

FELINE RETROVIRUS MANAGEMENT

# GUIDELINES

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FROM THE AMERICAN ASSOCIATION OF FELINE PRACTITIONERS



# About These Guidelines

This report is an abridged version of the Retrovirus Guidelines of the American Association of Feline Practitioners (AAFP)<sup>1</sup> to guide veterinary practitioners who want to optimize the care and management of feline patients. It represents a consensus of current information compiled by the researchers and practitioners on the panel.

The AAFP is a professional organization of practitioners and board-certified specialists who seek to raise the standards of feline medicine and surgery among practitioners.

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The guidelines in this report are based on the best research data, clinical experience and technical judgments available at the time of preparation. While the guidelines are as accurate and comprehensive as possible, they are subject to change should new insights become available from additional research or technological updates.

# Introduction

Feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) are among the most common infectious diseases of cats. Risk factors for infection include male gender, adulthood, and outdoor access, whereas indoor lifestyle and sterilization are associated with reduced infection rates.<sup>2–6</sup>

The retroviral status of all cats should be known. Cats may require retrovirus testing at different times in their lives. Here are some general principles for retrovirus testing:

- ▶ A cat with a confirmed-positive test result should be diagnosed as having a retroviral infection – not clinical disease. Diseases in cats infected with FeLV or FIV may not necessarily be the result of the retrovirus infection.
- ▶ Cats infected with FeLV or FIV may live for many years. A decision for euthanasia should never be made solely on the basis of whether or not the cat is infected.
- ▶ No test is 100% accurate at all times under all conditions. All test results should be interpreted along with the patient's health and prior likelihood of infection. All positives should be confirmed by another test method.

While they can be life-threatening viruses, proper management can give infected cats longer, healthier lives. The following guide reflects the recommendations of the AAFP on managing these infections.



# Epidemiology

The prevalence of FeLV infection has reportedly decreased during the past 20 years, presumably as a result of implementation of widespread testing programs and development of effective vaccines.<sup>2,3,7</sup> In contrast, prevalence of FIV has not changed since it was discovered in 1986.

In a study of more than 18,000 cats tested in 2004, 2.3% were positive for FeLV and 2.5% were positive for FIV.<sup>1</sup> (See opposite page.) Infection rates for FeLV (Column 4) and FIV (Column 5) varied among various subpopulations and sources of cats.

## FeLV and FIV Diseases

Although many cats experience prolonged survival, retroviral infections can also be associated with:

- Anemia
- Secondary and opportunistic infections
- Neoplasia
- Chronic inflammatory conditions
- Ocular Disorders
- Hematologic disorders

Specific diseases associated with very high rate of infection:

- Cutaneous abscesses (FeLV 8.8%, FIV 12.7%)<sup>8</sup>
- Oral inflammation (FeLV 7.3%, FIV 7.9%)<sup>12</sup>



**Similar to FIV, it is now thought that cats that become infected with FeLV remain infected for life.**

## Pathogenesis

► ► WEEKS TO MONTHS ► ►

### FeLV

#### Transmission

- Vertically from infected queens to kittens
- Horizontally among cats that live together or fight

#### Viremia

- Virus shed in saliva, nasal secretions, feces, milk and urine<sup>9,10</sup>

#### Viral Propagation to Other Tissues

- Targets lymphoid organs (thymus, spleen, lymph nodes)
- Immune response unable to clear infection

