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Identifying infectious causes of abortion

Adopt the right diagnostic approach

Repeated abortions in a herd or flock are a dramatic event for farmers and can have a severe economic impact on farming operations. A wide range of pathogens—some with zoonotic potential—may be the cause.

The vast number of potential infectious agents makes fast and accurate diagnosis a challenge. Their identification is key to successful treatment or controlling strategies.

Pathogenic agent	ELISA	Real-time PCR	Other*
Anaplasma phagocytophilum		•	
Border disease virus (BDV)	•	•	
Bovine herpes virus type 1 (IBR or BoHV1)	•	•	
Bovine herpes virus type 4 (BHV4)		•	
Bovine viral diarrhea virus (BVDV)	•	•	
Brucella abortus and *Brucella melitensis*	•		•
Campylobacter fetus		•	
Campylobacter spp.		•	
Chlamydophila spp.	•	•	
Chlamydophila abortus		•	
Coxiella burnetii	•	•	
Leptospira hardjo	•	•	
Pathogenic *Leptospira*		•	
Listeria monocytogenes		•	
Neospora caninum	•	•	
Salmonella enterica spp.	•	•	
Schmallenberg virus		•	
Toxoplasma gondii	•	•	

* Agglutination test

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Here we highlight two major ruminant infectious agents and their diagnostics tests:

- *Coxiella burnetii*
- *Neospora caninum*

These pathogens have been shown to be responsible for a large percentage of cases. Diagnostic testing for these two pathogens is therefore an important first step. There is, however, a wide range of other less common pathogens associated with ruminant abortion.

Detection of *Coxiella burnetii*, the causative agent of Q fever in sheep, goats, and cattle

Although *Coxiella burnetii* infection is often asymptomatic, it may lead to reproductive dysfunction and abortion, usually late in gestation in goats, sheep, and less often, cattle. Q fever in humans may cause a dramatic flu-like disease associated with pneumonia and endocarditis. Infection of pregnant women may lead to placentitis, premature birth, or miscarriage.

C. burnetii is highly resistant to heat, drying, and disinfection. Infection occurs through aerosols or direct contact with infected material (e.g., birth materials, milk, urine, feces, ticks, and blood). Even low levels of bacteria may lead to fatal infection. Infection may persist for several years and, in some cases, for the rest of the animal's life.

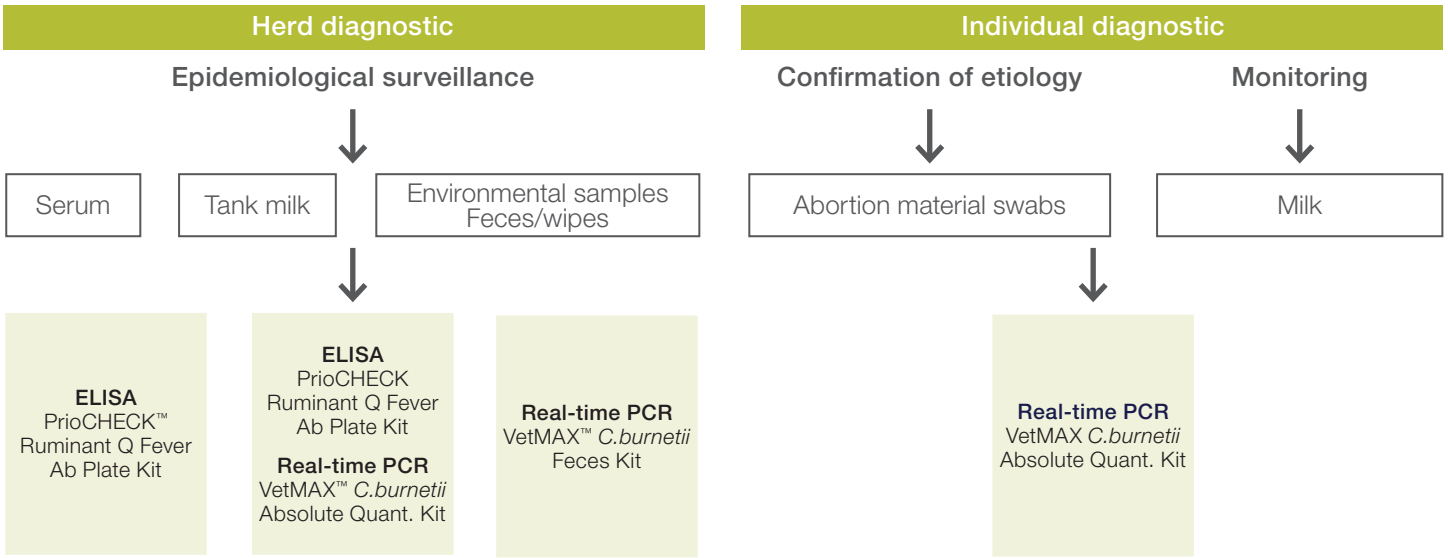
The combined application of ELISA and real-time PCR diagnostic methods can help significantly improve Q fever management. Diagnostic solutions from Thermo Fisher Scientific include effective tools for monitoring, surveillance, and confirmation of clinical cases.

