In May 2019, we reviewed and appended the canine antibody titre tests from adult dogs (more than 12 months of age) that we had accumulated since May 2017.

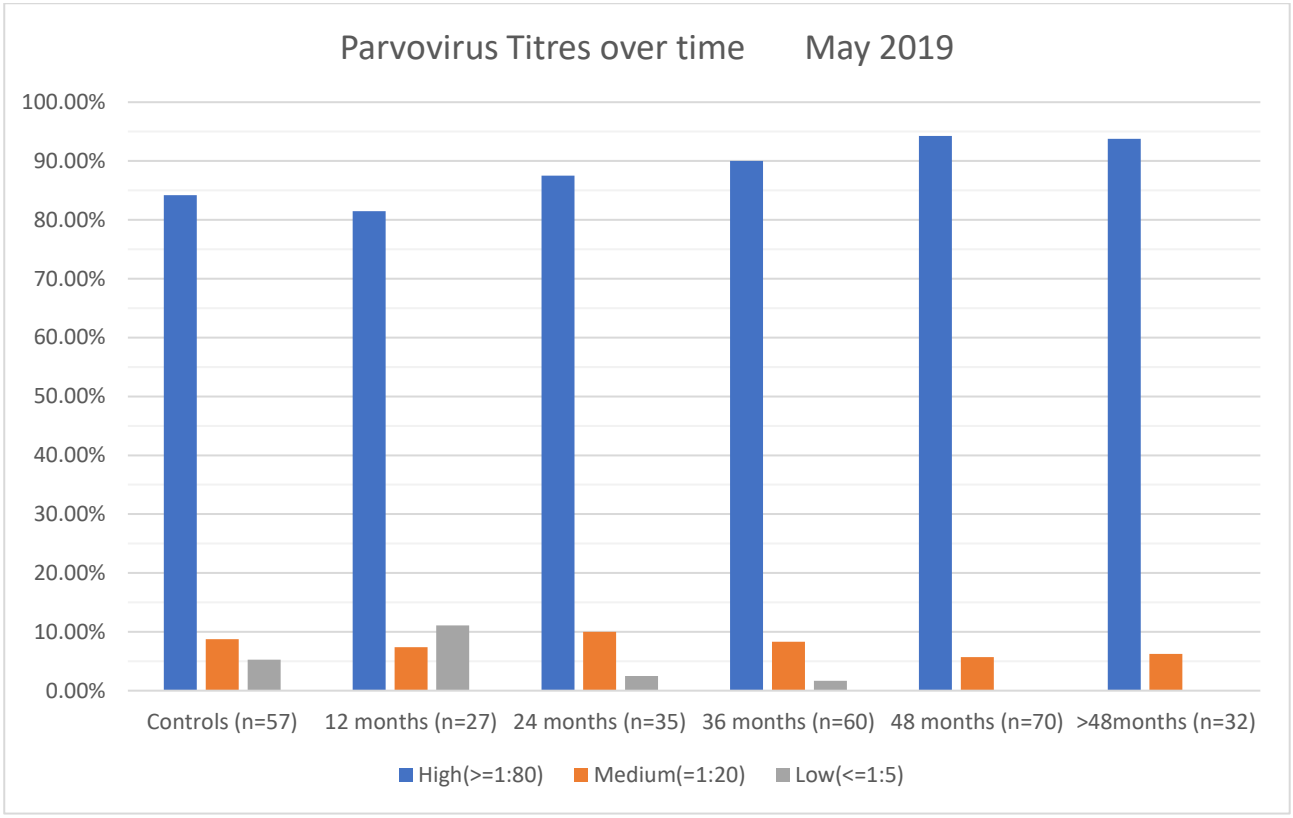
Testing protocols and grouping remained unchanged.

