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VITAL VACCINATION SERIES

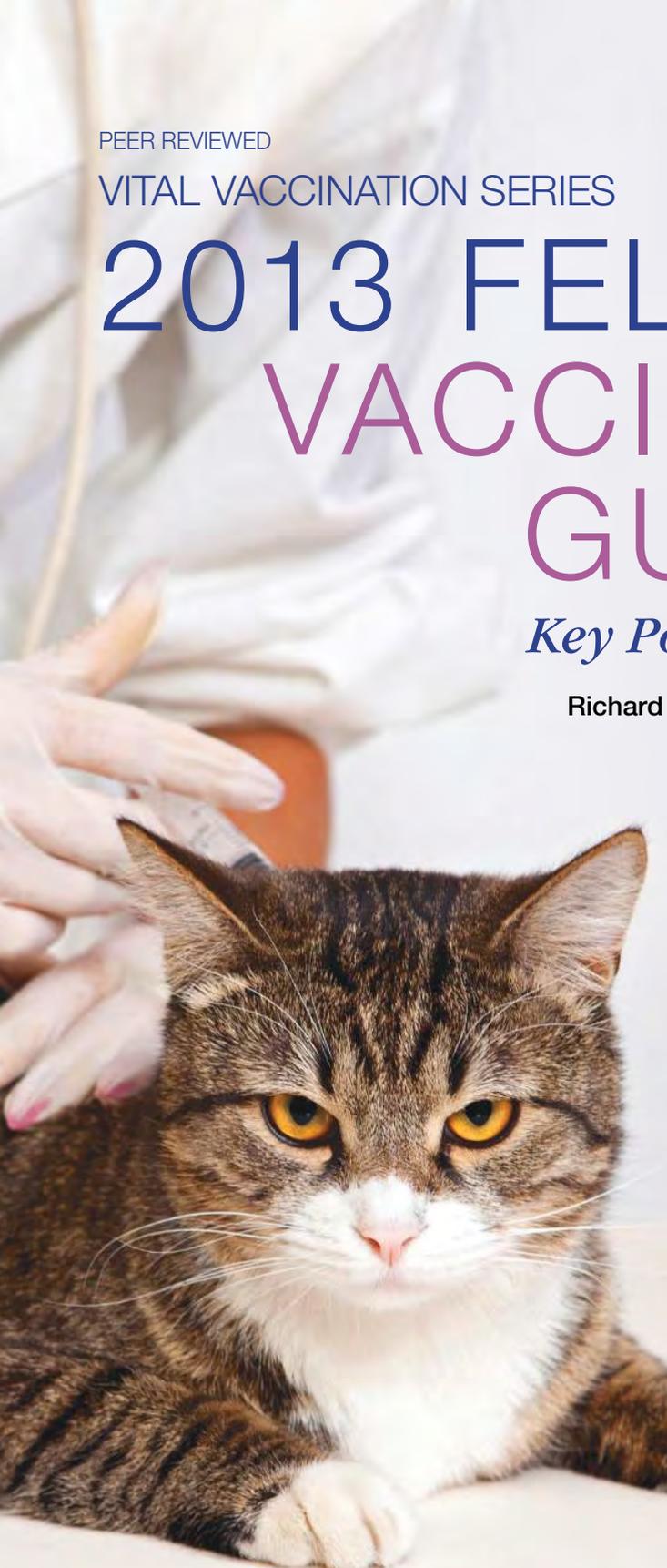
# 2013 FELINE VACCINATION GUIDELINES



Feline  
Friendly  
Article

## *Key Points for Veterinary Practice*

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In September 2013, the American Association of Feline Practitioners (AAFP) released an updated version of the Feline Vaccination Advisory Panel (FVAP) Report in a continuing effort to provide guidelines on the selection and use of vaccines for cats. The revised report is currently available at [catvets.com](http://catvets.com) (search Guidelines) for no cost. AAFP membership is not a pre-requisite for accessing the report.

The 2013 AAFP Feline Vaccination Advisory Panel Report<sup>1</sup> is organized in such a way as to provide practical insights on making vaccination decisions in practice. Recommendations likely to be of particular interest to practicing veterinarians include:

- Vaccination recommendations (core and noncore vaccines)
- Additional considerations when vaccinating pet cats
- Recommendations for pre-vaccination testing
- Vaccine adverse events (reactions), including injection-site sarcoma
- Vaccination site recommendations
- Legal considerations associated with vaccination.