Antibody detection using Applied Biosystems™ PrioCHECK™ ELISA kits at herd level:

- Use to determine seroprevalence in a herd or in a geographical region
- Gives information about the risk of new infections that could occur

Direct proof of bacteria in aborted material with Applied Biosystems™ VetMAX™ real-time PCR kits:

- Identifies coxiellosis (Q fever) as the cause of an abortion
- Measures the acuteness of the infection by quantification of the bacterial load in the sample
- Helps to reduce the risk for laboratory personnel compared to culture method



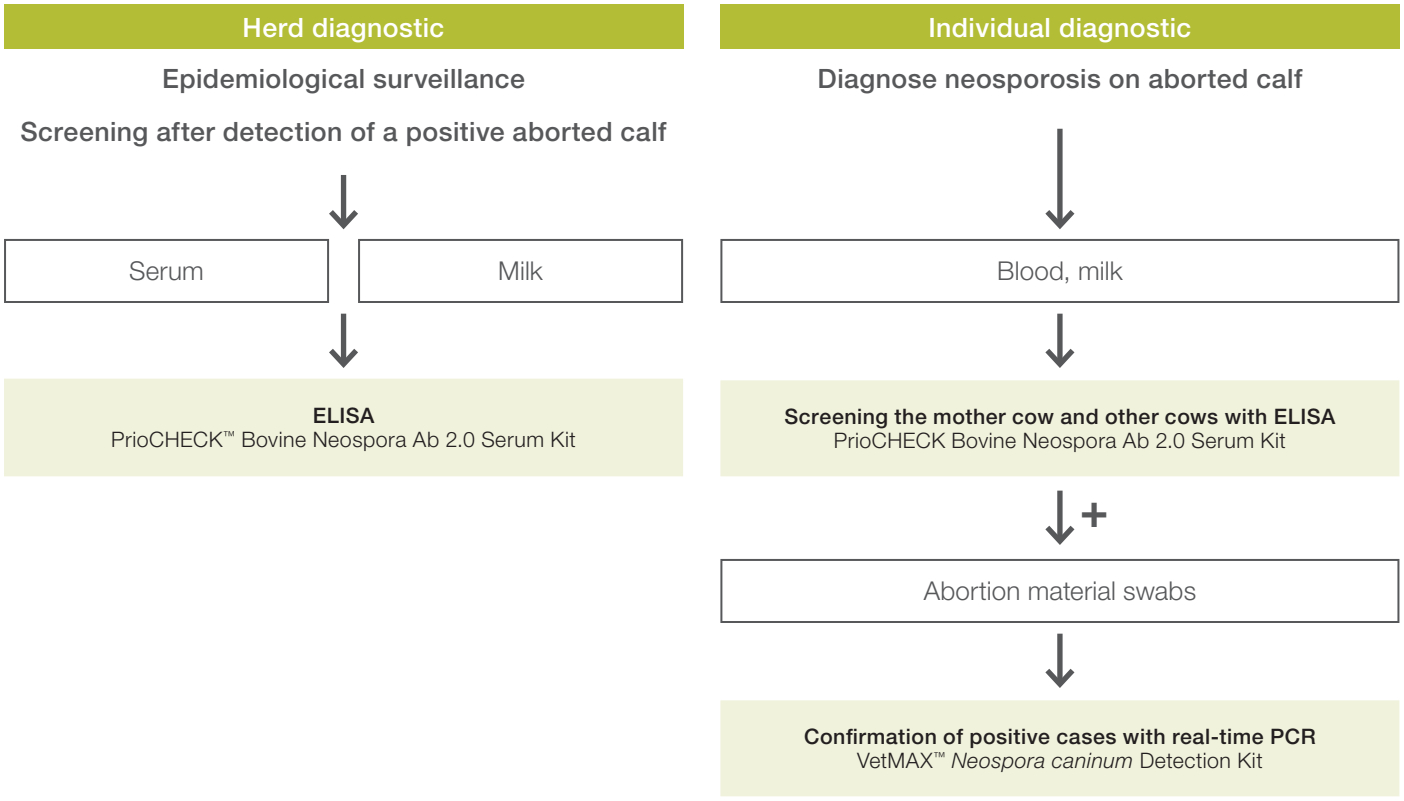
Neosporosis is a major cause of abortion in cattle, goats, sheep, and other animals. The disease is caused by *Neospora caninum*, a protozoan parasite first observed in dogs. Dogs and other carnivores are definitive hosts of the parasite. Cattle, horses, and other animals serve as intermediate hosts for the parasite.

