Diagnostic Testing Guidance for Responding to Outbreaks of Canine Distemper, Canine Parvo, or Feline Panleukopenia

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Antigen tests (SNAP tests) detect some part of the pathogen of interest, and when present typically means the animal is infected (and possibly infectious). For canine distemper, this is generally a send-out PCR test. For canine or feline parvo (panleukopenia) this is often an in-house test (e.g. Idexx SNAP ELISA test).

Titer testing (also called serology) is a test that detects antibodies, which are the immune system's response to a particular antigen.

Diagnostic testing decision-making rubric for animals exposed to CDV, CPV, or FPV

Clinical signs now?	Previous clinical signs?		To label as low risk:	
			Needs titer test	Needs negative antigen test*
No	No	→	Yes	No
No	Yes	→	Yes	Yes ◊
Yes	No	→	Yes ◊	Yes ◊ (do this before titer test; titer if negative only)
Yes	Yes	→	Yes ◊	Yes ◊
No	?	→	Yes	Yes
?	?	→	Yes	Yes

* Typical antigen test for CDV = respiratory PCR; Antigen test for CPV/FPV = Fecal Antigen test (e.g. Idexx SNAP test)

◊ Generally, you only titer test asymptomatic animals, but you can pair titer testing with antigen testing at the same time in exposed animals to help with risk assessment. Titer testing a sick animal without an antigen test has no value!

WHAT IS ANTIGEN TESTING FOR?

Provides a better understanding of who poses an infection risk to other animals in the population (who may be infectious) at this point in time.

- *Why do it?* isolate/remove animals who are infectious from the population
- *What are the tests?*
  - Canine distemper: send PCR testing for only CDV in known outbreak (i.e. respiratory PCR panel is not needed)
  - Canine parvo/feline panleukopenia: in-house fecal antigen test (e.g. SNAP test); ok to use canine test for cats.
- *Interpretation*:
  - Positive means you regard the animal as infectious until proven otherwise; do not perform or interpret the titer test.
  - Negative means the animal is not infectious at this time (they might become so in the future). Review titer test and current clinical signs of disease.

WHAT IS TITER TESTING FOR?

Provides a better understanding of who is most at risk for becoming infected/ill. In an outbreak, we generally recommend every exposed animal gets titer tested, and some animals should also be antigen tested (see above table). If the antigen test is positive, the titer test result doesn't matter (regard the animal as infectious).

- *Why do it?* Sort exposed shelter animals into high and low-risk categories to start to disrupt and manage a disease outbreak. Titer testing helps with
  - Eliminating or reducing the number of animals needing to be quarantined following disease exposure.
  - Knowing which animals to house in different housing areas in order to establish/maintain a clean break (more info below).
  - Performing a risk assessment for animals with known/high exposure (say a kennel mate has CDV- probably doesn't matter for a healthy adult animal with a protective titer).
  - Moving low-risk animals out of the shelter as quickly as possible (e.g. the healthy kennel mate to the sick dog in the example above) so that resources can be focused on addressing the outbreak.

In animals who are not currently infected, a protective titer indicates that they will not become infected or ill if exposed to the pathogen of concern. In other words, they are 'low risk.' A low aka non-protective titer indicates that they MAY become infected/ill if exposed to CDV/CPV/FPV ('high risk'). While there is good evidence supporting categorizing exposed animals in this way note that we do not call any animal "no risk."

- *What are the tests?*
    - Vaccicheck in-house test kits (use species-specific kit, https://vaccicheck.com/)
    - OR send out to UW CAVIDS Titer Testing Lab or other diagnostic lab of your choosing (https://www.vetmed.wisc.edu/lab/cavids/)
- *Interpretation:*
    - Animals 5 months and older who are healthy (antigen test negative):
        - IF protective titer: consider the animal low risk for becoming ill, handle + move along (out!) as normal.
        - IF no/non-protective titer: consider animal high risk. Revaccinate ASAP 2 weeks after their previous vaccination (no matter how many vaccinations they've already had). Isolate to protect from exposure. Move along with careful handling. Communicate risk status to adopters.
    - Pups younger than 5 months (<20 weeks of age) who are healthy + antigen test negative):
        - Protective titer: consider them a low risk for becoming ill, handle + move along as normal AS QUICKLY AS POSSIBLE. Titer may be transient! (Risk can become high as maternal antibodies wane). Can repeat titer 1 week after next vaccine if still in the shelter.
        - No/Non-protective titer: consider them high risk. Revaccinate ASAP 2 weeks after their previous vaccination (no matter how many vaccinations they've already had). Isolate to protect from exposure. Move along/out of the shelter ASAP with careful handling. Communicate risk status. Can repeat titer 1 week after next vaccine if still in the shelter.