The report includes an Appendix that addresses a series of frequently asked questions appropriate to vaccinating household pets, shelter-housed cats, and cats managed through trap–neuter–release programs.

### VACCINATION RECOMMENDATIONS

The 2013 AAFP Feline Vaccination Advisory Report reviews recent scientific literature and outlines feline vaccination recommendations suitable for most cats. It must be emphasized that the report is not intended to represent a general protocol for vaccination of all cats; instead, it is intended to guide the development and implementation of safe and effective vaccination protocols.

Veterinarians practicing in North America are faced with a wide spectrum of feline vaccine choices (Table 1). Implementing a rational feline vaccination protocol is made more complex by:



Read Dr. Ford's **Canine Vaccination Guidelines: Key Points for Veterinary Practice** (September/October 2012) at [todaysveterinarypractice.com](http://todaysveterinarypractice.com).

- Determining realistic risk for exposure among individual patients
- Selecting from various vaccine types (inactivated, attenuated, recombinant)
- Deciding which combination products to use
- Evaluating varying durations of immunity and safety issues.

Lifestyle is a fundamentally important variable in vaccination decisions made for many cats. Vaccination protocols can vary significantly among pet cats within the same practice. For this reason, the report offers specific recommendations based on lifestyle and identifiable risk factors unique to individual cats.

**CORE VACCINES**

Core vaccines are those that should be administered to all cats seen in the practice. The FVAP identifies the following vaccines as core for cats in North America:

- Feline calicivirus (FCV)
- Feline herpesvirus-1 (FHV-1)
- Feline leukemia virus (FeLV): For all kittens/cats up to 1 year, following completion of initial 2 doses
- Feline parvovirus (panleukopenia) (FPV)
- Rabies virus.

**Initial Vaccination of Kittens**

With the exception of rabies, the first dose of core vaccine (FPV + FHV-1 + FCV) can be administered as early as 6 weeks of age; then every 3 to 4 weeks until 16 to 20 weeks of age (Table 2, page 71), despite manufacturer recommendations to administer 2 initial doses at 9 and 12 weeks of age. The recommendation to administer the last dose in the initial series as late as 16 to 20 weeks of age is based on: (1) ensuring protective immunity at a time of life when risk of exposure to pathogenic viruses is especially high<sup>2,5</sup> and (2) minimizing the risk of vaccine interference by maternally derived antibodies.

All cats should receive the first booster dose of core vaccines 1 year following completion of the initial series.



**KEY POINT:** Regardless of the product used, all kittens should receive a final dose of the initial series of core vaccines (FPV + FHV-1 + FCV) at (or as close as feasible to) 16 to 20 weeks of age.

**Rabies Vaccination**

Because the report was written for an international audience, and some countries (eg, the United Kingdom) are

TABLE 1. FELINE CORE & NONCORE VACCINES

<b>FELINE CORE VACCINES</b>	<b>Feline parvovirus</b>
	<ul style="list-style-type: none"> <li>• Attenuated, nonadjuvanted</li> <li>• Inactivated, adjuvanted</li> </ul>
	<b>Feline herpesvirus-1 + feline calicivirus</b>
	<ul style="list-style-type: none"> <li>• Combined; attenuated, nonadjuvanted</li> <li>• Combined; inactivated, adjuvanted</li> </ul>
<b>FELINE NONCORE VACCINES</b>	<b>Rabies (U.S. and Canada)</b>
	<ul style="list-style-type: none"> <li>• Recombinant, nonadjuvanted</li> <li>• Inactivated, adjuvanted</li> </ul>
	<b>Feline leukemia virus (kittens)</b>
	<ul style="list-style-type: none"> <li>• Recombinant, nonadjuvanted</li> <li>• Inactivated, adjuvanted</li> </ul>
	<i>Note: Feline leukemia vaccination is recommended for all kittens.</i>
	<b>Feline leukemia virus (adult cats)</b>
<ul style="list-style-type: none"> <li>• Recombinant, nonadjuvanted</li> <li>• Inactivated, adjuvanted</li> </ul>	
<b>Feline immunodeficiency virus*</b>	
<ul style="list-style-type: none"> <li>• Inactivated, adjuvanted</li> </ul>	
<b>Feline Chlamydophila felis (formerly, Chlamydia psittaci)</b>	
<ul style="list-style-type: none"> <li>• Avirulent live, nonadjuvanted</li> <li>• Inactivated, adjuvanted</li> </ul>	
<b>Bordetella bronchiseptica</b>	
<ul style="list-style-type: none"> <li>• Intranasal only</li> <li>• Avirulent live bacteria, nonadjuvanted</li> </ul>	
<b>Virulent systemic calicivirus</b>	
<ul style="list-style-type: none"> <li>• Inactivated, adjuvanted</li> </ul>	
<b>Feline coronavirus (feline infectious peritonitis virus)</b>	
<ul style="list-style-type: none"> <li>• Provides limited or no protection against feline infectious peritonitis virus infection</li> </ul>	

