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Feline vaccination protocols: is a consensus emerging?

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Summary

Three international panels have been established over the past 11 years to provide veterinarians with guidelines on the use of feline vaccines. These are the American Association of Feline Practitioners (AAFP) Feline Vaccine Advisory Panel, the World Small Animal Association Vaccine Guidelines Group (WSAVA VGG) and the European Advisory Board on Cat Diseases (ABCD). The major recommendations of these three panels are summarised to show areas of agreement and areas of discrepancy. While the recommendations of the three groups are not fully aligned, all agree that core vaccines (those that every cat should receive) include panleucopenia virus (FPV), calicivirus (FCV) and herpesvirus (FHV-1) (with the addition of rabies virus where it is endemic or mandated by law). All the panels also recommend booster vaccination for the three core vaccines at intervals of more than one year in many situations (up to every three years for FCV and FHV-1 after the first booster, and at intervals no more frequently than every three years for FPV after the first booster), in view of the studies evaluating the duration of immunity for these vaccines. Precise recommendations vary though, and further studies are needed to provide additional information to clarify areas of discrepancy and further refine recommendations for the future. Ultimately the aim should be to vaccinate cats less frequently (based on a knowledge of the true duration of immunity conferred by vaccination), but to vaccinate more cats (and ideally every cat).

Keywords: vaccination intervals, panleucopenia, calici, herpes

Empfohlene Impfschemata bei der Katze: auf gutem Weg zu einem Konsens?

Drei internationale Gremien sind in den letzten 11 Jahren gebildet worden, um für Tierärzte Impfempfehlungen für Katzen aufzustellen. Es sind dies das *American Association of Feline Practitioners (AAFP) Feline Vaccine Advisory Panel*, die *World Small Animal Association Vaccine Guidelines Group (WSAVA VGG)* und das *European Advisory Board on Cat Diseases (ABCD)*. Im vorliegenden Artikel werden die wichtigsten Empfehlungen dieser drei Gremien zusammengefasst, um die übereinstimmenden und unterschiedlichen Aspekte darzulegen. Trotz gewisser Unterschiede besteht Konsens über die sogenannten Kern-Impfungen, welche jede Katze erhalten sollte. Dazu gehören Impfungen gegen das Panleukopenievirus (FPV), Calicivirus (FCV) und Herpesvirus (FHV-1) sowie in endemischen Gebieten oder, wo sie gesetzlich vorgeschrieben ist, die Tollwutimpfung. Alle Gremien empfehlen übereinstimmend relativ lange Abstände (>1 Jahr) für Booster Impfungen dieser 3 Kernimpfungen, Intervalle bis zu 3 Jahren für FCV und FHV-1 nach dem ersten Booster und ein Intervall von mindestens 3 Jahren für FPV nach dem ersten Booster. Diese Empfehlungen basieren auf Studien, welche die Dauer der Immunität für diese Impfungen untersucht haben. Genaue Empfehlungen weichen jedoch voneinander ab und zusätzliche Studien sind nötig, um die Unterschiede zu klären und Empfehlungen weiter zu verfeinern. Das Endziel sollte, gestützt auf vorhandenes Wissen über die Immunitätsdauer der Impfung darin bestehen, die Katzen weniger häufig, dafür aber mehr (idealerweise alle) Katzen zu impfen.

Schlüsselwörter: Impfintervall, Panleukopenie, Calici, Herpes

Prevention of disease is the ultimate goal of veterinarians, and there is no doubt that the widespread use of vaccines has contributed enormously to achieving that ambition. The current prevalence of vaccination in cat populations is not high enough to achieve a good level of herd immunity and elimination of infectious agents (Horzinek and Thiry, 2009) and so containment and control is a more realistic goal, along with protection of the individual animal. Nevertheless, as has been stated by the World Small Animal Association (WSAVA) Vaccine Guidelines Group