**Clinical Signs** Fever, lymphadenopathy, leukopenia

### FIV

#### Transmission

- Via bite wounds
- Horizontally among cats that live together is uncommon

#### Viremia

- High concentration in saliva

#### Viral Propagation

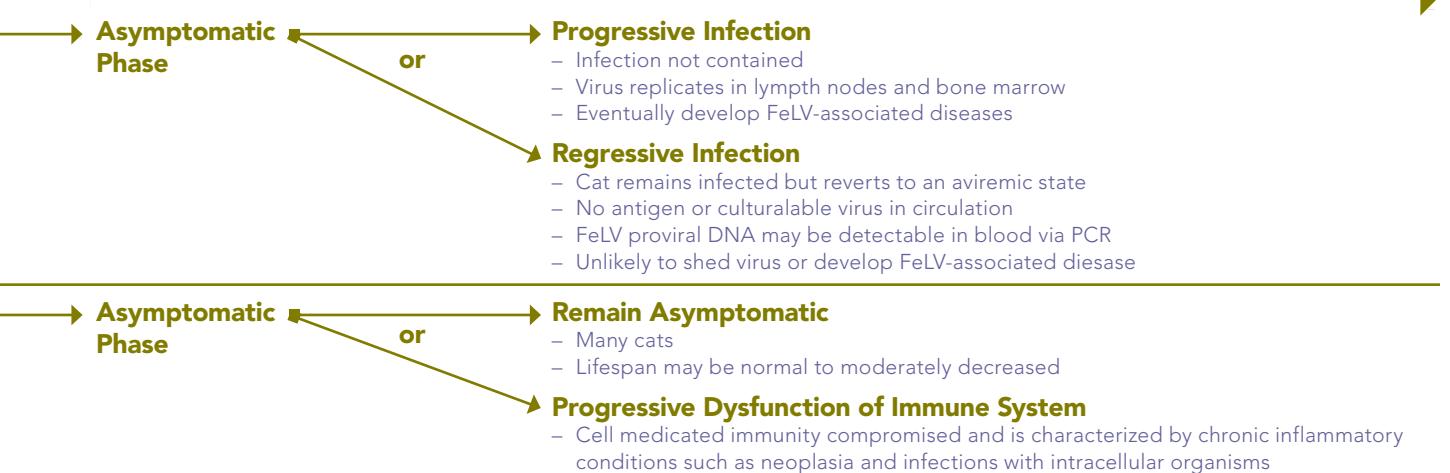
- Drop in Lymphocyte Count
- Inversion of T-lymphocyte ratio (CD4:CD8)
- Immune response unable to clear infection

**Clinical Signs** Fever, malaise, diarrhea

**Table – Risk factors for FeLV and FIV seropositivity in 18,038 cats tested at veterinary clinics and animal shelters in North America.**

Factor	Categories	No. of Cats Tested	FeLV No. with Positive Results (%)	FIV No. with Positive Results (%)
<b>Study Site</b>	Animal Shelter	8,068	124 (1.5)	141 (1.7)
	Veterinary Clinic	9,970	285 (2.9)	305 (3.1)
<b>Region</b>	West	3,737	39 (1.0)	72 (1.9)
	Canada	325	8 (2.5)	10 (3.1)
	South	6,359	144 (2.3)	183 (2.9)
	Northeast	3,747	107 (2.9)	79 (2.1)
	Midwest	3,870	111 (2.9)	102 (2.6)
<b>Source</b>	Clinic – Indoors Only	3,613	53 (1.5)	32 (0.9)
	Clinic – Outdoors Access	6,357	232 (3.6)	273 (4.3)
	Shelter – Relinquished Pet	2,809	41 (1.5)	38 (1.4)
	Shelter – Stray	4,550	71 (1.6)	75 (1.6)
	Shelter – Feral	709	12 (1.7)	28 (3.9)
<b>Age</b>	Juvenile	9,556	131 (1.4)	100 (1.0)
	Adult	8,482	278 (3.3)	346 (4.1)
<b>Sex</b>	Spayed Female	2,611	45 (1.7)	82 (1.2)
	Castrated Male	2,984	88 (2.9)	127 (4.3)
	Sexually Intact Female	6,588	128 (1.9)	44 (1.7)
	Sexually Intact Male	5,855	148 (2.5)	193 (3.3)
<b>Health Status</b>	Healthy	15,312	238 (1.6)	280 (1.8)
	Sick	2,726	171 (6.3)	166 (6.1)

### ► ► MONTHS TO YEARS ► ►



# Preventing FeLV and FIV Infection

Vaccines are available for both retroviruses. Both FeLV and FIV vaccines are non-core. Risk assessment of the individual animal should dictate their use. No vaccine is 100% effective and repeat testing should be performed as warranted.

## FeLV VACCINATION

The decision to vaccinate an individual cat against FeLV should be based on the cat's risk of exposure. Cats that live in a FeLV-negative, indoor environment are at minimal risk.

### FeLV vaccination is recommended for:

- ▶ all kittens because the lifestyles of kittens frequently change after acquisition and they may subsequently become at risk for FeLV exposure
- ▶ cats that go outdoors
- ▶ cats that have direct contact with cats of unknown status or in high turnover situations such as foster homes or other group housing
- ▶ cats that live with FeLV-positive cats

Because sufficient protection is not induced in all vaccinees, vaccination against FeLV does not diminish the importance of testing cats to identify and isolate those that are viremic. In addition, cats should be tested for FeLV infection before initial vaccination and whenever the possibility exists that they have been exposed to FeLV since they were last tested. Administering FeLV vaccines to cats confirmed to be FeLV-infected is of no value.

