

Animal Health Diagnostic Center

AHDC Contacts

Phone: 607-253-3900
Fax: 607-253-3943

Web: diagcenter.vet.cornell.edu
E-mail: diagcenter@cornell.edu

AHDC FACT SHEET

Testing for *Anaplasma*, *Ehrlichia*, *Babesia* and Other Similar Agents at the Animal Health Diagnostic Center and our Referral Partner Laboratories

All Host Species

Some of the agents of concern when considering blood parasite-related diseases may be detected by examination of blood smears, depending on the stage of infection. They will not be detected on automated hemograms or CBCs. The following is a list of tests offered by the [Animal Health Diagnostic Center \(AHDC\)](#) that include blood smear evaluation:

Blood Smear Examination
Hemogram (CBC), routine
Hemogram, partial
Red Blood Cell Exam, parasites

Genera-specific PCR tests, or broad PCR panels may be the most appropriate to test samples from species for which serological testing has not been developed or validated, such as wildlife or exotic species or some minor domestic species. The tests would require EDTA whole blood from a live animal. In the event that only post-mortem samples are available, EDTA unclotted heart blood could be used. In addition, spleen may be tested by some laboratories.

Call the AHDC (607-253-3900, ask to speak with one of the VSS veterinarians) with questions regarding the testing of non-equine/canine/feline/bovine species for tick-borne diseases in the genera *Anaplasma*, *Ehrlichia*, *Babesia*, *Bartonella*, and *Rickettsia*

Equine

Anaplasma phagocytophilum is the bacterial agent formerly called *Ehrlichia equi*. Illness can include a range of non-specific signs, including but not limited to fever, anemia, icterus, swollen stiff legs. It can be detected in blood smears early in the course of clinical infection and illness as morula in neutrophils, or by PCR of whole blood samples (EDTA blood) or later by antibody seroconversion with an IFA test.

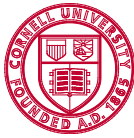
Neorickettsia risticii is the bacterial pathogen formerly called *Ehrlichia risticii*, the causative agent of **Potomac Horse Fever**. Illness can include a range of signs consisting of fever, anorexia, lethargy, depression, abdominal pain (colic) diarrhea, dehydration (even preceding diarrhea), laminitis, toxemia, and abortion. Infection is detected by PCR of whole blood samples (EDTA blood) or antibody seroconversion by IFA test.

Borrelia burgdorferi (Bb) is the bacterial causative agent of **Lyme disease**. Clinical signs associated with Bb infection in horses have been poorly defined, but may include shifting leg lameness, hypersensitivity to touch, uveitis, neurologic signs. Antibodies indicating prior infection are detected in serum of horses at the AHDC laboratory using the Lyme Multiplex assay. In addition, a PCR test may be used to detect the organism's DNA in tissue, for example in synovial tissue from inflamed joints or in CSF or ocular fluid, but it involves more invasive sampling. Whole blood PCR assays are only rarely positive, and may not be useful in routine diagnostic applications.

Babesia caballi and *Theileria equi* (formerly *Babesia equi*) are considered foreign animal disease agents associated with the illness referred to as **Equine Piroplasmosis**. Testing is often required for import or export purposes and there are occasional US outbreaks generally associated with the importation of positive animals.

Several tests are used, including a competitive ELISA assay referred to as the C-ELISA, and a complement fixation, or CF test, performed at the National Veterinary Services Laboratory (NVSL) in Ames, Iowa. In addition, PCR assays to detect the DNA of the agent have been employed. In acute phases of illness related to infection, the parasites may be detected on Giemsa-stained blood smears, within red blood cells.

It is extremely important for the requestor to be certain of which tests are required by supervising regulatory agencies for the movement of horses.



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Equine Testing Options

Animal Health Diagnostic Center (AHDC – Cornell)

Anaplasma phagocytophilum (formerly *Ehrlichia equi*) PCR (EDTA whole blood)
Neorickettsia risticii (Potomac Horse Fever – *Ehrlichia risticii*) IFA (serum sample)
Neorickettsia risticii (Potomac Horse Fever – *Ehrlichia risticii*) PCR (EDTA whole blood)
Borrelia burgdorferi (Lyme Disease) Lyme Multiplex assay (serum sample)
Borrelia burgdorferi (Lyme Disease) PCR (tissue/fluid sample, *Ixodes scapularis* tick)

Referral Tests (Each test is listed under the default laboratory we use for those tests, but this list may not represent all tests offered by each laboratory. Occasionally, we deviate from our default laboratory choice because of combinations of tests requested.)

