Table 1

2006 AAHA Canine Vaccination Guidelines* for the General Veterinary Practice, Revised

Vaccine†	Initial Puppy Vaccination‡ (≤16 weeks)	Initial Adult Vaccination (>16 weeks)	Revaccination (Booster) Recommendation	Comments and Recommendations *See the second page of the guidelines for definitions of core, noncore, and nonrecommended vaccines*
Canine Parvovirus (CPV-2) (MLV)	*All* puppies should receive a minimum of 3 doses between the ages of 6 and 16 weeks administered at intervals of 3 to 4 weeks (e.g., at 6, 10, and 14 weeks, or 8, 12, and 16 weeks). The final dose should be administered at 14 to 16 weeks of age.	Two doses, 3-4 weeks apart. One dose is considered protective and acceptable.	*All* puppies should receive a 1-year booster vaccination 1 year after completion of the initial puppy series, regardless of the product used. Following this vaccination, revaccination is recommended at intervals of every 3 years or longer.	*Core:* Although annual boosters are recommended by some vaccine manufacturers, studies have shown protection against challenge (DOI) up to 7 years postvaccination with MLV vaccine.§\ Products with CPV-2, regardless of genotype (i.e., CPV-2, 2a, or 2b), all provide excellent protection against field isolates.
Canine Parvovirus (CPV-2) (killed)				*Not Recommended:* Killed parvovirus products have been shown to be susceptible to maternal antibody interference in puppies as old as 16-18 weeks. Multiple doses (2-5) may be required even in puppies older than 12 weeks.¶
Canine Distemper Virus (CDV) (MLV)	*All* puppies should receive a minimum of 3 doses between the ages of 6 and 16 weeks administered at intervals of 3 to 4 weeks (e.g., at 6, 10, and 14 weeks, or 8, 12, and 16 weeks). The final dose should be administered at 14 to 16 weeks of age.	Two doses, 3-4 weeks apart. One dose is considered protective and acceptable.	*All* puppies should receive a 1-year booster vaccination 1 year after completion of the initial puppy series, regardless of the product used. Following this vaccination, revaccination is recommended at intervals of every 3 years or longer.	*Core:* Although annual boosters are recommended by some vaccine manufacturers, adult dogs challenged 7 years (Rockborn Strain) and 5 years (Onderstepoort Strain) following MLV vaccination were protected (DOI).#
rCanine Distemper Virus (rCDV)	*All* puppies should receive a minimum of 3 doses between the ages of 6 and 16 weeks administered at intervals of 3 to 4 weeks (e.g., at 6, 10, and 14 weeks, or 8, 12, and 16 weeks). The final dose should be administered at 14 to 16 weeks of age.	Two doses, 3-4 weeks apart.	*All* puppies should receive a 1-year booster vaccination 1 year after completion of the initial puppy series, regardless of the product used. Following this vaccination, revaccination is recommended at intervals of every 3 years or longer.	*Core:* A suitable alternative to the MLV-CDV and may be used interchangeably with MLV-CDV vaccine. Recent unpublished studies have shown that compared with the MLV-CDV vaccines, the recombinant CDV vaccine is more likely to immunize puppies in the face of passively acquired maternal antibody (PAMA).¶

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Distemper-Measles Virus (D-MV) (MLV)	One dose only between 4 and 12 weeks of age.	*Never* indicated in animals older than 12 weeks.	*Never* indicated in animals older than 12 weeks.	*Noncore:* Intended to provide temporary protection in young puppies because the measles vaccine is effective at providing immunity against CDV even in the presence of passively acquired maternal antibody (PAMA) to CDV. **Note:** Recent unpublished studies have shown that the recombinant CDV vaccine immunizes puppies in the face of PAMA. Therefore, D-MV is no longer the preferred option.
Canine Adenovirus-1 (CAV-1) (MLV and killed)				*Not Recommended:* Significant risk of "hepatitis blue-eye" reactions is associated with CAV-1 vaccines. CAV-2 vaccines very effectively cross-protect against CAV-1 and are much safer.
Canine Adenovirus-2 (CAV-2) (MLV parenteral)	*All* puppies should receive a minimum of 3 doses between the ages of 6 and 16 weeks administered at intervals of 3 to 4 weeks (e.g., at 6, 10, and 14 weeks, or 8, 12, and 16 weeks). The final dose should be administered at 14 to 16 weeks of age.	Two doses, 3-4 weeks apart. One dose is considered protective and acceptable.	*All* puppies should receive a 1-year booster vaccination 1 year after completion of the initial puppy series, regardless of the product used. Following this vaccination, revaccination is recommended at intervals of every 3 years or longer.	*Core:* Demonstrated cross-protection against canine hepatitis caused by CAV-1 as well as CAV-2, one of the agents known to be associated with infectious tracheobronchitis. Adult dogs challenged 7 years following CAV-2 MLV vaccination were found to be protected (DOI) against the more virulent CAV-1.[\]
Canine Adenovirus-2 (CAV-2) (killed or MLV-topical)				*Not Recommended:* CAV-2 (MLV parenteral) vaccines produce a more effective immune response than CAV-2 (killed parenteral) vaccines do. CAV-2 (MLV-parenteral) vaccine is commonly combined with CDV and CPV-2 parenteral vaccines, and in general, there is no advantage to administering both CAV-2 (MLV-parenteral) and CAV-2 (MLV-topical) vaccines.

