FELID TAXON ADVISORY GROUP
PREVENTATIVE MEDICINE RECOMMENDATIONS

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ROUTINE EXAMINATIONS

A routine examination schedule should be part of a comprehensive preventative medicine program for each institution holding felid species. Examinations under anesthesia should be performed at least every 2-3 years, but that frequency will be dependent on the age and history of the individual, the species, and the vet staffing of the facility. Many components of routine examinations can be done in between full anesthesia (e.g. in years when no full exam is planned or opportunistically) with training and visual examinations, including assessment of body condition, weight, blood draws, and palpation or visualization of specific body parts. However, this does not replace regular examinations under anesthesia for more thorough physical and diagnostic examinations.

Recommended components of routine examinations:

1) Minimum
    a) Complete physical examination under anesthesia
    b) Bloodwork:
        i) Complete blood count (CBC) with manual differential and hemoparasite examination
        ii) Serum chemistry panel
        iii) Serum banking
    c) Urinalysis, if possible
2) Recommended:
    a) Serology
        i) Baseline serology is recommended at preshipment examination (see below), repeat testing recommended at routine examination if there is a specific disease concern.
            (1) Feline Leukemia Virus (FeLV)
            (2) Feline Immunodeficiency Virus (FIV)
            (3) *Toxoplasma gondii*
            (4) *Dirofilaria immitis* (canine heartworm) antibody as applicable by region
    b) Radiographs every 2-3 years
    c) Ultrasonographic evaluation every 2-3 years if available

VACCINATIONS

Vaccination of felids are based on recommendations made by the American Association of Feline Practitioners (AAFP)[1] as well as on specific risks to non-domestic felid species and captive situations and risks factors. Vaccination recommendations made by the veterinary advisors are divided into core (recommended for all felids) and non-core (optional depending on the specific disease risk of the species and institution, not generally recommended). Although vaccine-associated sarcomas have been reported rarely in the non-domestic felid literature to date, it is recommended by this group to note the site of vaccination, along with the lot of the vaccine. Vaccines under anesthesia can be given in defined sites on the limbs. The frequency of vaccination varies among institutions. Challenge and serology studies in domestic cats have shown that protection is ensured for at least three years for the killed rabies vaccine and the killed and modified live combination vaccine (panleukopenia, calicivirus, herpesvirus).[2,3] Due to the lack of serology studies and difficulty performing challenge experiments on non-domestic felids, specific information on length of protection from vaccination is lacking, so specific recommendations for vaccination frequency cannot be made, although most AZA institutions report a frequency of every 1-3 years for the core vaccines. A few AZA institutions currently assess need to vaccinate based on titer levels; however, which titer level is protective is not currently known for non-domestic felids species.

1) Core vaccines
    a) Rabies (killed, e.g. Imrab 3®, Merial; or recombinant canarypox-vectored, e.g. PureVax Rabies®, Merial)
    b) Feline panleukopenia, calicivirus, herpesvirus (killed, e.g. Fel-O-Vax®, Fort Dodge)
2) Non-core vaccines
    a) Canine distemper virus (CDV) only if risk is deemed high (ideally recombinant canarypox-vectored, PureVax Ferret Distemper®, Merial)
        Modified live CDV vaccines are not recommended
    b) FeLV only if risk is deemed high for certain species (killed)

PARASITOLOGY

A fecal monitoring program is encouraged for all captive felids. Individuals should be treated based on current veterinary medical standards. Animals should be examined for ectoparasites at each physical examination, including fleas, ticks, flies, and other parasites.

QUARANTINE

Quarantining of captive felids is of utmost importance in order to protect the rest of the collection from infectious diseases. Each institution has its own method of quarantine for different species. Ideally, quarantine should occur in an off-exhibit area separate from other animals, especially other carnivores. Proper sanitation and protective equipment, including

footbaths and removable clothing, when applicable, should be part of the quarantine protocol. Quarantine for all felid species should be at least 30 days.