*\*Note: Vaccination is expected to create sustained (years) false-positive antibody test results. Kittens, 6 months of age or younger, may develop a false-positive test result if they nurse from a vaccinated queen (maternally derived antibodies). At this time, there is no test that can consistently and reliably distinguish between vaccinated and nonvaccinated cats. The report recommends that any cat receiving the FIV vaccine be identified with a microchip or tattoo.*

rabies free and do not permit routine vaccination of household cats, rabies vaccine is listed as noncore. However, for veterinarians practicing in the U.S. and Canada, rabies vaccine should be considered core. A single dose is recommended for all cats at 12 or 16 weeks of age or in accordance with state, provincial, or local law.

In locations that do not require rabies vaccination for cats, the FVAP recommends administering a single dose to all cats no less than 12 weeks (3 months) of age. All cats should receive a single dose of rabies vaccine within 1 year following the initial dose, regardless of the cat's age at the time the initial dose was administered.

Both inactivated (adjuvanted) vaccines and a recombinant (non-adjuvanted) rabies vaccine are licensed for use in cats in the U.S. and Canada. At this writing, the recombinant feline rabies vaccine must be administered annually

and may be used interchangeably with a 1-year inactivated rabies vaccine.

- Rabies vaccine should not be administered to cats less than 12 weeks of age.<sup>6</sup>
- Initial vaccination does not provide immediate immunity against rabies. In most U.S. states that require rabies inoculation, a cat is not legally immunized until 28 days following initial vaccination.<sup>6</sup>
- In several states, rabies vaccination for cats is not required. Within these states, however, local (city or county) ordinances may exist.
- Where no state, provincial, or local ordinance exists, veterinarians are encouraged to recommend rabies vaccination in all cats<sup>6</sup>; a suggested protocol is outlined in **Table 2**.

### **Feline Leukemia Vaccination**

Compared to adult cats, kittens have a significantly greater risk for developing progressive disease (clinical illnesses associated with immune suppression and persistent viremia) if infected with FeLV.<sup>7,9</sup> Therefore, in addition to FPV, FHV-1, FCV, and rabies, the FVAP recommends that kittens receive 2 doses of FeLV vaccine, 3 to 4 weeks apart, no earlier than 8 weeks of age. A third dose should be administered 1 year following the initial 2-dose series.

### **Revaccination Intervals in Adult Cats**

The FVAP recommends core vaccines (FPV + FHV-1 + FCV) be administered to adult cats at intervals of 3 years. Whether or not core vaccines are administered annually or triennially to adult cats is left to the discretion of the individual clinician.

### **Rabies Vaccination**

Where rabies vaccination is required, a single dose of rabies vaccine should be administered within 1 year following administration of the first dose. Depending on local/state requirements, veterinarians usually have discretion to administer a 1-year or 3-year rabies vaccine to adult cats. The duration of immunity, however, is contingent on product labeling (1 year or 3 years).<sup>6</sup>

### **Feline Leukemia Vaccination**

In adult cats, FeLV vaccination is considered to be noncore. Therefore, the decision to continue FeLV vaccination into adult life depends on the lifestyle of the individual cat and assessment of exposure risk. Adult cats at risk for FeLV exposure should be vaccinated with a single dose every 1 to 2 years as long as the risk is sustained. FeLV vaccination is not recommended for adult cats kept strictly indoors.

### **NONCORE VACCINES**

Feline vaccines designated as noncore, or optional, are listed in **Table 1**. The decision whether to administer a noncore vaccine is at each veterinarian's discretion but should be based on reasonable assessment of risk for exposure to a pathogenic virus or bacteria.

