

Vaccines & Vaccination: Updates & Insights

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In 1996 a group of academicians and feline practitioners met in an attempt to outline recommendations for implementing vaccination protocols in cats. At the time, we were concerned with a series of publications highlighting that, at least in some cats, feline leukemia and rabies vaccines were causally associated with fibrosarcoma and death...a vaccine ‘adverse event’ that, at least to us, seemed unacceptable. If recommendations could be written that were consistent with good immunization practices (and protection), yet requiring fewer vaccine doses over the lifetime of the cat, perhaps it would be possible to reduce the risk of what was being called at the time: Vaccine Associated Sarcoma, or VAS. This culminated in the first set of Feline Vaccination Guidelines, published in 1998, that included recommendations for administration of fewer doses of vaccine over the lifetime of the cat while introducing terms such as “core” vs. “non-core” and triennial vs. annual boosters.

Since 1998, various iterations of vaccination guidelines have been published for the dog and the cat. The focus has always been to develop recommendations, based on current science, which would support efforts by veterinarians to implement rational vaccination protocols in practice. What’s more, regional variations in infectious disease prevalence and vaccine availability have driven development of vaccination guidelines for the United Kingdom, Europe, and Asia, as well as North America. A task force has recently been formed to write companion animal vaccination guidelines for Latin America. Clearly, *Vaccination Guidelines are going “global”*.

While veterinarians are encouraged to incorporate published recommendations into vaccination protocols, there is no requirement to do so. These are simply recommendations. Rabies vaccination is the only exception...where rabies immunization laws are in place, veterinarians are expected to follow a vaccination protocol that is consistent with law.

This year’s manuscript includes a summary of current canine (2011) and feline (2013) vaccination guidelines for the US and Canada (see **Tables 1 and 2**), updates on new vaccines that have entered the market since Guidelines were published (eg, canine influenza virus strains H3N8 and H3N2), as well as practical recommendations for dogs/cats that are **overdue for a booster**. Given the unprecedented number of vaccines available for use in companion animals, an additional section describing known vaccine adverse reactions, along with recommendations managing these reactions has been included.

(Given the number of new companion animal vaccines that have, and will enter, the market in 2016-2017, the AAHA Vaccine Guidelines Task Force is currently in the process of updating Canine Vaccination Guidelines...the next iteration of vaccination Guidelines is planned to be published in an online format. In this way, “real-time” updates on new vaccines and recommendations can be provided in a timelier manner.)

NOTE: *Published vaccination recommendations for the dog and cat are based, whenever possible, on the results of current scientific studies. The reader is reminded, however, that for some of the recommendations offered, published studies are simply not available. Furthermore, not all recommendations published in the Canine (AAHA) and Feline (AAFP) Vaccination Guidelines fall within the manufacturers’ label recommendations.*