Table 1: Guideline recommendations for FPV vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Core	Core	Core
Primary vaccination of kittens	Begin from as early as 6 weeks, then every 3–4 weeks until 16 weeks of age	Begin at 8–9 weeks with a second 3–4 weeks later and a final vaccine at ≥ 16 weeks of age	Begin at 8–9 weeks with a second 3–4 weeks (minimum 12 weeks). Consider a final dose at 16–20 weeks of age Consider starting earlier than 8 weeks and repeating
Primary vaccination in cats ≥ 16w	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart	
Vaccination of adult cats of unknown status		A single dose of MLV in adults of unknown status followed by a booster after 1 year	A single dose of MLV in adults of unknown status followed by a booster after 1 year
Booster vaccinations	One year after the primary course, then no more frequently than every 3 years	One year after the primary course, then no more frequently than every 3 years	One year after the primary course, then no more frequently than every 3 years unless special conditions apply
Additional information	– Do not use MLV in pregnant cats – Do not use MLV in kittens < 4 weeks of age – Only killed vaccines should only be used in pregnant cats and only exceptionally – Only killed vaccines should be used in FeLV/FIV infected cats – Killed vaccines may be more appropriate in disease-free colonies – Kittens over 4 weeks (in the face of an outbreak) or 6 weeks (otherwise) of age in shelters should be vaccinated with a MLV and repeated every 3–4 weeks (or 2 weeks with high risk) until 16 weeks of age. – Intranasal vaccines may not be as effective in high-risk situations and are not recommended for routine use in kittens in shelters	– Do not use MLV in pregnant cats – Do not use MLV in kittens < 4 weeks of age – Only killed vaccines should only be used in pregnant cats and only exceptionally – Only killed vaccines should be used in FeLV/FIV infected cats – Killed vaccines may be more appropriate in disease-free colonies – Intranasal vaccines may not be as effective in high-risk situations where exposure may occur soon after vaccination	– Do not use MLV in pregnant cats – Do not use MLV in kittens < 4 weeks of age – Only killed vaccines should only be used in pregnant cats and only exceptionally – Only killed vaccines should be used in FeLV/FIV infected cats and with FIV, only those at high risk – Kittens over 4 weeks (in the face of an outbreak) or 6 weeks (otherwise) of age in shelters should be vaccinated with a MLV and repeated every 3–4 weeks until 16 weeks of age

(VGG), our aim should be to vaccinate every animal and each individual animal less frequently (Day et al., 2007).

In recent years, two particular lines of evidence have caused a re-evaluation of traditional vaccine recommendations. The first is the recognition that vaccination is not innocuous and that serious side effects sometimes occur. Various side effects are associated with vaccination with studies suggesting a prevalence of between 3 % and 25 % depending on the vaccine and how the data is collected (Rosenthal and Dworkis, 1990a; Rosenthal and Dworkis, 1990b; Clark et al., 1991; Pollock and Haffer, 1991; Starr, 1993; Gobar and Kass, 2002). Most of these adverse reactions are mild and transient, but occasionally severe and life-threatening events can occur such as severe hypersensitivity reactions or the more recently recognised injection-site sarcoma phenomenon in cats (Davis-Wurzler, 2006; Horzinek and Thiry, 2009). The recognition of such devastating side effects, albeit seen rarely, challenges the notion that vaccination is a safe procedure and that vaccine intervals are not an important consideration. The second strand of evidence has come from studies of duration of immunity (DOI) for vaccines. In the past, there has been a tendency for minimum DOI studies to be done for licensing purposes and/or for arbitrary annual vaccination boosters to be recommended (Gaskell et al., 2006). Some vaccine manufacturers are now undertaking the (more expensive) studies to determine more than just minimal DOI for vaccines, and other studies have emerged that have provided good evidence on prolonged DOI for a number of vaccines (see, for example, Scott and Geissinger, 1997; Scott and Geissinger, 1999, Coyne et al., 2001; Lappin et al., 2002; Mouzin et al., 2004). Thus the combined knowledge of occasional serious adverse reactions to vaccination, and for some vaccines growing evidence of a DOI well in excess of a year, has led to a serious re-evaluation of vaccination recommendations.

There are now three international panels that have been established to provide guidelines on feline vaccination protocols – the American Association of Feline Practitioners Feline Vaccine Advisory Panel which first reported