Preshipment examination is the first step in the process of adding new felids to a collection, and both a thorough preshipment and quarantine examination under anesthesia are recommended. The preshipment examination provides the receiving institution with important information to assess whether specific diseases may be introduced into the existing felid collection and pose an unacceptable risk. The preshipment exam also serves as a baseline for comparison with the results of the quarantine examination. The examination during the quarantine period provides vital information about the animal after shipment and a change in environment, and is an excellent time to gather samples to assess shedding of parasites, recurrence of diseases, as well as to store samples and acquire baseline information for the future.

Recommended components of preshipment examinations:

1) Minimum
    a) Complete physical examination under anesthesia
    b) Body weight
    c) Blood work:
        i) CBC with manual differential and hemoparasite examination
        ii) Serum chemistry panel
        iii) Serology to assess whether specific diseases may be introduced into the existing felid collection.
            (1) FeLV
            (2) FIV
            (3) *Toxoplasma gondii*
            (4) *Dirofilaria immitis* antibody as applicable by region
2) Recommended
    a) Urinalysis, if possible
    b) Thoracic and abdominal radiographs if feasible
    c) Ultrasonographic evaluation if feasible
    d) Fecal parasite examination

Recommended components of quarantine examinations:

1) Minimum
    a) Complete physical examination under anesthesia
    b) Body weight
    c) Blood work
        i) CBC with manual differential and hemoparasite examination
        ii) Serum chemistry panel
        iii) Bank serum for future serology
    d) Urinalaysis, if possible
    e) Permanent identification
    f) Thoracic and abdominal radiographs as baseline
    g) Ultrasonographic evaluation as baseline
2) Recommended:
    a) Three negative fecal parasite examinations during quarantine period

INFECTIOUS DISEASE TESTING

Test Definitions & Uses:
It is important to understand the different types of tests for infectious diseases because some tests document exposure while others document the presence of the infectious agent itself.

1) ELISA (enzyme-linked immunosorbent assay)

An ELISA is an assay for detection of either antibodies against a certain infectious agent or antigens (typically proteins produced by the infectious agent). If an ELISA is an antibody test, it can be used to document ***exposure*** to an infectious agent not the presence of the agent itself. This does not necessarily imply that the animal has that disease, only that the immune system has been exposed to the disease and mounted a response. In some tests, antibodies produced as a result of vaccination will give a "positive" test result, therefore results need to be interpreted with caution and in light of vaccination history. ELISAs that test for antigens are a more direct test for the presence of the infectious agent, but are less commonly available.
Test results can be reported as either positive, negative, or with a titer (e.g. 1:50). Titers can vary by laboratory and repeated tests should only be compared if tests were conducted using the same laboratory.

2) SN (Serum Neutralization)

Serum neutralization tests detect the presence of antibodies to a virus and thus document ***exposure*** to an infectious agent similar to an ELISA. SN utilizes the ability of antibodies produced by the animal to neutralize the ability of a virus to infect cells and cause damage. Results are typically quantitative and reported as titers, therefore collection of blood samples from two time points during infection (e.g. during the initial stage of infection and some time after) can indicate a "rising" titer and thus an active infection. The higher the number, the more antibodies against the infectious agent.

3) PCR (Polymerase chain reaction)

PCR is a very sensitive test for the presence of RNA or DNA from a given target (e.g. viral RNA) within a sample and therefore is a more direct test for the presence of the infectious agent. PCR is useful for detecting shedding of viral particles and utilizes very small amounts of tissue and or swabs of affected areas. Real-time PCR is a variant of regular PCR and works using the same principles. When submitting samples for PCR, carefully review the laboratory's guidelines for sample submission and transport.

4) Virus Isolation

Isolation of the virus from tissues, fluids, or swabs identifies the virus within the submitted sample. While virus isolation is the most laborious (and thus expensive) test, the virus, once

isolated, can be further studied to determine whether it is a new strain and research can possibly identify where the virus originated (e.g. domestic cat strain vs. raccoon strain).