TABLE 1: INITIAL VACCINATION of PUPPIES/DOGS

CORE Vaccines	Administration	Booster Recommendations
<p>Combination product administered as:</p> <p>MLV <i>or</i> Recombinant Canine Distemper Virus + MLV Parvovirus + MLV Adenovirus-2</p> <p>OPTION: May also include MLV Canine Parainfluenza Virus.</p>	<p>3 (to 4) doses are recommended between 6 and <u>18-20 weeks of age</u>.</p> <p><u>Example:</u> 8 weeks; and 12 weeks; 16 weeks, <u>AND</u>, a final dose at 18 to <u>20 weeks</u> of age. (NEW)</p> <p>NOTE: Serologic data (unpublished: U of Wisconsin) on young dogs (n = >1200) indicates maternally derived antibody interferes with both Distemper and Parovirus immunization in approx. 15% dogs at 16 weeks of age. (all dogs studied were personally owned pets examined in private practice).</p>	<p>Administer a single dose (of a combination product) not later than 1 year following the last dose in the initial series.</p> <p>NOTE: a minimum interval of 2 weeks between any 2 doses of vaccine is recommended.</p> <p>Administer subsequent boosters every 3 years (or longer).</p>
<p>Rabies (killed)</p> <p>1-Year & 3-Year vaccines are available.</p>	<p>A single dose of rabies vaccine is usually administered 12 <u>or</u> 16 weeks of age.</p> <p>(State/Local/Provincial law applies)</p>	<p>Schedule a second dose to be administered not later than 1 year following administration of the 1st dose, <i>regardless of the dog's age at the time the <u>initial</u> dose is given.</i></p> <p>Then...every 3 years thereafter.</p> <p>(State/Local/Provincial law applies)</p>
NON-CORE Vaccines	Administration	Booster Recommendations
<p><i>B. bronchiseptica</i> + canine parainfluenza virus (intranasal only)</p> <p>(some IN products may also contain CAV-2 antigen)</p>	<p>Single intranasal (IN) dose at 12 or 16 weeks of age. (optional-some authors recommended 2 doses at 12 <u>and</u> 16 weeks of age).</p> <p>IN vaccine may be administered as early as 3 to 4 weeks of age.</p>	<p>Where risk of exposure is sustained, administer a single dose 1 year following the last dose administered then every year thereafter.</p>
<p><i>B. bronchiseptica</i> only (monovalent)</p> <p>Three (3) options are available:</p> <p>> Parenteral (killed-bacterin) – or- > Intranasal (avirulent live) -or- > Intraoral (avirulent live).</p>	<p><u>Parenteral (SQ):</u> Two doses are required, 2 to 4 weeks apart.</p> <p><u>Intranasal (IN):</u> The manufacturer recommends a single initial dose.</p> <p><u>Intraoral:</u> The manufacturer recommends a single initial dose.</p>	<p>Where risk of exposure is sustained, administer a single dose 1 year following the last dose administered, then every year thereafter.</p>

<p>Leptospirosis (killed) 4-serovar</p> <p>NOTE: <i>routine use of a 2-serovar Leptospirosis vaccine is not recommended.</i></p>	<p>2 initial doses, 2 to 4 weeks, are required regardless of the dog's age.</p> <p>NOTE: <i>it is not recommended to administer the 1st dose prior to 12 weeks of age.</i></p> <p>NOTE: <i>Small Breed Dogs (< 20 pounds): consider delaying initial doses until the CORE vaccine series has been completed.</i></p>	<p>Where risk of exposure is sustained, administer a single dose 1 year following completion of the <i>initial</i> 2-dose series, then every year thereafter.</p>
<p>Lyme Disease (recombinant or killed or Chimeric/Recombinant crLyme)</p>	<p>2 initial doses, 2 to 4 weeks, are required regardless of the dog's age.</p> <p>NOTE: <i>Small Breed Dogs (<20 pounds): consider delaying initial doses until the CORE vaccine series has been completed.</i></p>	<p>Where risk of exposure is sustained, administer a single dose 1 year following completion of the <i>initial</i> 2-dose series, then every year thereafter.</p> <p>OPTION: For dogs residing in endemic regions, administration of the first booster 6 months following completion of the initial 2-dose series is a reasonable alternative schedule. An additional booster is recommended at 1 year following completion of the initial series with annual vaccination recommended thereafter.</p>
<p>Canine Influenza Virus (H3N8) (killed)</p> <p style="text-align: center;">-and-</p> <p>Canine Influenza Virus (H3N2) (killed)</p>	<p>2 initial doses, 2 to 4 weeks apart are required.</p>	<p>Where risk of exposure is sustained, administer a single dose 1 year following completion of the <i>initial</i> 2-dose series, then every year thereafter.</p>

NOTE: Canine coronavirus vaccination is not recommended.

NOTE: *Crotalus atrox* (Western Diamondback rattlesnake) vaccine should only be used in dogs with a defined risk for exposure. Follow the manufacturer's recommendations for dosing.

