Contact IDPH at 800-362-2736 during business hours or 515-323-4360 after hours.
Skunk, raccoon, fox, coyote	Euthanize and test animal	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate administer PEP.
	Animal unavailable for testing	Administer PEP immediately.
Large rodents: such as beavers, muskrats, or groundhogs	Euthanize and test animal	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate administer PEP.
	Animal unavailable for testing	Contact IDPH for consultation at 800-362-2736 during business hours or 515-323-4360 after hours.
Small rodent: such as squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, rabbits, or opossum	Provoked bite and animal behaving normal	No PEP is recommended, as these species almost never carry rabies.
	Unprovoked bite or animal behaving abnormal	Contact IDPH for consultation at 800-362-2736 during business hours or 515-323-4360 after hours.

\* Exposure: a bite or saliva/nervous tissue contact to an open wound or mucous membrane

**NOTE:** If the patient was bitten above the shoulders, IDPH recommends that the health care provider consider starting PEP immediately. PEP can be discontinued if the animal tests negative for rabies or is healthy at the end of the quarantine period.

Thoroughly wash all wounds with soap and water and, if available, flush with povidone iodine solution (or other virucidal solution). Evaluate tetanus vaccination status, update if needed.

If questions arise on any of the above information or circumstances related to the exposure are unusual, please contact IDPH for consultation at 800-362-2736 during business hours or 515-323-4360 after hours.

For additional information, visit [www.idph.state.ia.us/adper/rabies.asp](http://www.idph.state.ia.us/adper/rabies.asp).

(Updated 5/21/2010)



## VI. Rabies Statistics

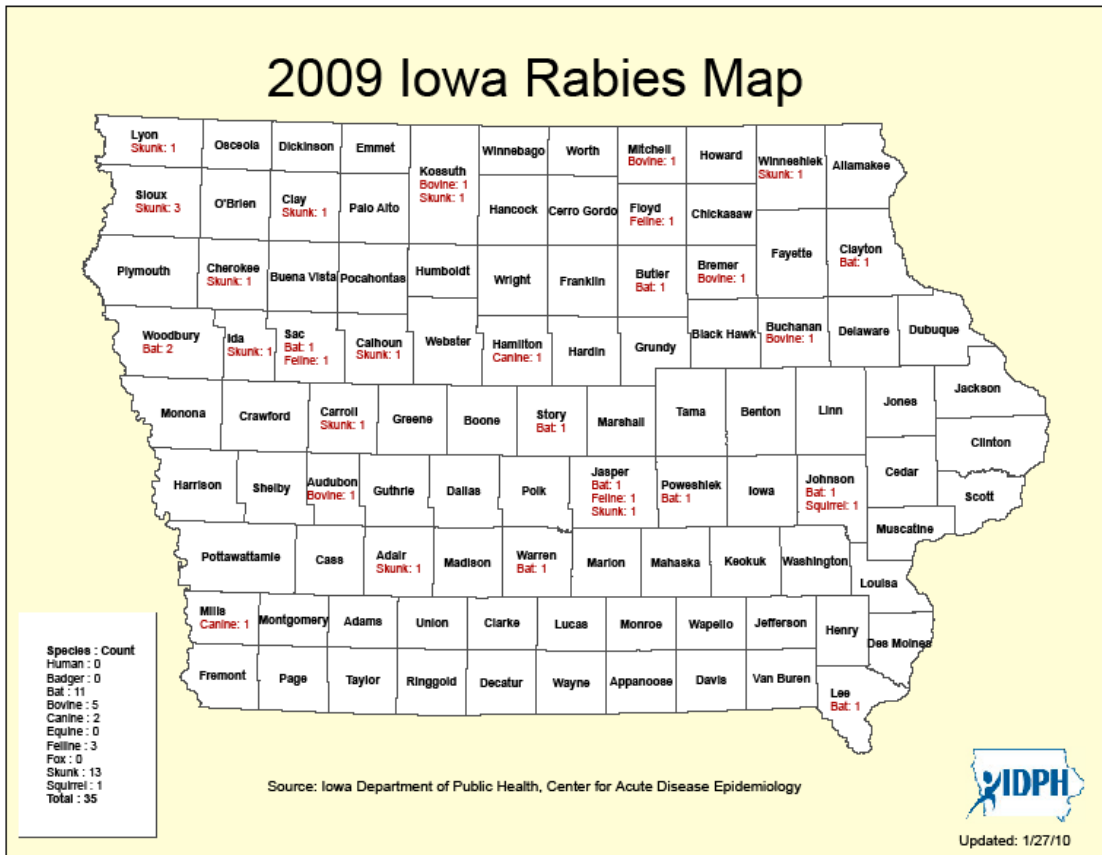
### ANIMAL RABIES IN IOWA:

In 2009, 35 cases of animal rabies were reported in Iowa, which is a slight increase from 2008 (see Table 1 below). Rabies was identified most frequently in wildlife species including 13 skunks, 11 bats, and one squirrel. Five cases were diagnosed in domestic species including 3 cats and 2 dogs. Five cows tested positive.

**Table 1: Positive Rabies Cases 2001-2009**

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Bat	31	27	47	47	60	28	13	11	11	<b>275</b>
Skunk	28	27	38	28	33	13	5	7	13	<b>192</b>
Cat	10	7	8	11	5	7	7	9	3	<b>67</b>
Cow	10	12	3	10	7	4	0	1	5	<b>52</b>
Dog	2	3	6	3	2	2	5	1	2	<b>26</b>
Horse	3	2	3	0	1	3	1	0	0	<b>13</b>
Fox	1	0	0	1	0	0	0	0	0	<b>2</b>
Squirrel	0	0	0	0	0	0	0	0	1	<b>1</b>
Badger	0	0	1	0	0	0	0	0	0	<b>1</b>
<b>Total</b>	<b>85</b>	<b>78</b>	<b>106</b>	<b>100</b>	<b>108</b>	<b>57</b>	<b>31</b>	<b>29</b>	<b>35</b>	<b>629</b>

As illustrated on the map below, cases were distributed across the state.



During 2009, 1694 animals in Iowa were tested for rabies and 35 were confirmed positive (2.07%). The percent positive varies greatly by species, see the Table 2 below. It is important to note that this data is greatly influenced by the number of animals tested. Many animals are tested because they exhibit unusual behavior or clinical signs making them more likely to be infected with the rabies virus. For these reasons, the percentages should not be considered representative of the true distribution of disease within the animal population in Iowa.

**Table 2: Percent Positive by Species in 2009**

<b>Species</b>	<b>Positive</b>	<b>Total Tested</b>	<b>% Positive</b>
Dogs	2	369	0.54%
Cows	5	86	5.81%
Cats	3	444	0.68%
Bat	11	558	1.97%
Squirrel	1	17	5.88%

## Appendix 1: SAMPLE: Rabies Exposure Investigation Protocol

In County/City X potential rabies exposures of humans, including those reported by the general public, health care providers, or veterinarians should be referred to:

Agency/Name: \_\_\_\_\_

Contact Information: \_\_\_\_\_

(For example: County Public Health/County Environmental Health/Sheriff's Department/Local Animal Control)

This entity serves as the **primary point of contact** for potential rabies exposures of humans. This primary point of contact will assess each potential rabies exposure individually. If the animal which potentially exposed the human is a dog, cat, or ferret, the primary point of contact will determine whether the animal should be quarantined in accordance with the *Compendium of Animal Rabies Prevention and Control, 2008*.

If it is determined that the animal should be quarantined, the primary point of contact will decide whether an in-home or out-of-the-home quarantine is most appropriate. The decision will be based upon several factors, including but not limited to the following.

In-Home Quarantines may be allowed under the following circumstances:

- If the animal is current its rabies vaccinations
- If the owners are cooperative and seem trustworthy
- If the owners have the ability to confine animal to the property.

Out-of-the-Home Quarantines may be required under the following circumstances:

- If the animal is not current on rabies vaccinations
- If the owners are not cooperative
- If the owners do not have the ability to satisfactorily confine the animal

At end of an in-home quarantine period, the primary point of contact will confirm that the animal is still alive and not showing symptoms of rabies infection by \_\_\_\_\_ (veterinary confirmation is recommended).

County/City X has an agreement with X veterinary clinic/ humane society/shelter to provide out-of-the-home quarantine services for stray and / or owned animals.

It is the responsibility of the animal owner to pay for any fees associated with animal quarantines and/or testing.