FELID INFECTIOUS DISEASE TESTING LABS

1) Feline Herpes Virus (FHV)

Serum neutralization (SN) is the most commonly available test for feline herpes virus exposure. However, this test cannot distinguish between antibodies from natural disease versus vaccination. If you suspect an active case, virus isolation from biopsies of the conjunctiva or swabs of the conjunctiva, nasal and/or oropharyngeal region can identify and characterize the virus. Swabs should be sent in transport media or saline and shipped overnight on cold packs. PCR can also be conducted on conjunctival biopsies to confirm active infection.

Recommended laboratories:

Veterinary Diagnostic Laboratory at Cornell University (www.diaglab.vet.cornell.edu)
- Serology (serum neutralization)
- Virus isolation

The University of Tennessee College of Veterinary Medicine
(http://www.vet.utk.edu/diagnostic/virology/index.php)
- PCR
- Virus isolation

2) Feline Enteric Coronavirus (FCoV)

For cheetahs, current recommendations include both serology (testing for antibodies) AND testing of fecal samples by PCR for active shedding. There are two types of feline coronavirus (type I and II). Currently, the University of Tennessee laboratory is the only laboratory that tests for antibodies against both virus types. To test for fecal shedding, five consecutive fecal samples from each cheetah should be quickly frozen (-20 C or -70 C) then shipped to the University of Tennessee (Dr. Melissa Kennedy) (submission information and forms can be downloaded from *www.vet.utk.edu* then click on Diagnostic Services, then Virology; or email Melissa Kennedy at <mkenned2@utk.edu>). Serum should also be taken during routine exams.

Recommended laboratory:

The University of Tennessee College of Veterinary Medicine
(http://www.vet.utk.edu/diagnostic/virology/index.php)
- Serology
- PCR for fecal shedding

3) Feline Leukemia Virus (FeLV)

ELISA is the most common and available serological test used to screen for FeLV infection. This ELISA tests for the presence of antigen (not antibody) and thus a positive result usually means that the animal is viremic (has virus circulating in the blood). However, viremia can be transient in some cases resulting in a negative result. Additionally, if exposure was recent, retesting a minimum of 28 days after the last possible exposure is recommended. False positive results are also known to occur in non-domestic felids and also when whole blood is used. Therefore, if positive, results should be repeated in 2-3 weeks to confirm. Testing at a second lab that uses a different ELISA kit is also recommended as differing kits have different cross-reactivity with non-domestic felid sera. Additional follow-up tests to discriminate discordant results are the indirect immunofluorescent antibody test (IFA), which tests for cell-associated antigen, and PCR.

Recommended Laboratory:

Veterinary Diagnostic Laboratory at Cornell University (www.diaglab.vet.cornell.edu)
- Serology (ELISA)

4) Feline Immunodeficiency Virus (FIV)

ELISA is the most common serological test used to screen for antibodies against FIV. Because this assay was developed for use in domestic cats, there can be nonspecific reactivity of other felid serum. Positive and/or equivocal results can be tested for specificity (confirmation) using a Western Blot. Cornell will automatically perform a Western Blot on equivocal samples.

Recommended laboratory:

Veterinary Diagnostic Laboratory at Cornell University (www.diaglab.vet.cornell.edu)
- Serology (ELISA)
- Western Blot

5) Feline Calicivirus

Currently, vaccination for calicivirus is standard practice at most captive facilities, therefore serology may not be useful, as antibodies may be due to vaccination rather than current exposure. If an institution experiences an outbreak and would like to determine if disease is due to calicivirus, the virus can be identified by either virus isolation or PCR. No specific laboratories are recommended.

6) Canine Parvovirus or Feline Panleukopenia Virus

Similar to calicivirus, vaccination is standard practice at most captive facilities. Antemortem diagnostic tests on clinical cases of enteritis include electron microscopy or PCR assays on feces. No specific laboratories are recommended.

7) Canine Distemper Virus (CDV)

Serology using a serum neutralization assay is the most common test for Canine Distemper Virus infection. If this is suspected in a felid, it is recommended to contact the laboratory regarding the case prior to submission. The laboratory assay offered at the Cornell Diagnostic Laboratory has been utilized extensively to diagnose CDV in felids.

Recommended laboratory:

Veterinary Diagnostic Laboratory at Cornell University (www.diaglab.vet.cornell.edu)
- Serology (Serum neutralization)