

Australian companion animal infectious disease threats – new global vaccination trends

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Introduction

In this paper, selected emerging and established Australian companion animal infectious disease threats will be considered with a focus on new and interesting findings. The emerging significance of canine parvovirus infection of cats will be covered. The broadening range of recognised clinical manifestations of canine leptospirosis will be considered along with brief comments about diagnosis and prevention. An update on global companion animal vaccination recommendations, especially focused on scheduling, will be provided.

An update on FIV and the commercially-available FIV vaccine

An interesting paper published recently in the journal *Vaccine* describes a study carried out by Sydney-based researchers, investigating the degree of protection provided by the only commercially-available FIV vaccine.¹ This was a case-control field study. Initially, 440 cats with outdoor access, living in five Australian states and territories, underwent testing. There were initially 139 vaccinated “cases” and 301 unvaccinated control cats. FIV status was carefully determined using point-of-care antibody detection test kits and PCR. Virus isolation (viewed as the gold standard) was used where discordant results were obtained and in all instances of suspected vaccine failure or breakthrough.

Strict inclusion criteria meant that only 89 FIV-vaccinated cats and 212 unvaccinated control cats were ultimately included in the study. Five of the 89 vaccinated cats (6%) and 25 of the 212 unvaccinated cats (12%) became infected. This equated to a “vaccine protective rate” of 56% but, importantly, the 95% confidence interval for degree of protection extended from -20 to +84% and the difference in FIV prevalence between the case and control groups was not statistically significant ($p=0.14$). The authors of the study reported that these findings cast doubt on the efficacy of Fel-O-Vax FIV® in the field and that testing for FIV prior to annual FIV revaccination and in sick FIV-vaccinated cats may be prudent. This was the first field-based study of this vaccine conducted anywhere in the world.

Canine parvovirus infection of cats

Feline panleucopenia (FP) is a viral disease of cats characterised by fever, depression, anorexia, vomiting and diarrhoea with consequent severe dehydration. It has been recognised for about 100 years and is nowadays uncommonly diagnosed in Australian pet cats.

A disease identical to FP (some would say it *is* FP) can be caused experimentally in susceptible cats by administering canine parvovirus (CPV) type 2a, -2b, or 2c.^{2,3} FP can also be caused by natural canine parvoviral infection.⁴⁻⁶

The proportion of cats with FP that are nowadays infected with CPV rather than FPV is uncertain and probably varies geographically. One report described cats with clinical signs of FP in Vietnam and Taiwan.⁷ This study indicated that up to 80% of

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panleucopenia-affected cats were infected with CPV rather than FPV. Several other studies from other parts of the world have suggested that only a minority (approximately 10%) of FP-affected cats are infected with one of the CPV variants rather than with FPV. In one such study, CPV-2a or CPV-2b were isolated from about 10 to 20% of cats that had parvoviral enteritis in Japan, Germany and the USA.

Some cats naturally infected with currently circulating strains of CPV have remained completely unaffected. In one British study, 33% of faecal samples from 50 healthy cats living in a cat-only shelter contained CPV DNA.⁸ Interestingly, the percentage was only slightly higher (34%) in 74 cats that lived in a mixed cat and dog shelter environment. In a recent Australian study, 7/32 tested cats had CPV DNA in their bone marrow (and 1/32 had FPV in its bone marrow).⁹ These were semi-feral cats euthanased at an animal shelter.

The 'regained' ability of CPV to infect cats may have epizootiological consequences for both dogs and cats. From the point of view of susceptible puppies and dogs, CPV-excreting cats could potentially act as a source of virus and environmental contamination additional to that caused by shedding dogs, although little work has been done to quantify this risk. Given the fastidious toilet habits of cats, one might hypothesise that sub-clinically infected and shedding cats would pose less risk than those with diarrhoea. Long-haired cats, whose fur is more easily soiled by faeces, may pose a greater risk than short-haired cats. Of interest are two recent studies indicating that cats may become persistently infected by CPV, with virus circulating inside their peripheral blood mononuclear cells despite the presence of circulating virus neutralising antibodies. Persistent faecal shedding of virus from such sub-clinically infected cats has not, however, been demonstrated. Further work is needed to determine whether CPV-infected and shedding cats pose a health risk to unprotected puppies and adult dogs.