### **ADDITIONAL CONSIDERATIONS FOR PET CATS**

#### **Indoor/Outdoor Pet Cats**

- In addition to core vaccine (FPV + FHV-1 + FCV) administration, rabies and FeLV vaccination should be considered for cats of any age that spend a significant amount of time outdoors (unsupervised and not within an enclosure).
- Strictly indoor cats co-housed with indoor/outdoor cats also have increased risk for exposure; therefore, vaccination against rabies and FeLV for these cats should be considered.
- Because feline immunodeficiency virus (FIV) vaccination will cause false-positive test results (serology) for several years, all cats receiving this vaccine should be appropriately identified (eg, microchip or tattoo).
  - » Note that the FIV vaccine does not provide complete protection from exposure.
  - » A vaccinated cat can become infected with FIV and, subsequently, become a long-term shedder.
  - » An FIV vaccinated cat can have a true-positive test if it has antibodies and is virally infected.

#### **Pet Cats Entering Boarding Facilities**

- It is generally recommended that cats scheduled for boarding receive a single dose of core vaccines (FPV + FHV-1 + FCV) 7 to 10 days prior to entering a boarding facility *if they have not received a booster dose within the previous year*.
- When feasible, kittens scheduled for boarding should receive at least 2 doses of vaccine, with the last dose administered 7 to 10 days prior to entry.
- The FVAP also recommends that kittens be isolated from the adult cat population at all times if boarding is necessary.

#### **Vaccination During Pregnancy/Lactation**

- It is generally not recommended to vaccinate cats known to be pregnant or lactating. Attenuated FPV vaccine has been linked to cerebellar hypoplasia in kittens from queens vaccinated during pregnancy.
- In the event vaccination of a pregnant or lactating queen is deemed necessary, an inactivated product should be administered.

#### **Cats Overdue for Revaccination**

- Regardless of the time elapsed since the last dose of a core vaccine, a single dose of (multivalent) vaccine is generally considered sufficient to boost a healthy cat's immunity.
- Duration of immunity following FeLV vaccination of healthy cats has not been extensively studied. While the FVAP recommends revaccination intervals of 1 or 2 years depending on risk, cats 3 or more years overdue for an FeLV booster and considered at risk may benefit from administration of 2 doses, 2 to 4 weeks apart.
- Generally, cats that are overdue by 2 or more years for a noncore vaccine should receive 2 doses, 2 to 4 weeks apart.