Expenses related to quarantine and/or testing of stray animals are the responsibility of \_\_\_\_\_ .



**SAMPLE: RABIES EXPOSURE REPORTING FORM**

**REPORT:**

Caller Name: \_\_\_\_\_  
Caller Phone Number: \_\_\_\_\_  
Relationship to Exposed Patient: \_\_\_\_\_

Completed by: \_\_\_\_\_  
Date of Report: \_\_\_\_\_

**PERSON EXPOSED:**

First Name: \_\_\_\_\_  
Last Name: \_\_\_\_\_  
Age: \_\_\_\_\_ Male:  Female:   
Street: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_  
Zip: \_\_\_\_\_  
Home Phone: \_\_\_\_\_  
Alternate Phone: \_\_\_\_\_

Patient's Physician: \_\_\_\_\_  
Clinic/Hospital: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Is patient hospitalized? Y  / N   
Other information: \_\_\_\_\_  
Guardian: \_\_\_\_\_

**DESCRIPTION OF EXPOSURE:**

Exposure date: \_\_\_\_\_ Time: \_\_\_\_\_  
Street: \_\_\_\_\_  
City: \_\_\_\_\_  
County: \_\_\_\_\_ State: \_\_\_\_\_  
Summary: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Bite: Y  / N   
Bite Location: \_\_\_\_\_  
Explain the Non-bite Exposure: \_\_\_\_\_  
\_\_\_\_\_

Were others exposed? Y  / N   
➤ If yes, please list: \_\_\_\_\_

**ANIMAL:**

Species: \_\_\_\_\_  
Wild  Stray  Owned   
If Applicable:  
Breed: \_\_\_\_\_  
Age: \_\_\_\_\_ Sex: \_\_\_\_\_  
Current Rabies Vaccine: Y  / N

Owner's Veterinarian: \_\_\_\_\_  
Clinic Name: \_\_\_\_\_  
Clinic Address: \_\_\_\_\_  
Clinic City: \_\_\_\_\_ County: \_\_\_\_\_  
Clinic Phone: \_\_\_\_\_

Animal Owner Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
City: \_\_\_\_\_  
County: \_\_\_\_\_ State: \_\_\_\_\_  
Owner Phone: \_\_\_\_\_

Is the animal available for testing? Y  / N   
Is animal available for observation? Y  / N   
Where is the animal now? \_\_\_\_\_

**RECOMMENDATIONS:**

Nothing- no exposure occurred   
Owner must confine animal in the home for 10 days (dogs, cats, ferrets only). If symptomatic euthanize and test, administer PEP based upon results   
Animal will be confined in the veterinary clinic/shelter for 10 days (dogs, cats, ferrets only). If symptomatic euthanize and test, administer PEP based upon results   
Shelter/clinic name and location \_\_\_\_\_

Euthanize animal and test immediately. Administer PEP based upon results   
Recommended patient consult their healthcare provider   
Bite above shoulders, give PEP immediately, discontinue if tests negative   
Recommended bat proofing   
Other: \_\_\_\_\_

**Iowa Department of Public Health Rabies Consultation:  
800-362-2736 or 515-323-4360 after hours**

**SAMPLE: Veterinary Certification Form**

On (date), I examined the following animal. Upon physical examination, the animal was not exhibiting clinical symptoms consistent with rabies virus infection.

Animal Name: \_\_\_\_\_

Species: \_\_\_\_\_

Owners Name: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: \_\_\_\_\_

Phone: \_\_\_\_\_

---

Veterinarians Name: \_\_\_\_\_

Clinic Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Signature: \_\_\_\_\_

**Template developed by the Iowa Department of Public Health  
and the Iowa Veterinary Medical Association**

## Appendix 2: Clarification of Rabies Revaccination Requirements

*(Source: Iowa Veterinary Medical Association Communiqué, Issued July, 2009)*

Iowa law requires all dogs over six months of age to have a current rabies vaccination with a USDA-approved rabies vaccine. Canine rabies vaccination must be administered by a licensed veterinarian and the veterinarian is required to issue a tag and a certificate of vaccination. The tag is required to be attached to the collar of the dog. Iowa law also adds this exception “dogs kept in kennels and not allowed to run at large shall not be subject to the vaccination requirement.”