WHAT IS A CLEAN BREAK?

A clean break in an animal shelter outbreak situation means establishing one or more housing areas in the shelter in which healthy, non-infectious dogs (unexposed animals and/or new admissions) are protected from disease exposure.

When you have a lot of animals to test and/or limited personnel available to perform the testing, here is one way to prioritize testing (antigen and/or titer testing):

- First priority: animals who appear ill or have had consistent clinical signs in the recent past and have good prospects for a live outcome.
    - Testing strategy: Antigen test followed by titer (can do at the same time for efficiency, but titers are not useful in animals who have a positive antigen test)
- Second priority: animals who can leave quickly if deemed low risk for infection
    - Testing strategy: Titer; PCR if clinical signs noted (past or present)
- Third priority: Everybody else (or describe your own priorities beyond 1 + 2 above)

○ Testing: Titer; PCR if clinical signs noted (past or present)

RECOMMENDATIONS FOR PREVENTING FUTURE OUTBREAKS

- Designate one housing area where ONLY sick animals are housed. Animals in the isolation ward are never cohoused unless they came in together. Move sick animals out of the general population and into the isolation ward when clinical signs are noted +/- pending diagnostic testing results.
- Daily health monitoring: place concern reporting clipboards in all wards housing animals. Train staff to report health concerns. Consider providing a specific list of signs you want staff to report (e.g. not eating, snotty nose, etc.)
- Population management rounds: one person or a team of personnel review the list of animals in care and what their current realistic pathway plan is. Determine if each animal has any unmet needs in that moment and discuss whether their current pathway plan is appropriate in the context of that animal's needs as well as the needs of the overall population at that time. Ideally performed daily but if this is not feasible do it as often as possible on a regular basis.
- Make proactive pathway decisions: if an animal is showing a behavioral and/or medical problem that puts them at risk for euthanasia OR a long stay in the shelter (i.e. hard to transfer and adopt), consider euthanasia sooner rather than later.
    - Make a label for these animals (e.g. "TBD") and assign it to animals as soon as concerns are noted. Review the list of animals with this label during population rounds. Note if improvement, worsening, or no change has been seen. Factor that into decisions to seek placement, perform diagnostic testing/disease risk assessment, or euthanize.
    - This label does not mean that these animals will or must be euthanized, but it is a tool to help your team be clear about how many of these difficult animals you have at any single time. This clarity is important not because you're euthanizing for space or time, but because your team probably cannot provide humane care to 100 high-needs animals at one time and expect them to thrive, but your team might be able to do a great job providing individualized and advanced care for 10 high needs animals.
- Routinely house animals in double-compartment housing without co-housing unrelated animals, and aim to routinely be managing your population with no more than 80% of your housing full (so that you have empty kennels for those emergency situations that will pop up occasionally). If the number of animals currently in your care exceeds your capacity for care, you are probably stretching your team thin, compromising the welfare of the animals in care, and not optimizing your community's life-saving potential.

ADDITIONAL RESOURCES

If you would like to learn more outbreak risk assessment and diagnostic testing we recommend the following resources:

- Risk Assessment: How do you decide how much to worry about exposed animals? (Chapter 5 of the Canine Parvovirus Guidebook) www.sheltermedicine.com/library/guidebooks/?r=canine-parvovirus/risk-assessment-how-do-you-decide-how-much-to-worry-about-exposed-animals

- Shelter Medicine for Veterinarians and Staff. 2nd ed.
    - Chapter 16: Strategies for Management of Infectious Diseases in a Shelter
    - Chapter 17: Epidemiology of Infectious Diseases in Shelter Populations
    - Chapter 19: Disease Recognition and Diagnostic Testing
    - Chapter 21: Outbreak Management

- Infectious Disease Management in Animal Shelters. 2nd ed.
    - Chapter4: Diagnostic Testing
    - Chapter 6: Outbreak Management

CONTACT US

Have questions or need additional support? Email us at sheltermedicine@ucdavis.edu.