TABLE 2. SUMMARY RECOMMENDATIONS FOR VACCINATION OF PET CATS

Vaccine	Initial Vaccination	Revaccination
<b>CORE VACCINES</b>		
<b>Panleukopenia (MLV) + Herpesvirus-1 (MLV) + Calicivirus (MLV)</b>	<ul style="list-style-type: none"> <li>Administer single dose as early as 6 weeks of age; then, every 3 to 4 weeks until 16 to 20 weeks of age.</li> <li>Attenuated (MLV) vaccine is recommended over inactivated (killed) vaccine.</li> <li>FPV + FHV-1 + FCV (MLV) and FHV-1 + FCV (MLV) are also available for intranasal administration.</li> </ul>	<ul style="list-style-type: none"> <li>Administer first booster dose 1 year following completion of initial series.</li> <li>Then administer every 3 years thereafter.</li> </ul>
<b>Rabies</b> » <b>Recombinant or</b> » <b>1-year inactivated</b>	<ul style="list-style-type: none"> <li>Administer single dose at 12 <i>or</i> 16 weeks of age.</li> <li>Do NOT administer prior to 12 weeks of age.</li> <li>State, provincial, or local laws may apply.</li> </ul>	<ul style="list-style-type: none"> <li>Administer single dose of 1-year labeled vaccine within 1 year following initial dose.</li> <li>Administer annually thereafter.</li> </ul>
<b>Rabies</b> » <b>3-year inactivated</b>	<ul style="list-style-type: none"> <li>Some locations permit substituting a 3-year labeled vaccine for a 1-year vaccine.</li> <li>If used in initial vaccination series, administer single dose at 12 or 16 weeks of age.</li> <li>Do NOT administer prior to 12 weeks of age.</li> <li>State, provincial, or local laws may apply.</li> </ul>	<ul style="list-style-type: none"> <li>Administer single dose of 3-year labeled vaccine within 1 year following initial dose.</li> <li>Administer every 3 years thereafter.</li> </ul>
<b>Feline leukemia virus (kittens)</b> » <b>Recombinant or</b> » <b>1-year inactivated</b>	<ul style="list-style-type: none"> <li>Administer 2 doses, 3 to 4 weeks apart, as early as 8 weeks of age.</li> </ul>	<ul style="list-style-type: none"> <li>Administer single dose 1 year following completion of initial series.</li> </ul>
<b>NONCORE VACCINES</b>		
<b>Feline leukemia virus (adults)</b> » <b>Recombinant or</b> » <b>Inactivated</b>	<ul style="list-style-type: none"> <li>For adult cats with no prior FeLV vaccination history.</li> <li>Administer 2 doses, 3 to 4 weeks apart, if indicated.</li> </ul>	<ul style="list-style-type: none"> <li>If risk of exposure exists, administer single dose every 1 to 2 years thereafter.</li> </ul>
<b>Feline immunodeficiency virus</b> » <b>Inactivated</b>	<ul style="list-style-type: none"> <li>Administer 3 initial doses, 2 to 4 weeks apart, if indicated.</li> </ul> <p><i>Note: Vaccination causes false-positive FIV test results for several years with ALL commercial FIV tests. Kittens nursing from a vaccinated cat may also have false-positive tests. This vaccine has limited indications in practice.</i></p>	<ul style="list-style-type: none"> <li>Manufacturer recommends annual revaccination of cats at risk for exposure.</li> </ul>
<b>Feline Bordetella bronchiseptica</b> » <b>Avirulent live bacteria</b>	<ul style="list-style-type: none"> <li>Administer single dose intranasally as early as 4 weeks of age, if indicated.</li> </ul> <p><i>FOR INTRANASAL ADMINISTRATION ONLY</i> <i>This vaccine has limited indications in practice.</i></p>	<ul style="list-style-type: none"> <li>Booster annually, if risk of exposure is present.</li> </ul>
<b>Feline Chlamydomphila felis</b> » <b>Avirulent live bacteria</b> » <b>Inactivated</b>	<ul style="list-style-type: none"> <li>Administer 2 doses, 3 to 4 weeks apart, if indicated.</li> </ul> <p><i>This vaccine has limited indications in practice.</i></p>	<ul style="list-style-type: none"> <li>Booster annually, if risk of exposure is present.</li> </ul>
<b>Virulent systemic calicivirus</b> » <b>Inactivated</b>	<ul style="list-style-type: none"> <li>Administer 2 doses, 2 to 4 weeks apart, if indicated.</li> </ul> <p><i>This vaccine has limited indications in practice.</i></p>	<ul style="list-style-type: none"> <li>Booster annually, if risk of exposure is present.</li> </ul>

**Note:** This table summarizes vaccination guidelines for most pet cats seen in general practice. Since lifestyles and, therefore, exposure risk of individual cats vary considerably, veterinarians should consult the full text of the 2013 AAAP Vaccination Advisory Panel Report<sup>1</sup> for further information.

MLV = modified-live virus



**KEY POINT:** Because distinguishing indoor/outdoor cats from indoor only cats can be difficult in practice, discrete vaccination recommendations targeting these 2 groups have not been written. However, it should be noted that cats living predominantly indoors (indoor only) should still receive core vaccines at the recommended initial and revaccination intervals.

## PREVACCINATION TESTING

### Infectious Disease Testing

If FeLV or FIV vaccination is recommended to a client, the cat should be tested for FeLV antigen and FIV antibody prior to vaccination. Testing for disease presence prevents future questions regarding how a well vaccinated cat developed an infection.



**KEY POINT:** There is no benefit associated with administering an FeLV or FIV vaccine to a cat that is, respectively, FeLV or FIV positive.

### Antibody Titer Measurement

Veterinarians have questioned the rationale of measuring antibody titers in lieu of routine revaccination of adult cats.

- Generally, cats that have a positive antibody titer to FPV are considered to be immune and protected if exposed.<sup>10-12</sup>
- Although some laboratories offer serology testing for FHV-1 and FVC, titers do not correlate well with protective immunity and are not routinely recommended.<sup>13</sup>
- Antibody titers for FeLV and FIV are not reliable indicators of immunity.
- Antibody titers for rabies are only valid as an indication of serologic response to prior vaccination; they are not recognized as an index of immunity in lieu of revaccination.<sup>6</sup>



**KEY POINT:** The FVAP recommends routine revaccination at defined intervals rather than measuring antibody titers to assess immunity.