National Veterinary Services Laboratory (NVSL - Ames, Iowa)

Babesia caballi (Piroplasmosis) c-ELISA (serum sample)
Babesia equi (Piroplasmosis) c-ELISA (serum sample)
Babesia caballi (Piroplasmosis) CF (serum sample)
Theileria equi (Piroplasmosis) CF (serum sample)

Texas Veterinary Medical Diagnostic Laboratory (TVMDL – Texas A&M University)

Anaplasma phagocytophilum (formerly *Ehrlichia equi*) IFA (serum sample)

Canine

Rickettsia rickettsii is the agent of **Rocky Mountain Spotted Fever**. It causes serious, life-threatening disease in dogs. In addition, diagnosis of infection in dogs can serve as surveillance for the risk of infection from tick bites to people.

Ehrlichia canis is the agent of the illness generally referred to as **Canine Ehrlichiosis**. However, dogs are susceptible to infection by other *Ehrlichia* species, also.

Borrelia burgdorferi is the agent of **Lyme Disease**.

Other tick-borne agents which might play a role in canine illness, in various geographic locations, include *Neorickettsia risticii*, *Anaplasma phagocytophilum*, *Ehrlichia chaffensis*, *Ehrlichia ewingii*, *Anaplasma platys*, *Babesia canis*, *Babesia gibsoni*, *Bartonella henselae*, *Bartonella vinsonii*, *Bartonella clarridgeiae*, and *Bartonella quintana*.

Leishmania infantum has also been detected associated with canine illness in the United States, particularly among dogs in hunting kennels. It is probably transmitted by members of the sandfly family, rather than ticks.

Canine Testing Options

Animal Health Diagnostic Center (AHDC – Cornell)

Ehrlichia canis PCR (EDTA whole blood)
Borrelia burgdorferi (Lyme Disease) Lyme Multiplex assay (serum sample)
Neorickettsia risticii (Potomac Horse Fever – Equine Monocytic Ehrlichiosis) IFA (serum sample)
Neorickettsia risticii (Potomac Horse Fever – Equine Monocytic Ehrlichiosis) PCR (EDTA whole blood)
Anaplasma phagocytophilum (formerly *Ehrlichia equi*) PCR (EDTA whole blood)
Leishmania infantum indirect ELISA (serum sample)

Referral Tests (Each test is listed under the default laboratory we use for those tests, but this list may not represent all tests offered by each laboratory. Occasionally, we deviate from our default laboratory choice because of combinations of tests requested.)

North Carolina State Tick Borne Diagnostic Laboratory

Individual serologies (serum sample):

- *Bartonella henselae*, *Bartonella vinsonii* and *Bartonella koehlerae* Bartonella Serology (by IFA;serum)
- *Babesia canis* IFA (serum sample)
- *Ehrlichia canis* IFA (serum sample)
- *Rickettsia rickettsii* (Rocky Mountain Spotted Fever) IFA (serum)
- *Leishmania infantum* IFA (serum)



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Canine Comprehensive Panel (serum sample and EDTA whole blood): Includes *R. rickettsia*, *E. canis*, *B. canis*, *Bartonella henselae*, *Bartonella vinsonii* and *Bartonella koehlerae* by IFA + *B. burgdorferi* (Lyme Disease), *E. canis*, *Anaplasma*/Heartworm antigen by Snap 4Dx plus PCR testing to detect presence of Babesia, Bartonella, Anaplasma, Ehrlichia, Rickettsia, and hemotropic Mycoplasma organisms.