Overdue for Vaccination

Studies focused on dogs that are overdue for routine vaccination have not been published. The following recommendations represent expert opinion and are intended to provide a practical approach to immunizing dogs when conventional vaccination guidelines have not been followed:

Overdue during the initial vaccine series: While most practices administer the initial core vaccine series to young dogs at intervals of 3 to 4 weeks, dogs exceeding a 6-week interval between any of the initial doses should receive 2 additional doses, 3 to 4 weeks apart.

The same is true during the initial 2-dose series recommended for dogs receiving non-core vaccines. If the interval between doses exceeds 6 weeks, 2 additional doses, 3 to 4 weeks apart should be administered.

Overdue for CORE vaccine booster: administer a single dose of a combination core vaccine *regardless of the number of years that have lapsed.*

Overdue for RABIES booster: requirements for re-vaccination of dogs that are overdue for a rabies booster vary from State to State, and may vary within an individual State. Many States follow recommendations published in the *2016 Rabies Compendium* that states: administer a single dose, after which the dog will be considered *immediately* immunized. NOTE: the *Rabies Compendium*, as published by the Natl Assoc. of State Public Health Veterinarians, Inc., is NOT a legal document. Veterinarians must be familiar with rabies immunization requirements and laws within the State, local jurisdiction, or Province in which they practice.

Overdue for Leptospirosis, Lyme and/or parenteral Bordetella booster: dogs that are within 2 years of a previous dose may receive a single dose. Dogs exceeding a 2-year interval should re-start the initial 2-dose series.

Overdue for intranasal or intraoral Bordetella booster: administer a single dose *regardless of the number of years that have lapsed.*

Overdue for Canine Influenza Virus booster: dogs that are within 2 years of a previous dose may receive a single dose. Dogs exceeding a 2-year interval should re-start the initial 2-dose series.

TABLE 2: INITIAL VACCINATION of CATS/KITTENS

CORE Vaccines	Administration	Booster Recommendations
MLV Panleukopenia + MLV Herpesvirus + MLV Calicivirus NOTE: <i>2015 WSAVA and the European Advisory Board on Cat Diseases (2015) recommend avoiding use of killed (adjuvanted) vaccines when implementing vaccination protocols for cats.</i>	3 doses are recommended between 8 and 16 weeks of age. Example: 8 weeks; and 12 weeks; and 16 weeks of age... <i>an additional dose at 20 weeks of age</i> may be recommended where risk of exposure is high.	Administer a single dose (of a combination product) not later than 1 year following the last dose in the initial series. Administer subsequent boosters every 3 years.
Recombinant Rabies [non-adjuvanted] Now available as a 1-Year product and a 3-Year product. -or- Killed Rabies [adjuvanted] Available as 1-Year & 3-Year products.	Single dose is usually administered at 12 <u>or</u> 16 weeks or age. (State/Local/Provincial law applies)	Schedule a second dose to be administered not later than 1 year following administration of the 1 st dose, <i>regardless of the cat's age at the time the <u>initial</u> dose is given.</i> Then...every 3 years thereafter. (State/Local/Provincial law applies)