The risks posed to susceptible kittens and adult cats by CPV-excreting dogs have not been sufficiently quantified. Immunosuppressed adult cats, for example those with feline leukaemia virus (FeLV)- or feline immunodeficiency virus (FIV)-associated AIDS, would be expected to be at greater risk than those with an intact immune system. It has already been shown that FIV and FeLV can each 'collaborate' with FPV to produce an FP-like illness in adult cats.^{10,11} The FIV-infected cats were in the primary stage of their retroviral infection, rather than a later stage, when this happened. A modified live FPV vaccine strain was enough to cause severe FP-like disease in these immunosuppressed cats.

Update on canine leptospirosis

A lateral flow assay (LFA) for detection of *Leptospira*-specific IgM recently became commercially available in Europe (Witness Lepto, Zoetis). In one recent study, this new "patient-side" test showed strong promise for diagnosis of acute leptospirosis in dogs.¹² Diagnostic sera from dogs submitted to a German university diagnostic laboratory were studied. Sensitivity and specificity of the LFA during the acute phase of illness were 75.7% and 98.3%, respectively. This compared favourably with microscopic agglutination testing.

In a second recently-published study,¹³ two LFAs for diagnosis of canine leptospirosis were compared (again, Witness Lepto and Test-it™, LifeAssay Diagnostics). Weak positive results were obtained frequently using both tests. If these were interpreted as true positives, the positive predictive values of the two tests were 94% and 100% and the negative predictive values were 73% and 74%, respectively. The authors declared

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these two tests useful when used in conjunction with other confirmatory testing methods.

Clinical manifestations of canine leptospirosis (beyond the conventional) that are being increasingly recognised as strongly disease-associated, at least in some countries, include acute renal failure in the absence of jaundice,¹⁴ pulmonary oedema and haemorrhage,¹⁵⁻¹⁷ uveitis and cholecystitis¹⁸ and small intestinal intussusception.^{19,20}

Commercially-available, licensed vaccines to protect against canine leptospirosis (bivalent, trivalent, tetravalent) are all bacterins²¹, although novel vaccines based on reverse vaccinology approaches are apparently in development.²²

Update on global companion animal vaccination recommendations

The most recent, international, companion animal vaccination guidelines were produced by the World Small Animal Veterinary Association (WSAVA) Vaccination Guidelines Group and published in January 2016.²³ Other guidelines are published periodically by the American Animal Hospital Association (dogs only)²⁴, the American Association of Feline Practitioners²⁵ and the European Advisory Board on Cat Diseases.²⁶ Although these groups develop their guidelines independently, there is increasing consensus in their recommendations.²⁷

The 2015/16 WSAVA Vaccination Guidelines are freely available here:

<http://www.wsava.org/guidelines/vaccination-guidelines>

For those familiar with previous iterations, the most significant updates in the latest WSAVA vaccination guidelines are as follows:

1. The recommended timing of the last primary kitten and puppy vaccines is adjusted upward from 14–16 weeks of age to 16 weeks or later. This was based on some evidence that maternal antibodies can sometimes cause interference, even at 14 weeks of age and beyond.
2. The “first annual booster” is reconsidered in light of what it is thought to achieve immunologically. That is, it is thought to immunise a minority of animals that fail to respond immunologically to one or more vaccine components, even at 16 weeks of age. WSAVA guidelines recommend that the “first annual booster” be reconsidered and rescheduled from 12–16 months to 6–12 months of age.
3. The FIV vaccine, previously designated as “not recommended” is redesignated as “non-core”.
4. “Low risk” and “high risk” situations and feline lifestyles are more thoroughly described. Visiting a boarding cattery is now explicitly designated as “high risk”. This has implications for the use of feline respiratory virus vaccines.
5. There is updated consideration of the possible anatomical sites for injection of vaccines (particularly adjuvanted vaccines) in cats. This includes brief consideration of tail vaccination.
6. The guidelines are much more thoroughly referenced, although there is scope for yet further improvement. Quality of evidence is considered using a novel system specifically developed by the authors for the purpose.

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