Infection of cattle may lead to abortion as well as to neurological symptoms in infected calves. Most infections occur from mother to offspring (vertical).

Neosporosis may lead to a fatal brain infection in the offspring, or lifelong persistence. Primary infection (after birth) occurs through infected meat and feces.

To help reduce the risk of abortion, infected animals have to be identified and removed from the herd. A combination of ELISA and real-time PCR diagnostic methods should be applied to identify:

- Preexisting *Neospora caninum* infection in a herd
- Geographical region infected



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Simultaneous detection of multiple abortive agents/ pathogens by multiplex PCR

The key to correcting abortion problems is to identify the causes, in order to prevent future abortions. Our abortion screening pack is ideal for a quick and easy way to diagnose infectious abortive agents when testing is not implemented in the laboratory.

The test can also be used when the amount of aborted tissue is limited. The Applied Biosystems™ LSI VetMAX™ Ruminant Abortion Screening Kit Multiplex Detection is a unique multiplex real-time PCR kit that allows for the simultaneous detection of 8 pathogens responsible for abortive diseases in ruminants.

8 DNA pathogens

- *Coxiella burnetii* (detection and quantification)
- *Chlamydophila* spp.
- *Anaplasma phagocytophilum*
- *Listeria monocytogenes*
- *Salmonella* spp.
- BHV4
- *Leptospira* spp. (pathogenic strains)
- *Campylobacter fetus* (*fetus fetus* and *fetus venerealis*)

VetMAX Ruminant Abortion Screening Kit Multiplex Detection

- **Number of tests**: 25
- **Sample type**: vaginal swab or cotyledon swab from the placenta
- **Composition**: 8 ready-to-use mixes and external positive control

Sampling one swab/animal → **One extraction/animal** → **8 DNA pathogens detected simultaneously**

Thermo Scientific™ KingFisher™ Flex Magnetic Particle Processor

Applied Biosystems™ 7500 Fast Real-Time PCR System

Combining PCR and serological diagnostic tools helps to elucidate 6 out of 10 aborted cases.*

* Guatteo R., Nicollet P., Le Dréan E., Ninio C., Maingourd C., Joly A. 2014. *Differential diagnostics of the infectious agents causing abortion in bovines: interest of a multiplex PCR technique within a standardized approach.* Proceeding from: Journées Nationales GTV – Reims 2014.

Find out more at **thermofisher.com/ruminantabortion**

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