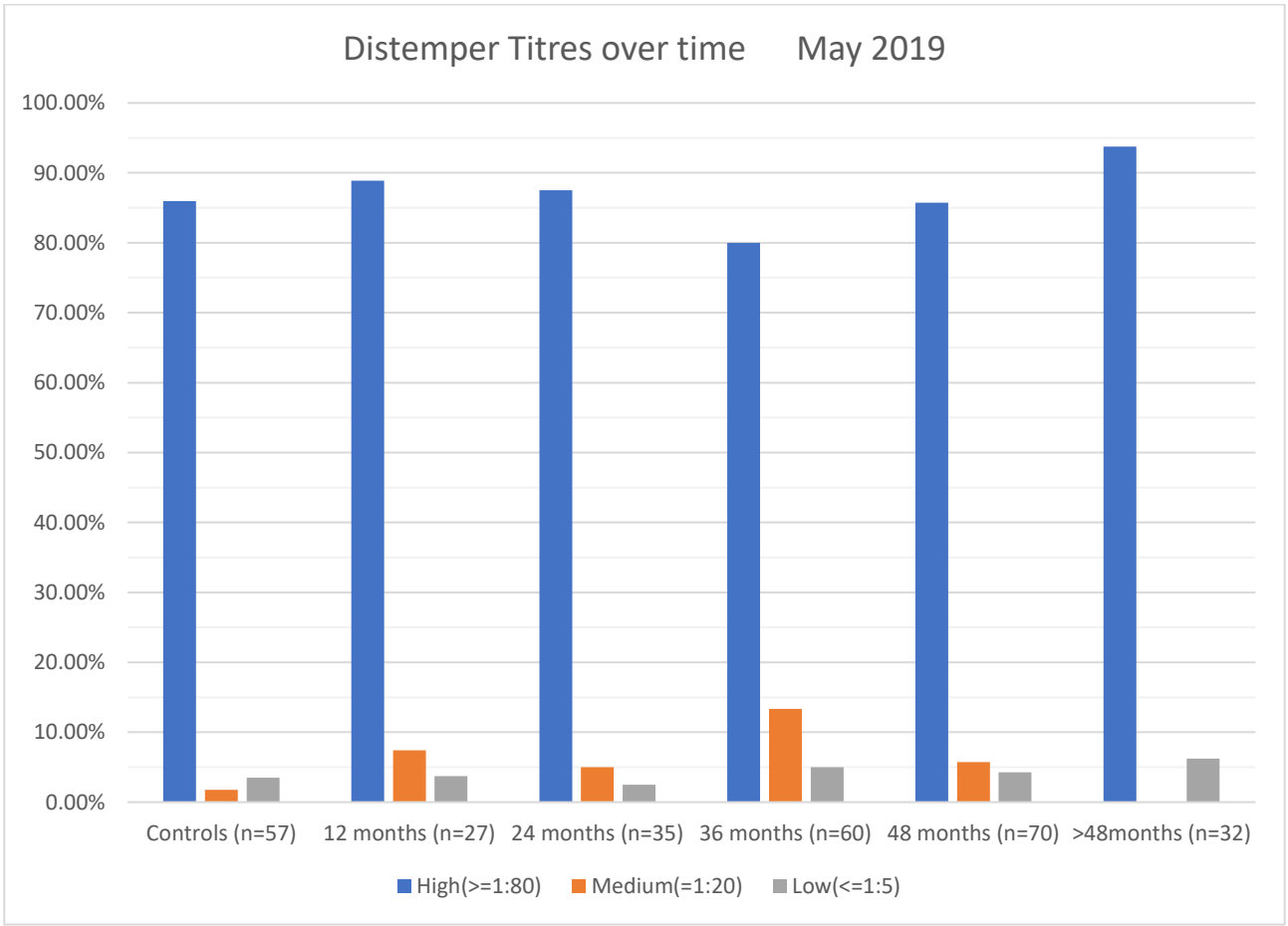
For all dogs, with respect to parvovirus testing 89.5% had high titres, 7.7% had medium titres and 2.2% had low titres. For distemper testing, 89.5% had high titres 6.2% had medium titres and 4.3% had low titres.

Multiple statistical T-tests were performed comparing the average titre levels between the control and test groups ($P<0.05$). These showed that the was no significant difference between control and test groups and between each of the test groups for parvovirus and distemper. Multiple statistical T-tests were performed comparing the percentage of high titre levels between the control and test groups ($P<0.05$). These showed that there was no significant difference in between control and test groups and between each of the test groups for parvovirus and distemper, respectively. When comparing data from pre 2017 to post 2017, there was an overall increase in the percentage of high titre dogs but there was no significant change to percentage groups for each duration category for parvovirus and distemper.

There was no evidence that vaccine type or manufacturer determined the level antibody titres in any group.

The graphs below show the distribution of titres for control and sample groups for parvovirus and distemper. The duration on the horizontal access represents the time between known vaccination and titre testing.