Individual PCR tests (EDTA whole blood):

- Rickettsia (Spotted Fever group and Typhus group) PCR
- Babesia PCR (positive genus test will include speciation for *B. canis canis*, *B. canis rossii*, and *B. canis vogeli* genotypes; *B. gibsoni* Asian genotype; *B. coco*, *B. conradae*, *B. microti*-like and *B. odocoilei* at no additional charge)
- Anaplasma and Ehrlichia PCR (positive test will include speciation for *E. canis*, *E. chaffensis*, *E. ewingii*, *E. muris*, *E. sp. Panola Mountain*, *A. phagocytophilum*, & *A. platys*, *A. Ovis*, *A. marginale* at no additional charge)
- Bartonella genera PCR (positive test will include speciation for *B. henselae*, *B. vinsonii*, *B. koehlerae*, *B. clarridgeiae*, *B. quintana*, *B. rochalimae* at no additional charge)
- Leishmania PCR for Leishmania spp. In EDTA whole blood or lymph node aspirate (optimal sample is blood enriched with lymph node aspirate)
- PCR Panel tests for all organisms in Babesia genera, Bartonella genera and Ehrlichia genera. Positive samples will be speciated and DNA sequenced as needed.
- Hemotropic Mycoplasma PCR including *M. haemofelis*, *M. haemocanis*, *M. haemominutum*, *M. haematoparvum* and *M. turicensis*

Texas Veterinary Medical Diagnostic Laboratory (TVMDL – Texas A&M University)

- *Anaplasma phagocytophilum* (formerly *Ehrlichia equi*) IFA (serum sample)
- *Babesia* spp. blood smears for export

Feline

Borrelia burgdorferi is the agent of **Lyme Disease**

Cytauxzoon felis is the agent of **Cytauxzoonosis** in cats, a serious, often fatal, protozoal disease affecting domestic cats in the south central and southeastern portions of the United States.

Bartonella henselae is the agent of Cat-Scratch Fever/Disease in people. About 40% of cats are thought to carry *B. henselae* at some time in their lives. Cats that carry *B. henselae* do not show any signs of illness.

Mycoplasma haemofelis (formerly named *Hemobartonella felis*) is the agent of feline infectious anemia, previously known as hemobartonellosis or feline hemotropic mycoplasmosis. Disease in affected cats can represent a wide clinical range from mild anemia to shock.

Feline Testing Options

Referral Tests (Each test is listed under the default laboratory we use for those tests, but this list may not represent all tests offered by each laboratory. Occasionally, we deviate from our default laboratory choice because of combinations of tests requested.)

North Carolina State Tick Borne Diagnostic Laboratory

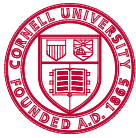
Bartonella serology (serum sample) includes *B. henselae*, *B. vinsonii*, and *B. koehlerae* by IFA

Cytauxzoon felis PCR (EDTA whole blood)

Feline Comprehensive Panel (serum sample and EDTA whole blood): Includes *Bartonella henselae*, *Bartonella vinsonii* and *Bartonella koehlerae* by IFA + *B. burgdorferi* (Lyme Disease), *E. canis*, *Anaplasma*/Heartworm antigen by Snap 4Dx plus PCR testing to detect presence of Babesia, Bartonella, Cytauxzoon, Anaplasma, Ehrlichia, Rickettsia, and hemotropic Mycoplasma organisms.

Laboratories of Vet Medicine, Illinois

Mycoplasma haemofelis (formerly named *Hemobartonella felis*) PCR (EDTA whole blood)



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Bovine

Anaplasma marginale is the agent of bovine Anaplasmosis endemic to many areas of the United States and emerging in non-endemic areas.

Babesia bovis and **B bigemina** are the agents of **bovine Babesiosis**, sometimes referred to as **Cattle Tick Fever** or **Bovine Piroplasmosis**. The United States is currently free of these agents, but they occur in many parts of the world, including Mexico, and areas of Central and South America.

Bovine Testing Options

Animal Health Diagnostic Center (AHDC – Cornell)

Anaplasma marginale c-ELISA test (serum sample)

Referral Tests (Each test is listed under the default laboratory we use for those tests, but this list may not represent all tests offered by each laboratory. Occasionally, we deviate from our default laboratory choice because of combinations of tests requested.)

Iowa State University Vet Diag Lab

Anaplasma marginale PCR test (EDTA whole blood sample; post-mortem fresh spleen)

National Veterinary Services Laboratory

Babesia bovis and *Babesia bigemina* CF or IFA (serum sample)

Tests called **Piroplasmosis, bovine CF** or **Piroplasmosis, bovine IFA**