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Rabies 1-year (killed)	Administer one dose as early as 3 months of age.	Administer a single dose.	Annually. State, provincial, and/or local laws apply. The 1-year rabies vaccine may be used as a booster vaccine when dogs are required by statute to be vaccinated annually against rabies.	*Core:* State, provincial, and local statutes govern the frequency of administration for products labeled as "1-year rabies vaccines." The 1-year rabies vaccine is sometimes administered as the initial dose followed 1 year later by administration of the 3-year rabies vaccine. State, provincial, and local statutes may dictate otherwise. When given annually, 1-year rabies products should not be considered to cause fewer adverse reactions than 3-year rabies products. Route of administration may not be optional; see product literature for details.
Rabies 3-year (killed)	Administer one dose as early as 3 months of age. Where authorized by local/state statutes, a 3-year rabies vaccine may be substituted as an alternative to a 1-year rabies vaccine for initial and subsequent doses.	Administer a single dose. Where authorized by local/state statutes, a 3-year rabies vaccine may be substituted as an alternative to a 1-year rabies vaccine for initial and subsequent doses.	The second rabies vaccination is recommended 1 year following administration of the initial dose, regardless of the animal's age at the time the first dose was administered. Booster vaccines should be administered every 3 years. State, provincial, and/or local laws apply.	*Core:* State, provincial, and local statutes govern the frequency of administration for products labeled as "3-year rabies vaccines." The 1-year rabies vaccine is sometimes administered as the initial dose followed 1 year later by administration of the 3-year rabies vaccine. State, provincial, and local statutes may dictate otherwise. Route of administration may not be optional; see product literature for details.
Parainfluenza Virus (CPIV) (MLV-parenteral)	Administer at 6-8 weeks of age, then every 3-4 weeks until 12-14 weeks of age.	One dose is adequate.	After a booster at 1 year (unless manufacturer label recommends otherwise), revaccination once every 3 years is considered protective.	*Noncore:* DOI by challenge has been shown to be at least 1 year (unpublished) for topical (intranasal) vaccine. NOTE: There is no evidence that parainfluenza vaccine produces any cross immunity to the recently reported canine influenza virus.
Bordetella bronchiseptica (killed bacterin)—parenteral	Administer one dose at 6-8 weeks and one dose at 10-12 weeks of age.	Two doses, 2-4 weeks apart.	Annually. Annually or more often in very high-risk animals not protected by annual booster.	*Noncore:* There is no known advantage to administering parenteral and intranasal *B. bronchiseptica* vaccines simultaneously. Vaccine should be administered at least 1 week prior to anticipated exposure.

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Bordetella bronchiseptica (live avirulent bacteria) + Parainfluenza Virus (MLV)—topical (intranasal) application	Administer a single dose as early as 3 weeks of age (see product literature for specific age recommendations). For best results, a second dose should be given 2-4 weeks after the first.	A single dose is recommended by the manufacturer.	Annually. Annually or more often in very high-risk animals not protected by annual booster.	*Noncore:* **Note:** Transient (3-10 days) coughing, sneezing, or nasal discharge may occur in a small percentage of vaccinates. If animal has not been vaccinated within the previous 6 months, a booster is recommended 1 week prior to known exposure (e.g., boarding, showing).
Bordetella bronchiseptica (cell wall antigen extract)—parenteral	Administer one dose at 8 weeks of age and one dose at 12 weeks of age.	Two doses, 4 weeks apart.	Annually (manufacturer). Annually or up to every 6 months in high-risk environments.	*Noncore:* DOI is approximately 9-12 months. There is no known advantage to administering parenteral and intranasal *B. bronchiseptica* vaccines simultaneously. Vaccine should be administered at least 1 week prior to anticipated exposure.
Borrelia burgdorferi (Lyme borreliosis) (killed whole bacterin) or *Borrelia burgdorferi* (**r**Lyme borreliosis) (recombinant-Outer surface protein A [OspA])	Initial dose may be given at 9 or 12 weeks of age (depending on manufacturer recommendations) with a second dose 2-4 weeks later.	Two doses, 2-4 weeks apart.	Annually (manufacturer). Revaccinate just prior to start of tick season as determined regionally.	*Noncore:* Generally recommended only for use in dogs with a known high risk of exposure, living in or visiting regions where the risk of vector tick exposure is considered to be high, or where disease is known to be endemic. Minimum DOI based on challenge studies is 1 year.
Canine Coronavirus (CCV) (killed and MLV)				*Not Recommended:* Prevalence of clinical cases of confirmed CCV disease does not justify vaccination. Clinical disease rarely occurs and when seen is typically mild and self-limiting. Experience has shown no additional increase in infectious enteritis among adults or puppies subsequent to discontinuing CCV vaccine. Neither the MLV vaccine nor the killed CCV vaccines have been shown to significantly reduce disease caused by a combination of CCV and CPV-2. Only CPV-2 vaccines have been shown to protect dogs against challenge when these two viruses are used.** DOI cannot be determined because in studies performed to date, neither vaccinates nor control dogs developed clinical evidence of disease following experimental virus challenge.