Parvovirus Titres over time May 2019
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Controls (n=57)
12 months (n=27)
24 months (n=35)
36 months (n=60)
48 months (n=70)
>48months (n=32)
High(>=1:80)
Medium(=1:20)
Low(<=1:5)


Distemper Titres over time May 2019
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Controls (n=57)
12 months (n=27)
24 months (n=35)
36 months (n=60)
48 months (n=70)
>48months (n=32)
High(>=1:80)
Medium(=1:20)
Low(<=1:5)

In May 2017, we conducted a review of all the canine antibody tests that we had performed between 2012 and 2017 to assess the prevalence of circulating antibodies to canine parvovirus and canine distemper following vaccination in adult dogs.

Canine distemper has not been reported in Western Australia since at least 2006.[1] The last confirmed case that we saw at Applecross Veterinary Hospital was in 1988. It has however been reported in other states of Australia.

Canine parvovirus is frequently reported in Western Australia but the exact numbers of cases are poorly documented. There is also debate concerning the diagnosis of the disease and the distinction between those dogs that may show a positive test for parvovirus in the faeces and have no symptoms compared to those dogs that have true necrotising enteritis from infection. Suffice to say the virus is sufficiently prevalent to justify prophylactic vaccination in all dogs.

There is also significant debate regarding the requirement for ongoing vaccinations and significant misunderstanding and misconceptions regarding vaccination protocol. Currently, all manufacturers of parvovirus vaccines in Australia have legitimate claims that their vaccines are cross protective against all currently known strains of parvovirus presently known to be in Australia – 2a, 2b and 2c.

The first misconception regards the registration and label claims of the vaccine. Label claims give a <u>minimum</u> expected duration of immunity not a maximum. This means that in a normal immunocompetent dog a vaccine with a 12-month label claim would be expected to produce protective antibodies for at least 12 months and a vaccine with a three-year label claim would be expected to produce protective antibodies for at least three years. However, these vaccines may and usually do induce immunity for much longer than their label claim.[2]

The second misconception is that low levels of antibody indicates may indicate risk. Any level of antibody confirms prior exposure, the presence of immune memory cells and in a normal immunocompetent dog, the ability to produce protective/high levels of antibodies within sufficient time to protect them from the disease. This means that having low antibodies does not mean that a dog is unprotected – it may simply mean that the dog has not had recent exposure.

The third misconception is that by re-vaccinating a known immune dog it will somehow improve its “immunity”.

Our aim was to review those adult dogs that had had antibody testing to distemper and parvovirus. The sample consisted of 201 dogs. No exclusions were made for gender, breed or age except that no dogs younger than 12 months of age were tested. To the best of our knowledge all dogs had been

adequately vaccinated as puppies and no dogs had had a previous diagnosis of parvovirus infection. Dogs were divided into a control group which consisted of adult dogs where we had no accurate data on the timing of the previous vaccination (n=27), group 1 which consisted of dogs that had been vaccinated 12 months or less prior to testing (n=21), group 2 which consisted of dogs that had been vaccinated between 12 to 24 months prior to testing(n=34), group 3 which consisted of dogs that had been vaccinated between 24 to 36 prior to testing(n=46), group for which consisted of dogs that have been vaccinated between 36 months and 48 months prior to testing (n=49) and group 5 which consisted of dogs that had been vaccinated more than 48 months prior to testing(n=24).