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Table 2: Guideline recommendations for FHV-1 and FCV vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Core	Core	Core
Primary vaccination of kittens	Begin as early as 6 weeks, then every 3–4 weeks until 16 weeks of age	Begin at 8–9 weeks with a second 3–4 weeks later and a final vaccine at ≥ 16 weeks of age	Begin at around 9 weeks with a second 2–4 weeks later (not earlier than 12w for FCV). Consider a third FCV dose at 16w in high-risk situations
Primary vaccination in cats ≥ 16w	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart	Two doses 2–4 weeks apart
Booster vaccinations	One year after the primary course, then every 3 years	One year after the primary course, then every 3 years	Annual for FHV-1, especially in high-risk situations, but for low-risk (e.g. indoor-only cats) 3-yearly intervals recommended.
Booster with lapsed vaccinations		If the interval since the last vaccination is ≤ 3 years a single dose is considered sufficient, if > 3 years consider two doses	If the interval since the last vaccination is ≤ 3 years a single dose is considered sufficient, if > 3 years consider two doses
Additional information	– Killed vaccines are preferred in pregnant cats and should only be used exceptionally – Only killed vaccines should be used in FeLV/FIV infected cats – Killed vaccines may be more appropriate in disease-free colonies – Early vaccination of kittens is especially appropriate in high risk situations and/or when MDA status is questionable – IN vaccines have rapid onset of immunity and may be useful in naïve cats entering high risk situation – Oronasal exposure to injectable MLV may result in development of clinical disease – Mild URTD signs may be seen more commonly with IN vaccines – Unusually, an additional booster may be considered if a cat is going into a known high-risk situation	– Mild URTD signs may be seen more commonly with IN vaccines	– In shelters with a high risk, MLV vaccines are preferable as they provide quicker protection – In breeding catteries, booster vaccination of queens prior to mating may be valuable – Killed vaccines are preferred in pregnant cats and should only be used exceptionally – Where previous problems have been encountered,? repeat early vaccination of kittens (every 2 weeks from 4 weeks of age) should be considered – Use of killed vaccines is recommended in immunocompromised cats – Only killed vaccines should be used in FeLV/FIV infected cats

Table 3: Guideline recommendations for FeLV vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Non-core	Non-core	Non-core
Primary vaccination of kittens	Begin as early as 8 weeks then second 3–4 weeks later	Begin as early as 8 weeks then second 3–4 weeks later	Begin at 8–9 weeks with a second dose at 12 weeks
Primary vaccination in cats ≥ 16w	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart
Booster vaccinations	Annually in cats at risk of exposure	Annually in cats at risk of exposure	Annually in cats at risk of exposure until 3–4 years of age, then every 2–3 years
Additional information	– Highly recommended in all kittens as their subsequent lifestyle is unknown – Booster vaccinations should only be administered to cats considered at risk of exposure – FeLV testing prior to vaccination is recommended and only those testing negative should be vaccinated	– FeLV testing prior to vaccination should be mandatory and only those testing negative should be vaccinated	– FeLV testing prior to vaccination is recommended and only those testing negative should be vaccinated – Do not rely on vaccination to protect FeLV negative cats living with FeLV positive cats

Table 4: Guideline recommendations for FIV vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Non-core	Not recommended	Not recommended in Europe
Primary vaccination of kittens	Three doses starting as early as 8 weeks, given 2–3 weeks apart	Three doses starting as early as 8 weeks, given 2–3 weeks apart	
Primary vaccination in cats ≥ 16w	Three doses at 2–3 week intervals	Three doses at 2–3 week intervals	
Booster vaccinations	Annually in cats at risk of exposure	Annually in cats at risk of exposure	
Additional information	– Should be restricted to cats at high risk of exposure – Vaccination interferes with and invalidates routine antibody testing for infection- FIV testing prior to vaccination is recommended – Vaccinated cats should be permanently identifiable (e.g. microchip)	– Vaccination interferes with and invalidates routine antibody testing for infection	– The vaccine has not been tested against European field isolates and did not protect against a virulent UK primary isolate in one study

Table 5: Guideline recommendations for rabies vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Core where rabies endemic	Non-core except where required by statute or disease is endemic	Core where rabies endemic
Primary vaccination of kittens	A single dose as early as 8–12 weeks of age according to vaccine license	A single dose as early as 8–12 weeks of age according to vaccine license	1 single dose as early as 8–12 weeks of age according to vaccine license
Booster vaccinations	One year after the primary vaccine, then every 1–3 years according to state or government legislation and vaccine license	One year after the primary vaccine, then every 1–3 years according to state or government legislation and vaccine license	One year after the primary vaccine, then every 1–3 years according to state or government legislation and vaccine license

