Identifying infectious causes of abortion

Repeated abortions in a herd or flock are a dramatic event for farmers and can have severe economic impact on farming operations. A wide range of pathogens – some with zoonotic potential – may be the cause. The large number of potential infectious agents makes fast and accurate diagnosis a challenge. Their identification is key to successful treatment or controlling strategies.

Thermo Fisher Scientific offers a large portfolio of direct and indirect detection of abortion pathogens

<table>
<thead>
<tr>
<th>Pathogenic agent</th>
<th>ELISA</th>
<th>Real-time PCR</th>
<th>Other*</th>
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<tr>
<td>Anaplasma phagocytophilum</td>
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<td>Border disease virus [BDv]</td>
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<td>Bovine Herpes virus type 1, (IBR or BoHV1)</td>
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<td>Bovine Herpes virus type 4</td>
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<td>Bovine Viral Diarrhea virus [BVDv]</td>
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<td>Brucella abortus and Brucella melitensis</td>
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<td>Campylobacter fetus</td>
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<td>Campylobacter spp</td>
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<td>Chlamydophila spp</td>
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<td>Chlamydophila abortus</td>
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<td>Coxiella burnetii</td>
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<td>Leptospira hardjo</td>
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<td>Pathogenic Leptospira</td>
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<td>Listeria monocytogenes</td>
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<td>Neospora caninum</td>
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<td>Salmonella enterica spp</td>
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<td>Schmallenberg virus</td>
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<td>Toxoplasma gondii</td>
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* lateral flow test, agglutination test
Detection of Coxiella burnetii, the causative agent of Q fever in sheep, goat and cattle

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

C. burnetti is highly resistant to heat, drying and disinfection. Infection occurs through aerosols or direct contact with infected material, e.g. birth materials, milk, urine, faeces and even blood. The infection may also be transmitted by ticks. Even small levels of bacteria may lead to fatal infection. Infection is often lifelong.

The combined application of ELISA and real-time PCR diagnostic methods can significantly improve Q fever management. The Thermo Fisher Scientific diagnostic solution offerings include the right tools for monitoring, surveillance and confirmation of clinical cases.

**Herd diagnostic**
- Epidemiological surveillance
- Serum
- Tank milk
- Environmental samples faeces/wipes

**Individual diagnostic**
- Confirmation of etiology
- Abortion material swabs
- Milk

**Antibody-detection using ELISA at herd level**
- Use to determine seroprevalence in a herd or in a geographical region
- Give information about the risk of new infections which could occur

**Direct proof of bacteria in aborted material with real-time PCR kits**
- Allow to identify Coxiellosis as the cause of an abortion
- Give the acuteness of the infection by quantification of the bacteria load in the sample
- Help to reduce the risk for laboratory personnel in comparison with culture method

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.

Here, we highlight two major ruminant infectious agents and their diagnostics tests:
- *Coxiella burnetii*
- *Neospora caninum*
Detection of *Neospora caninum*, the causative agent of Neosporosis

Neosporosis is a major cause of abortion in cattle, goat, 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 the parasite as intermediate hosts.

Infection of cattle may lead to abortion as well as to neurological symptoms in infected calves. Most infections occur from mother to offspring (vertical) and may lead to a fatal brain infection in the offspring, or lifelong persistence. Primary infection (after birth) occurs through infected meat and faeces.

To reduce the risk of abortion, persistently 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 –

- Pre-existing *Neospora caninum* infection in a herd
- Geographical region infected
- Persistent infected animals

### Herd diagnostic

- Epidemiological surveillance
- Screening after detection of a positive aborted calf

- Serum
- Milk

- ELISA
  - LSIVet Bovine Neosporosis Advanced – Serum/Milk

### Individual diagnostic

- Diagnose neosporosis on aborted calf

- Blood – Milk

- Screening the mother cow and other cows with ELISA
  - LSIVet Bovine Neosporosis Advanced – Serum/Milk

- Abortion material swabs

- Confirmation of positive cases with real-time PCR
  - LSIVetMAX® *Neospora caninum* detection kit
Simultaneous detection of multiple abortive agents/pathogens by multiplex PCR

The key to correcting abortion problems is to identify the cause(s), in order to prevent future abortions. For a quick and easy way to diagnose infectious abortive agents, for which testing is not implemented in the laboratory, our abortion screening pack is ideal.

The test is also used when the amount of aborted tissue is limited. The LSI VetMAX Screening Pack – Ruminant Abortion is a unique multiplex real-time PCR kit that allows 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.
- BHV 4
- *Leptospira* spp (pathogenic strains)
- *Campylobacter fetus* (fetus fetus and fetus veneralis)

LSI VetMAX Screening Pack – Ruminant Abortion increases success of finding the abortive agent
- 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

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


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