## FIV VACCINATION

The decision to vaccinate a cat for FIV is complicated. FIV vaccines may be considered for cats whose lifestyles put them at high risk of infection, such as outdoor cats that fight or cats living with FIV-infected cats. Because FIV infection is spread more by unfriendly exchanges, mainly biting, cats in households with a stable social structure are at lower risk for acquiring FIV infection.

### Current tests cannot distinguish vaccinated cats from infected cats.

Clients should be informed that vaccinated cats will have positive FIV test results, and the decision to vaccinate should be reached only after careful consideration of this implication. If the decision falls in favor of vaccination, cats should test negative immediately prior to vaccination.

A permanently placed identification microchip and collar are recommended for all cats to increase the chance of returning lost cats to their owners. Microchip databases can also record the veterinary care provider. This information can be used by animal shelters to help assess the significance of positive FIV test results when shelters screen cats prior to adoption.



## LIMITING TRANSMISSION

### In the Veterinary Practice

Retroviruses are unstable outside their host animals and can be quickly inactivated by detergents and routine disinfectants.<sup>13–17</sup> Simple precautions and routine cleaning procedures will prevent transmission of these agents in veterinary hospitals.

#### As a guide:

- ▶ All infected patients should be housed in individual cages and not in isolation/contagious wards where they may be exposed to infectious agents.
- ▶ Hospital staff should wash their hands between patients and after cleaning cages.
- ▶ Because FeLV and FIV can be transmitted in blood transfusions, donors should be tested prior to donating. A real-time PCR test for FeLV is also recommended for blood donors as proviral elements in seronegative cats with regressive FeLV infection may cause infection in transfusion recipients.
- ▶ Dental and surgical instruments, endotracheal tubes and other items potentially contaminated with body fluids should be thoroughly cleaned and sterilized between uses.
- ▶ Fluid lines, multi-dose medication containers and food can become contaminated with body fluids (especially blood or saliva) and should not be shared among patients.



### Limiting Transmission – At Home

- ▶ **Confine** – Infected cats should be confined indoors so they do not pose a risk of infection to other cats and so they are protected against infectious hazards in the environment.
- ▶ **Isolate** – The best method of preventing spread to other cats in the household is to isolate the infected cat from interacting with its housemates. Isolation to a separate room is recommended, but a simple screen or chain-link barrier is adequate. Generally, FIV transmission is low in households with stable social structures where housemates do not fight, but FeLV can still be transmitted via friendly interactions.
- ▶ **Don't Introduce** – If separation is not possible, no new cats should be introduced in the household to reduce the risk of territorial aggression.

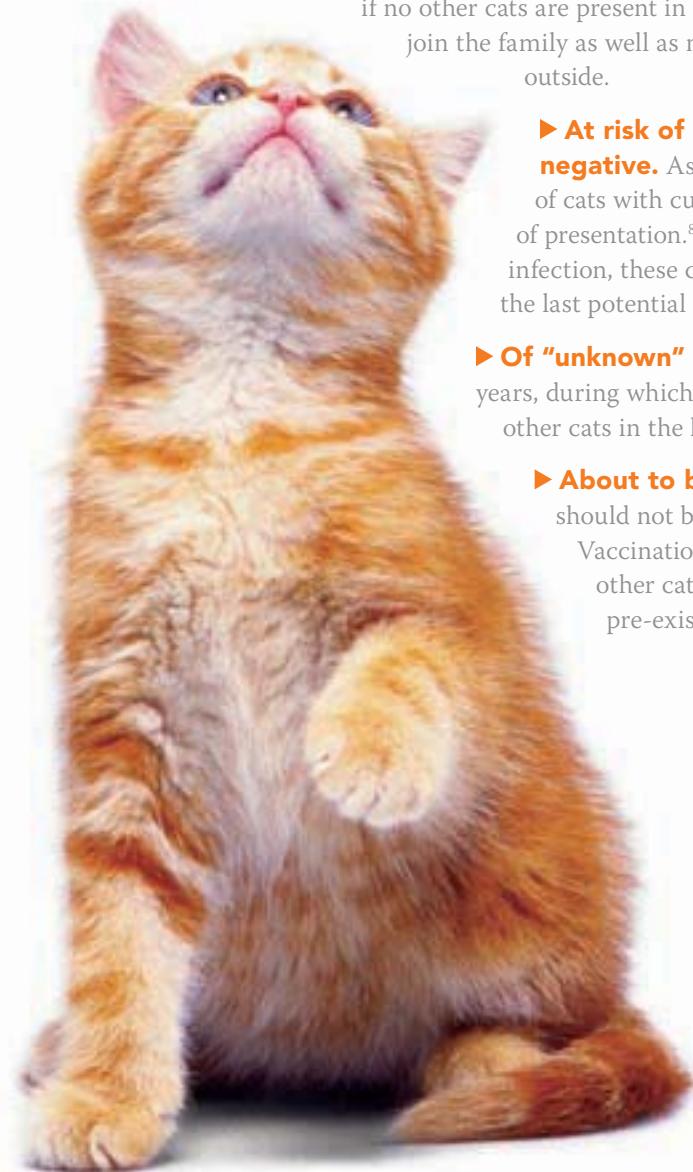
If owners choose not to separate retrovirus-infected housemates from their other cats, the uninfected cats should be considered for vaccination. Vaccinated cats should be isolated from infected cats for at least two months after the vaccine series is completed.