Table 6: Guideline recommendations for FIP vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Not generally recommended	Not recommended	Non-core
Primary vaccination of kittens	Two doses 3–4 weeks apart from the age of 16 weeks	Two doses 3–4 weeks apart from the age of 16 weeks	Two doses three weeks apart from the age of 16 weeks
Booster vaccinations	Annual (recommended by manufacturer)	Annual (recommended by manufacturer)	Annual
Additional information	– From limited studies only FCoV seronegative cats are likely to develop some protection from vaccination – Vaccination of seropositive cats or cats in a household in which FIP is known to exist is not recommended	– From limited studies only FCoV seronegative cats are likely to develop some protection from vaccination	– Vaccination before 16w does not protect against infection – Kittens may benefit from vaccination if they are at risk and have not been exposed to FCoV prior to vaccination

Table 7: Guideline recommendations for Giardia vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Not generally recommended	Not recommended	
Primary vaccination of kittens	Two doses 2–4 weeks apart from 8 weeks	Two doses 2–4 weeks apart from 8 weeks	
Booster vaccinations	Annual (recommended by manufacturer)	Annual (recommended by manufacturer)	
Additional information	Insufficient data to support vaccination	Insufficient data to support vaccination	

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in 1998 and was updated in 2000 and most recently in 2006 (Richards et al., 2006), the WSAVA VGG which reported in 2007, and the European Advisory Board on Cat Diseases (ABCD) which reported in 2009 (Horzinek et al., 2009). The major recommendations from these three bodies are summarised in Tables 1–9. While there are differences between the recommendations of the three groups (as can be seen), there is a clear consensus among them too on many aspects. All the groups recommend that vaccines should not be given needlessly; that an annual health check is advisable irrespective of whether vaccines are given; that owners should be involved with discussions, and the risks and benefits of vaccination explored so that informed consent is given; that adverse reactions to vaccinations should be properly reported to vaccine manufacturers and regulatory authorities; and that vaccines should be regarded as *core* (where vaccination of *all* cats is justifiable) and *non-core* (where vaccination can only be justified in certain circumstances). All three groups have also recommended booster vaccination schedules that include extended intervals (beyond the traditional 12 months), especially for the core vaccines (where more data is available), but that choices should be made on an individual basis and protocols cannot be formulated that are suitable for all cats in all circumstances. These are important principles and show the way to a more enlightened use of vaccines in the future. Perhaps of note is the fact that in the USA, since 1998 when the AAFP first introduced recommendations suggesting booster vaccination for core vaccines may given less frequently (e.g. every three years), despite apparent widespread uptake of this recommendation there have been no reports or suggestions of outbreaks of disease that would otherwise have been prevented. More information is still needed to reconcile some of the discrepancies between the recommendations of these three groups and to provide a greater evidence base for ongoing refinement and changes to these recommendations, but there is now emerging an international consensus whereby veterinarians can clearly identify with the WSAVA stated aim of vaccinating every animal but each individual less frequently.

Table 8: Guideline recommendations for Chlamydophila felis vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Non-core	Non-core	Non-core
Primary vaccination of kittens	Two doses 3–4 weeks apart from 9 weeks of age	Two doses 3–4 weeks apart from 9 weeks of age	Two doses 3–4 weeks apart starting at 8–10 weeks
Primary vaccination in cats ≥ 16w	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart	Two doses 3–4 weeks apart
Booster vaccinations	Annual where sustained risk of infection	One year after the primary course, then no more frequently than every 3 years	Annual
Additional information	– Generally reserved for use in cats at risk of exposure to? multicat environments where disease has been confirmed – Conjunctival administration of MLV may cause clinical signs	– Generally reserved for use in cats at risk of exposure ? multicat environments where disease has been confirmed – Conjunctival administration of MLV may cause clinical signs	– Consider in cats at risk of exposure, especially multicat environments

Table 9: Guideline recommendations for Bordetella bronchiseptica vaccination.

	AAFP Guidelines	WSAVA Guidelines	ABCD Guidelines
Nature of vaccine	Non-core	Non-core	Non-core
Primary vaccination of kittens	Single IN dose from 8 weeks of age	Single IN dose from 8 weeks of age	Single IN dose from 8 weeks of age
Primary vaccination in cats ≥ 16w	Single IN dose	Single IN dose	Single IN dose
Booster vaccinations	Annual where sustained risk of infection	Annual where sustained risk of infection	Annual where sustained risk of infection
Additional information	– Use may be considered where cats are likely to be at specific risk of exposure, e.g. in some multicat environments where bordetellosis has been confirmed	– Use may be considered where cats are likely to be at specific risk of infection	– Use should be limited to cats in, or moving into, a high-density population with a history of bordetellosis – Avoid in immunocompromised cats

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