## VACCINE ADVERSE EVENTS

Vaccine adverse events (adverse reactions) are considered rare; however, vaccination cannot be considered risk free. Only limited information is available on the occurrence, type, and frequency of acute-onset reactions in cats following vaccine administration. However, extensive information is available on one of the most serious delayed-onset vaccine reactions—feline injection-site sarcoma (FISS).

### Acute-Onset Reactions

The majority of reported feline acute-onset vaccine adverse reactions occur within 3 days postvaccination, including:

- Lethargy (with or without fever)
- Injection site pain/swelling
- Vomiting and/or diarrhea
- Facial edema (angioedema)
- Pruritus
- Collapse.

Fatal acute anaphylaxis is a possible, although rare, event following vaccination. Reports on its frequency range from 0.23% to 0.52%.<sup>14-17</sup>

### Feline Injection-Site Sarcoma

FISS is a delayed-onset reaction that epitomizes the complexity involved with attributing a serious or fatal disease to a vaccine administered months or years ago.

Reports on the frequency of FISS associated with vaccination vary significantly, although overall prevalence is low.<sup>18</sup> Epidemiologic studies, however, are complicated by several factors, including:

- Lack of an effective reporting system
- Variation in time-of-onset following vaccination (months to years)
- Practice of administering multiple vaccines at the same appointment
- Fact that sarcoma development in cats is not uniquely linked to vaccine administration.

Although a causal relationship between tumorigenesis and administration of rabies and FeLV vaccination has been established,<sup>19</sup> the relationship between vaccine type or brand and risk of sarcoma development has not been definitively established.<sup>20-23</sup>

## VACCINATION SITE RECOMMENDATIONS

Vaccination site recommendations outlined in the report are not based on preventing FISS development. Instead, they allow veterinarians to surgically manage the tumor—by amputation—if a cat develops a sarcoma at a vaccination site.

- The FVAP recommends that all vaccines be administered subcutaneously (SC), unless mucosal (intranasal) administration is indicated. Although tumor risk is the same between intramuscular and SC vaccine administration, if one develops, it is typically detected earlier in cats vaccinated SC.
- The following sites are suggested for vaccine administration:\*
  - » FPV/FHV-1/FCV (multivalent): Below the right elbow
  - » FeLV: Below the left stifle
  - » Rabies: Below the right stifle.
- If a tumor does develop at the injection site, long-term survival may be improved by amputation of the affected limb.\*

*\*Data have not been published that support these recommendations; therefore, they should not be interpreted as requirements. Also note that licensing studies for parental feline vaccines are generally conducted in cats that*

### INTERNATIONAL OUTLOOK

The 2013 AAFP Feline Vaccination Advisory Panel Report has been written for the international community of practicing veterinarians. For this reason, note that some of the vaccines referenced are not available in the U.S. or Canada (eg, *Microsporium canis* [dermatophyte] vaccine). Additionally, categorizing rabies vaccine as noncore is based on the fact that, in rabies free countries (eg, United Kingdom), veterinarians do not administer this vaccine to dogs or cats. Dogs and cats in the U.S., Canada, or Mexico, however, should receive this vaccine as part of their core vaccinations.

*receive vaccines administered SC in the interscapular region; other administration sites have not been evaluated during vaccine safety and efficacy studies.*

### LEGAL CONSIDERATIONS

With the exception of those locations where state, provincial, or local ordinance requires rabies vaccination in cats, veterinarians do have significant discretion in the selection and use of vaccines in cats and are permitted to use professional judgment when making vaccination recommendations.

- Despite the fact that most manufacturers recommend annual vaccination (per package inserts), veterinarians can use discretion when recommending administration of core vaccines annually or every 3 years.
- Where feline rabies vaccination is required, veterinarians must adhere to requirements.
- Current recommendations strongly encourage veterinarians to document vaccine administration in patients' permanent medical records. ■

AAFP = American Association of Feline Practitioners; FCV = feline calicivirus; FeLV = feline leukemia virus; FHV-1 = feline herpesvirus-1; FISS = feline injection-site sarcoma; FIV = feline immunodeficiency virus; FPV = feline parvovirus (also, feline panleukopenia); FVAP = Feline Vaccination Advisory Panel; SC = subcutaneous

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