NON-CORE Vaccines	Administration	Booster Recommendations
Recombinant Feline Leukemia Virus (rFeLV) [non-adjuvanted] -or- Killed Feline Leukemia Virus [adjuvanted]	Recommended for <u>all</u> kittens: Administer 1 dose as early as 8 weeks of age followed by a 2 nd dose 3-4 weeks later. Booster 1 year later. <i>The Au recommends 2 doses at 12 and 16 weeks of age followed by a booster 1 year after completion of the initial series.</i>	Where risk of exposure exists...administer a single dose annually thereafter. (some authors recommend revaccination every 2 or 3 years for cats considered to be at “low risk” for exposure).
Killed Feline Immunodeficiency Virus (FIV) [Only available as a Killed-adjuvanted product] (This product was removed from the US and Canadian markets in 2016)	3 initial doses, 2 to 4 weeks apart, if indicated. NOTE: <i>cats receiving this vaccine should be ‘microchipped’ to facilitate identification if the cat becomes lost and is presented to an animal shelter or veterinary practice.</i>	The manufacturer recommends annual boosters where risk for exposure is sustained. NOTE: <i>vaccination can cause a False + FIV test result lasting for several years. Kittens having nursed from a vaccinated cat may also have a False + test result if tested prior to 6 months of age.</i> Currently, there is no commercial test that has been shown to reliably distinguish a vaccinated from an infected cat.
Feline <i>Bordetella bronchiseptica</i> Avirulent Live Intranasal (non-adjuvanted)	A single intranasal (IN only) dose administered as early as 4 weeks of age, if indicated.	Booster annually where the risk of exposure is present. NOTE: <i>indications for use of this vaccine are limited.</i>
<i>Chlamydia felis</i> (formerly: <i>Chlamydophila felis</i> and <i>Chlamydia psittaci</i>) (both non-adjuvanted and adjuvanted products are available)	2 initial doses 3 to 4 weeks apart, if indicated.	Booster annually where exposure risk is sustained. Indications for use of this vaccine are limited.
Virulent Systemic (VS) Calicivirus Killed-adjuvanted	2 initial doses 2 to 4 weeks apart, if indicated	The manufacturer recommends annual vaccination where exposure risk is sustained. Disease prevalence is considered low, even within high-density housing environments (eg, shelters). Indications for use of this vaccine are limited.

NOTE: Unless specifically indicated for intranasal administration, all feline vaccines should be administered by the SQ route.

NOTE: The Feline Infectious Peritonitis (FIP) vaccine has been re-categorized as NON-Core, but is still not recommended by most authors due to limited or no known efficacy.

NOTE: The World Small Animal Veterinary Association (Vaccine Guidelines Group) does not recommend administration of either the FIP vaccine on grounds of low to no demonstrated efficacy.

NOTE: Inactivated (killed), adjuvanted vaccines are *recommended* for administration to:

1. Pregnant queens, and
2. Retrovirus (FeLV or FIV) infected cats (no studies have been published that define the risk of administering MLV or recombinant vaccines to retrovirus + cats).

Overdue for Vaccination

Studies focused on cats that are overdue for routine vaccination have not been published. The following recommendations represent expert opinion and are intended to provide a practical approach to immunizing cats when conventional vaccination guidelines have not been followed:

Overdue during the initial vaccine series: While most practices administer the initial core vaccine series to kittens at intervals of 3 to 4 weeks, cats exceeding a 6-week interval between any of the initial doses should receive 2 additional doses, 3 to 4 weeks apart.

The same is true during the initial 2-dose series recommended for cats receiving non-core vaccines. If the interval between doses exceeds 6 weeks, 2 additional doses, 3 to 4 weeks apart should be administered.

Overdue for CORE vaccine booster: *ASSUMING USE OF A MODIFIED-LIVE VIRUS VACCINE*, administer a single dose of a combination core vaccine *regardless of the number of years that have lapsed*.

Overdue for RABIES booster: requirements for re-vaccination of cats that are overdue for a rabies booster vary from State to State, and may vary within an individual State. Many States follow recommendations published in the 2016. *Rabies Compendium* that states: administer a single dose, after which the cat will be considered *immediately* immunized. NOTE: the *Rabies Compendium*, as published by the Natl Assoc. of State Public Health Veterinarians, Inc., is NOT a legal document. Veterinarians must be familiar with rabies immunization requirements and laws within the State, local jurisdiction, or Province in which they practice.

Overdue for Feline Leukemia booster: this is complicated...compared to kittens, adult cats are significantly more resistant to developing *progressive* disease associated with FeLV infection. For this reason, significant differences of opinion exist with respect to *conventional intervals* (annual, biennial, triennial recommendations exist). It would be reasonable to recommend that the initial 2-dose series should be restarted in the event a cat is more than 3 years overdue for vaccination.

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