# Diagnosing FeLV and FIV

The retroviral status of all cats should be known because the serious health consequences of infection influence patient management both in illness and wellness care. Failure to identify infected cats may lead to inadvertent exposure and transmission to uninfected cats. Misdiagnosis of infection in uninfected cats may lead to inappropriate changes in lifestyle or even euthanasia.

## Cats should be tested when they are:

- ▶ **Sick, regardless of age, despite previous negative test results or previous vaccination.** These viruses are associated with a wide variety of health disorders.<sup>5,6</sup> Identification of retroviral infection as a complicating factor can assist in the development of optimal management plans.
- ▶ **About to be adopted, regardless of age, or brought into a new household.** Even if no other cats are present in the household, testing will protect future cats that may join the family as well as neighborhood cats should the pet escape or be allowed outside.
- ▶ **At risk of exposure even if their most recent test was negative.** As an example, a 2008 study showed that more than 19% of cats with cutaneous abscesses were FeLV or FIV positive at the time of presentation.<sup>8</sup> Because of delay in seroconversion following initial infection, these cats should also be re-tested (a minimum of 30 days after the last potential FeLV exposure and 60 days after potential FIV exposure).
- ▶ **Of “unknown” viral status.** Infected cats can remain asymptomatic for years, during which time they may serve as hidden sources of infection to other cats in the household.
- ▶ **About to be vaccinated against FeLV or FIV.** These vaccines should not be administered to cats that are already infected. Vaccination does not affect the carrier state, the capacity to infect other cats or the development of disease in cats with pre-existing infection.



## DIAGNOSIS OF FeLV

Soluble-antigen tests are preferred for initial screening. These include ELISA and other immunochromatographic tests.

While screening tests detect the presence of free antigen in the circulating blood, the IFA tests for the presence of antigen within infected white blood cells and platelets.

Positive results from tests that detect free antigen may be reflective of the transient period of antigenemia associated with regressive infections.

Positive results from tests that detect cell-associated antigen such as the IFA test are likely to be reflective of progressive infections.

Tests that use saliva and tears yield an unacceptable high percentage of inaccurate results and their use is not recommended.<sup>19</sup>

Although there are no published assessments of diagnostic accuracy of polymerase chain reaction (PCR) testing for FeLV, the test is offered by a number of commercial laboratories. Recent studies using real-time PCR have shown that 5-10% of cats negative on soluble antigen tests were positive for FeLV provirus by PCR (regressive infection).<sup>11, 20</sup>

## DIAGNOSIS OF FIV

FIV produces a persistent, life-long infection, so detection of antibodies in peripheral blood has been judged sufficient for routine diagnostic screening if the cat has not been previously vaccinated against FIV and has not acquired FIV antibodies in colostrum.<sup>21, 22</sup>

ELISA and other immunochromatographic tests are the preferred screening tests. Confirmation of positive screening tests should include a different method or at least an antibody test from a different manufacturer.<sup>23, 24</sup> Western Blot tests have been the recommended confirmation test in the past, but were found to be less sensitive and specific than in-clinic screening tests in one study.<sup>22</sup>

Vaccination of cats against FIV induces anti-FIV antibodies that cannot be distinguished from natural infection. These antibodies persist for at least one year and can be transferred in colostrum to kittens.