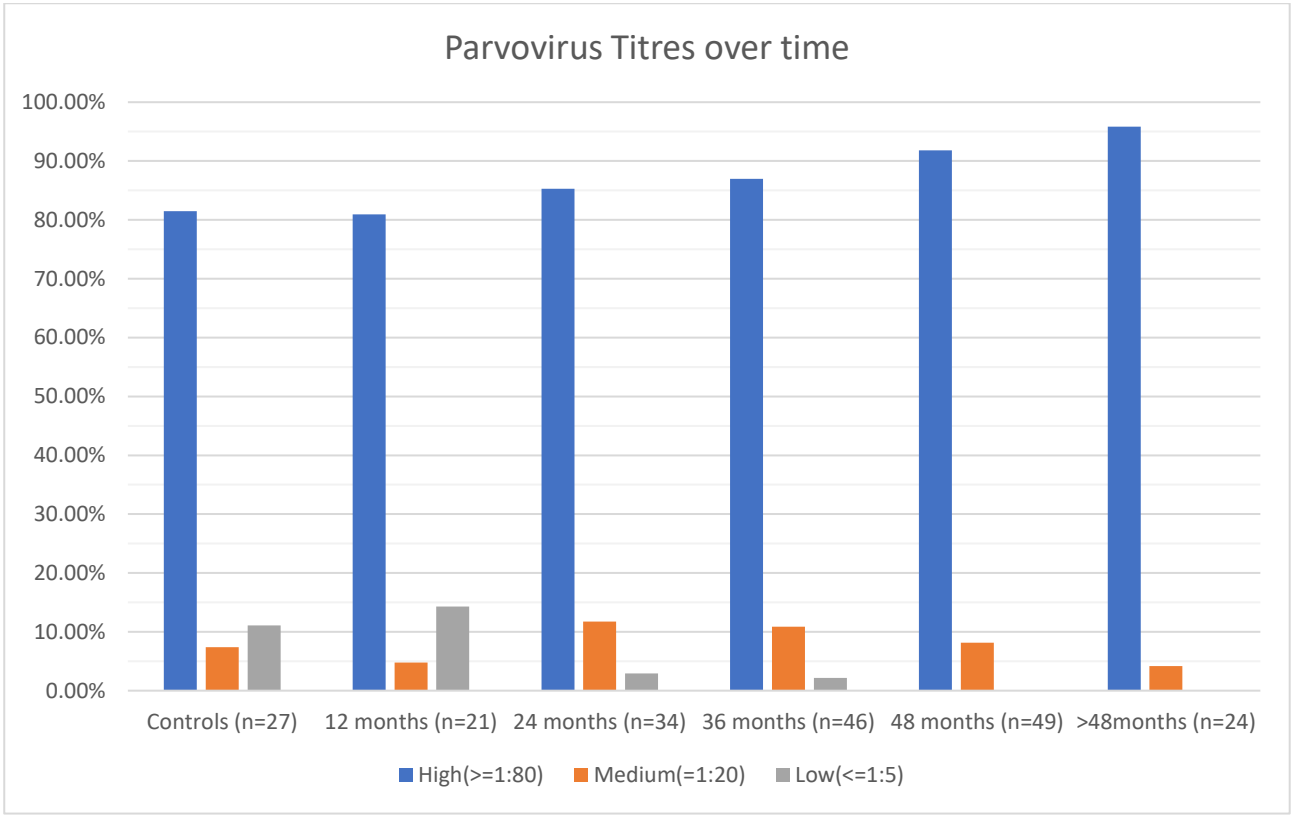
Blood samples were collected and submitted to an independent reference laboratory and analysed using commercially available antibody tests. Assays were performed using a dilution titre test.[3,4,5] Results were reported as high titres (greater than or equal to 1:80), medium titres (1:20), low titres (1:5) and undetectable titres (less than 1:5) for both parvovirus and distemper virus. However, for statistical analysis low and undetectable titre groups were combined.