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Leptospira interrogans (combined with serovars canicola and icterohaemorrhagiae) (killed bacterin) (Also available with serovars grippotyphosa and pomona)	Administer one dose at 12 weeks and one dose at 14-16 weeks. For optimal response, do not administer to dogs younger than 12 weeks.	Two doses, 2-4 weeks apart.	Annually (manufacturer). Annual boosters are not routinely recommended for all dogs. Vaccination should be restricted to use in areas where a reasonable risk of exposure has been established. Veterinarians are advised of anecdotal reports of acute anaphylaxis in toy breeds following administration of leptospirosis vaccines. Routine vaccination of toy breeds should only be considered in dogs known to have a high exposure risk. Dogs determined to be at exceptionally high risk should be vaccinated at 12 and 16 weeks of age, and then at intervals of 6-9 months until the risk has been reduced.**	*Noncore:* Disease prevalence is likely to vary for each serovar. Vaccine recommendations are therefore difficult to make due to lack of information on prevalence of specific serovar infections in dogs in various geographic regions. Anecdotal reports from veterinarians and breeders suggest that incidence of postvaccination reactions (acute anaphylaxis) in puppies (<12 weeks of age) and small-breed dogs is high. Reactions are most severe in young puppies. Therefore, routine use of the vaccine should be delayed until dogs are 12 weeks of age. Minimum DOI based on challenge studies has been shown to be approximately 1 year for serovars *L. canicola* and *L. icterohaemorrhagiae*; however, efficacy of the products can be low (<75%). DOI for serovars grippotyphosa and pomona are assumed to be up to 1 year.
Giardia lamblia (killed)				*Not Recommended:* The vaccine may prevent oocyst shedding but does not prevent infection. There is insufficient data to warrant routine use of this vaccine. Infection in puppies and kittens is often subclinical. Most animal strains of *Giardia duodenalis* are not infective to an immunocompetent human host. Dogs can carry *Giardia* strains that are potentially infective for humans.†† Transmission to humans is most likely through fecal-oral contact with ingestion of cysts, or from contaminated water. Because the vaccine does not prevent infection, a minimum DOI based on challenge is not reported.

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Crotalus atrox Toxoid (rattlesnake vaccine)	Refer to manufacturer's label. Current administration is two doses 1 month apart to puppies as young as 4 months.	Refer to manufacturer's label. Current administration is two doses 1 month apart.	Refer to manufacturer's label. Annual boosters are currently recommended, especially at the beginning of rattlesnake "season" or when the animal is traveling into rattlesnake habitats.	Intended to protect dogs against the venom associated with the bite of the Western Diamondback Rattlesnake. Some cross-protection may exist against the venom of the Eastern Diamondback Rattlesnake. There is currently no evidence of cross-protection against the venom of the Mojave Rattlesnake. **Because of a lack of experience and paucity of field validation of efficacy, the Task Force takes no position on the use of this vaccine. A reasonable expectation of efficacy does exist.**
Porphyromonas sp. (periodontal disease vaccine)	See manufacturer's labeled directions.	See manufacturer's labeled directions.	See manufacturer's labeled directions.	Intended as an aid in prevention and control of periodontal disease in dogs. **Because of a lack of experience and paucity of field validation of efficacy, the Task Force takes no position on the use of this vaccine. A reasonable expectation of efficacy does exist.**

* The AAHA 2006 Canine Vaccine Guidelines, Revised February 2007, are provided to assist veterinarians in developing a vaccination protocol for use in clinical practice. They are not intended to represent vaccination standards for all dogs.

† MLV—modified live virus; r—recombinant.

‡ Route of administration is SQ (subcutaneous) or IM (intramuscular) unless otherwise noted by the manufacturer.

§ DOI—duration of immunity.

\ American Animal Hospital Association Canine Vaccine Task Force. Report of the AAHA Canine Vaccine Task Force: executive summary and 2003 canine vaccine guidelines and recommendations. J Am Anim Hosp Assoc 2003;39:119–131.

¶ Schultz RD et al. Information provided at International Vaccines and Diagnostics Conf, Guelph, Ontario, Canada, 2003.

Carmichael LE. Canine viral vaccines at a turning point—A personal perspective. In: Schultz RD, ed. Advances in Veterinary Medicine 41: Veterinary Vaccines and Diagnostics. San Diego: Academic Press, 1999:289–307.

** Schultz RD, DVM. University of Wisconsin School of Veterinary Medicine. Personal communication of unpublished study.

†† Bowman D. Companion Animal Parasite Council Guidelines. North Am Vet Conf, Orlando, FL, 2004.