While polymerase chain reaction (PCR) assays may help distinguish cats infected with FIV from cats vaccinated against FIV, one study found marked variability in diagnostic accuracy among commercial laboratories.<sup>25</sup>

# FeLV Diagnostic Algorithm

## TEST INTERPRETATION

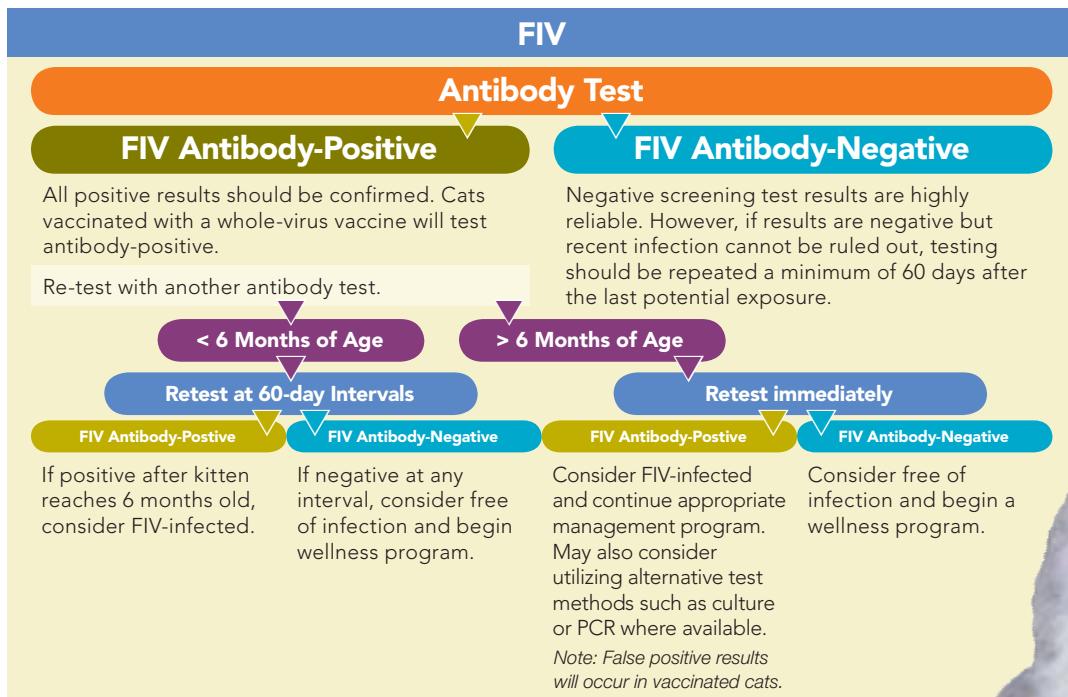


Negative results for either FeLV or FIV are much more reliable because of the low prevalence of infection in most cat populations.

**Positive test results should be confirmed**, especially in asymptomatic and low-risk cats. No test is 100% accurate all the time, under all conditions. In cat populations with a low prevalence, for example less than 0.5%, more than half of the cats that test positive are likely to be uninfected.<sup>26</sup>

# FIV Diagnostic Algorithm

## TEST INTERPRETATION



**Kittens may be tested for FeLV and FIV at any age.** Most kittens test negative, indicating no infection. Antibody tests for FIV can detect antibodies passed in colostrum from an infected or vaccinated mother, which can be mistaken for infection in the kitten. Kittens that test positive for FIV antibodies should be retested every 60 days up to 6 months of age and if the kitten becomes seronegative, it most likely is not infected. If results of tests performed after six months of age are still confirmed positive, these kittens should be considered infected.

**FeLV vaccinations will NOT induce positive test results.**

**FIV vaccinations WILL induce positive test results.**



# Managing Positive Cats

Both FeLV-infected and FIV-infected cats can live for many years and may succumb at older ages from causes unrelated to their retrovirus infections. In recent studies, the median survival after diagnosis of FeLV-infected cats was 2.4 years and for FIV-infected cats was 4.9 years.<sup>27</sup> Thus, a decision for treatment or for euthanasia should never be based solely on the presence of a retrovirus infection.