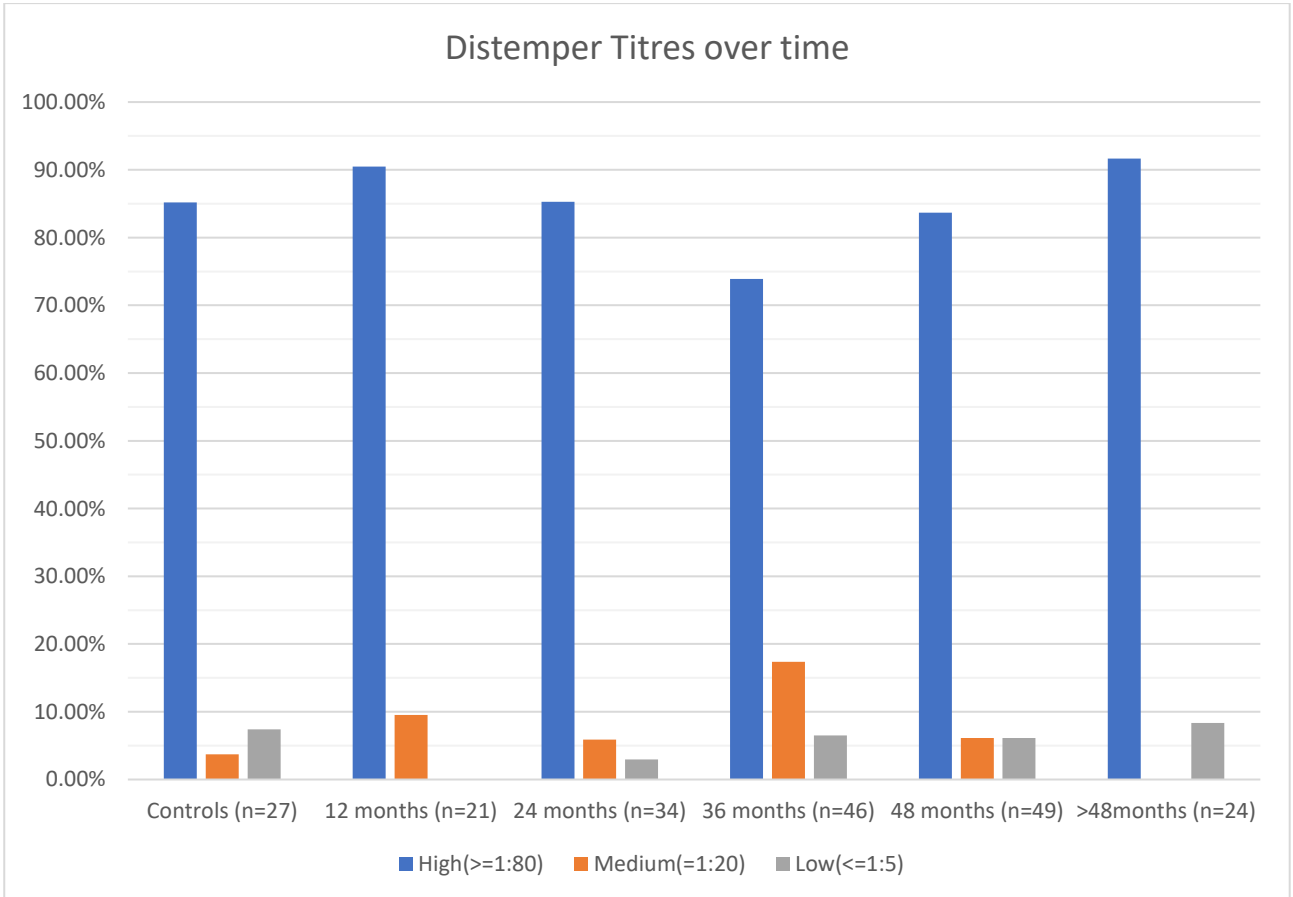
For all dogs, with respect to parvovirus testing 87.5% had high titres, 8.5% had medium titres and 4% had low titres. For distemper testing, 85.6% had high titres 8.2% had medium titres and 6.1% had low titres.

Multiple statistical T-tests were performed comparing the average titre levels between the control and test groups ($P<0.05$). These showed that the was no significant difference between control and test groups and between each of the test groups for parvovirus and distemper. Multiple statistical T-tests were performed comparing the percentage of high titre levels between the control and test groups ($P<0.05$). These showed that there was no significant difference in between control and test groups and between each of the test groups for parvovirus and distemper, respectively.

There was no evidence that vaccine type or manufacturer determined the level antibody titres in any group.

The graphs below show the distribution of titres for control and sample groups for parvovirus and distemper.


Parvovirus Titres over time
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Controls (n=27)
12 months (n=21)
24 months (n=34)
36 months (n=46)
48 months (n=49)
>48months (n=24)
High(>=1:80)
Medium(=1:20)
Low(<=1:5)


Distemper Titres over time
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
Controls (n=27)
12 months (n=21)
24 months (n=34)
36 months (n=46)
48 months (n=49)
>48months (n=24)
High(>=1:80)
Medium(=1:20)
Low(<=1:5)

The conclusions that we have made from this study have confirmed that currently available vaccines against distemper and parvovirus produce antibody responses beyond the manufacturers label claims.

Our sample cohort of dogs showed that more than 84% of mature dogs have high titres against distemper and parvovirus four years of more after vaccination. It would be prudent to only vaccinate any mature dog with low or no antibodies based on antibody testing.

References

1. SE Wyllie, M Kelman and MP Warda. Epidemiology and clinical presentation of canine distemper disease in dogs and ferrets in Australia, 2006–2014. *Aust Vet J*. Volume 94, No 7, July 2016: 215-222

2. SA Mitchell, RJ Zwijnenberg J Huang A Hodge and MJ Day. Duration of serological response to canine parvovirus-type 2, canine distemper virus, canine adenovirus type 1 and canine parainfluenza virus in client-owned dogs in Australia. *Aust Vet J*. Volume 90, No 12, December 2012:468-473

3. L Twark, WJ Dodds. Clinical use of serum parvovirus and distemper virus antibody titers for determining revaccination strategies in healthy dogs. *JAVMA*, Vol 217, No. 7, October 2000:1021-1024.

4. Canine Parvovirus and Distemper Immunofluorescent (IFA) Antibody Kit, Fuller Laboratories, California, USA.

5. Vetpath Laboratory Services, 39 Epsom Avenue, Ascot, WA 6104