Iowa law does not require rabies vaccination for cats. **Important note:** Local county and city ordinances may require vaccinations for cats and other animals. Local law takes precedence if it is more restrictive than state law. Rabies vaccination may be administered to cats, ferrets, livestock and other domestic animals for which there is an approved vaccine by non-veterinarians. Only a licensed, accredited veterinarian can issue and sign a rabies certificate.

Iowa law requires rabies vaccine frequency and procedure follow the recommendations from the Compendium of Animal Control prepared by the National Association of State Public Health Veterinarians.

### **Rabies revaccination**

An initial rabies vaccine should be boosted in one year. At that point, Iowa law follows the vaccine manufacturer’s recommendation for booster vaccination. If a 3 year vaccine is administered, the vaccine should be boosted prior to the 3 year expiration date. There are no studies available that indicate duration of immunity after administering a vaccination to a dog that has passed the three year expiration date. Therefore, because rabies is a zoonotic disease and nearly 100% fatal when contracted by humans, Iowa Department of Agriculture rules require a booster vaccine in one year if the 3 year vaccine has expired. The subsequent booster vaccine would expire in 3 years if a three year approved product is used. It has come to the attention of the IVMA that our members are recommending a number of different protocols for rabies revaccinations in a dog that has an expired three year vaccination. The IVMA recommends all veterinarians follow Iowa law and recommend a one year vaccination booster if an animals’ three year vaccine has expired. Link to the Compendium for Animal Rabies Control: [www.nasphv.org/Documents/RabiesCompendium.pdf](http://www.nasphv.org/Documents/RabiesCompendium.pdf)

## Appendix 3: Rabies Considerations with Animals in Public Settings

Source: Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2009 (*Morbidity and Mortality Weekly Report, May 1, 2009/Vol. 58/ No. RR-5*)

### Exposure to Rabies

Certain venues encourage or permit the public to be in contact with animals, resulting in millions of human-animal interactions each year. These settings include county or state fairs, petting zoos, animal swap meets, pet stores, zoologic institutions, circuses, carnivals, educational farms, livestock birthing exhibits, educational exhibits at schools and child-care facilities, and wildlife photo opportunities. Although human-animal contact has many benefits, many human health problems are associated with these settings, including infectious diseases, exposure to rabies, and injuries. Although no human rabies deaths caused by animal contact in public settings have been reported, multiple rabies exposures have occurred, requiring extensive public health investigations and medical follow-up.

For example, thousands of persons have received rabies postexposure prophylaxis (PEP) after being exposed to rabid or potentially rabid animals, including bats, cats, goats, bears, sheep, horses, and dogs, at various venues: a pet store in New Hampshire, a county fair in New York State, petting zoos in Iowa, and Texas, school and rodeo events in Wyoming, a horse show in Tennessee, and summer camps in New York. Substantial public health and medical care challenges associated with potential mass rabies exposures include difficulty in identifying and contacting persons, correctly assessing exposure risks, and providing timely medical prophylaxis. Prompt assessment and treatment are critical to prevent this disease, which is usually fatal.

### Recommendations:

**Rabies:** All animals should be housed to reduce potential exposure to wild animal rabies reservoirs. Mammals should also be up-to-date on rabies vaccinations. These steps are particularly critical in areas where rabies is endemic and in venues where animal contact is encouraged (e.g., petting zoos). Because of the extended incubation period for rabies, unvaccinated mammals should be vaccinated at least 1 month before they have contact with the public.

If no licensed rabies vaccine exists for a particular species (e.g., goats, swine, llamas, and camels) that is used in a setting where public contact occurs, consultation with a veterinarian regarding off-label use of rabies vaccine is recommended. Use of off-label vaccine does not provide the same level of assurance as vaccine labeled for use in a particular species; however, off-label use of vaccine might provide protection for certain animals and thus decrease the probability of rabies transmission. Vaccinating slaughter-class animals before displaying them at fairs might not be feasible because of the vaccine withdrawal period that occurs as a result of antibiotics used as preservatives in certain vaccines. Mammals that are too young to be vaccinated should be used in exhibit settings only if additional restrictive measures are available to reduce risks (e.g., using only animals that were born to vaccinated mothers and housed to avoid rabies exposure). In animal contact settings, rabies testing should be considered for animals that die suddenly.