## MANAGING THE **HEALTHY** POSITIVE CAT

- Examinations should be performed at least twice a year and at each visit:
  - Update medical history. Monitor for any signs of weight loss.
  - Perform a thorough physical exam; pay close attention to lymph nodes, eyes and oral cavity.
  - Perform a complete blood count, biochemical analysis, urinalysis, and fecal examination at least once a year. FeLV cats may need a complete blood count twice a year.
  - Spay or neuter intact cats.
  - Control internal and external parasites.
  - Vaccinate as lifestyle indicates. Most retrovirus-infected cats mount adequate immune responses when vaccinated, and there is no need to modify standard vaccination intervals.<sup>28</sup> There is controversy about the use of inactivated versus modified-live vaccines. Current recommendations are to use inactivated vaccine products due to the theoretical risk of a modified-live product regaining its pathogenicity in cats with compromised immune systems.
  - Infected queens should not be bred and should be spayed if their condition is sufficiently stable to permit them to undergo surgery.



## MANAGING THE CLINICALLY ILL POSITIVE CAT

Prompt and accurate diagnosis is essential to allow early therapeutic intervention and a successful treatment outcome. Therefore, intensive diagnostic testing should proceed early in the course of illness for infected cats. Many cats infected with FeLV or FIV respond as well as their uninfected counterparts to appropriate medications and treatment strategies, although a longer or more aggressive course of treatment may be needed.

Few attempts have been made to evaluate anti-viral drugs, immunomodulators, or alternative therapies in large controlled studies of naturally infected cats. To date, no treatment has been shown to reverse well-established retrovirus infection in cats.

Clients with a healthy or ill retrovirus positive cat may be frightened by the initial diagnosis. It is important to alleviate these fears when appropriate and offer encouraging advice on the proper care and management of the cat.

### Advice for Pet owners



Watch closely for behavioral changes in the cat.



Confine cat indoors to prevent spread to other cats.



Feed a nutritionally balanced diet – avoid raw diets because of the risk of food-borne bacterial and parasitic infections.



Separate infected cats from uninfected housemates to eliminate the potential for transmission.



# **Shelter And Catteries**

## **Testing for FeLV and FIV in Shelters and Breeding Catteries**

**Here are general testing recommendations for shelters and breeding catteries:**

- As for pet cats, it is ideal for all cats in shelters and catteries to be tested for FeLV and FIV.
- Testing at admission is optional for singly-housed cats in shelters, but all cats in breeding catteries should be tested.
- Testing is highly recommended for group-housed cats.
- If not performed prior to adoption, testing should be recommended to the new owner before exposure to other cats.
- Testing should be repeated 60 days after the initial test and annually for cats kept in long-term group housing.
- Each cat should be individually tested. Testing representative kittens in a litter or colony and extrapolating results to other cats in the group is unreliable. Procedures such as pooling multiple samples for use in a single test reduce test sensitivity and should not be performed.
- Both foster families and adopters should have their own resident cats tested prior to fostering or adopting a new cat.
- Testing is optional in feral cat trap-neuter-return programs.

Because currently no test can distinguish FIV antibodies induced by infection compared to those induced by vaccination, shelters have the difficult task of determining the true infection status of stray cats that are admitted without medical histories and that test positive for FIV antibodies. In some cases, the history of FIV vaccination may be obtained by using microchip information to locate the veterinary care provider. However, even if cats are known to have been vaccinated against FIV, determining whether they are or are not also infected is not usually possible. This is a challenge for shelters for which no current solution exists.

## **Prevention of FeLV and FIV Transmission in Shelters and Catteries**

### **Control Recommendations:**

- FeLV vaccination is optional for singly housed cats.
- Cats should test negative prior to vaccination.
- FeLV vaccination is highly recommended for all cats housed in groups and for both foster cats and permanent residents in foster homes.
- In catteries that follow testing guidelines and maintain retrovirus-negative status, vaccination against FeLV and FIV is not necessary.
- Vaccination is not 100% effective and should never be used in place of a test and segregate program.
- In contrast to the case for feline panleukopenia, herpesvirus and calicivirus vaccines, the value of a single FeLV vaccine for feral cats has not been determined. Therefore, FeLV vaccination is not recommended for feral cat trap-neuter-return programs if program resources are needed for higher priorities.
- FIV vaccination is not recommended for use in shelters or feral cats.
- Strict adherence to universal precautions is required to prevent iatrogenic transmission of retroviruses in the shelter environment via contaminated equipment and secretions.



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- ▶ Vaccination Guidelines

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A message from the American Association of Feline Practitioners.

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