Animal &
Plant Health
Agency

Guidance for investigation of poor reproductive performance in cattle herds and sheep flocks during Bluetongue virus outbreaks

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Target audience: Veterinarians in GB

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APHA is an Executive Agency of the Department for Environment, Food and Rural Affairs and also works on behalf of the Scottish Government, Welsh Government and Food Standards Agency to safeguard animal and plant health for the benefit of people, the environment and the economy.

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Background

This document is intended to provide guidance on investigating poor reproductive performance in sheep flocks and cattle herds, during periods where bluetongue virus (BTV) should be considered as a potential cause. Poor reproductive performance may be characterised by all or one of lower-than-expected scanning or pregnancy diagnosis rates, infertility abortion, and/or stillbirth.

There is a statutory requirement to report all bovine abortion cases:

- In England via the Defra Rural Services helpline: 03000 200 301
- In Wales: 0300 303 8268
- In Scotland via your local APHA Scotland Field Services office

Suggested test protocols may vary depending on whether there is one clinical sign or a range of reproductive signs and, is not exhaustive or intended to be wholly inclusive. Guidance is intended to aid sampling and testing in combination with clinical judgement and consideration of the flock or herd history. Veterinary Investigation Officers (VIOs) at your local surveillance pathology centre are happy to discuss cases and advise on sampling and testing.

Since the incursion of bluetongue virus serotype 3 (BTV-3) to England in 2024, consideration of BTV as a cause of infertility, abortion, stillbirth, and/or dummy animals is recommended. Clinical suspicion of BTV may depend on seasonality, herd/flock history, and/or vaccination status.

Bluetongue testing

Bluetongue is a notifiable disease. Where there is clinical suspicion of BTV, this must be reported to APHA field services (please see above details for reporting).

Where there is no clinical suspicion of bluetongue infection, testing is possible on samples sent directly to the Pirbright Institute: Get bluetongue testing - GOV.UK.

To comply with current legislation, material or samples known or suspected to be infected with BTV cannot currently be accepted to APHA Veterinary Investigation Centres (VICs) or laboratories for examination or testing. Please discuss alternative options with the VIC or laboratory.

For further information on bluetongue and testing, including what happens if a test is positive, refer to current official guidance or get official advice: Bluetongue: latest situation - GOV.UK and Get bluetongue testing - GOV.UK

Diagnostic investigation

Poor reproductive performance can be attributable to infectious and non-infectious causes. A comprehensive history is essential to guide investigation, and it is important to consider non-infectious causes at the start of the investigation

Non-infectious causes

Management factors

- Mating mismanagement – inappropriate timing or protocol, ram to ewe ration, luteolytic drugs
- Handling – during early or late pregnancy, lack of dystocia intervention

Environmental factors

- Weather – heat, adverse conditions
- Stress – dog worry, competition

Genetic factors

- Chromosomal abnormalities – incompatible with life, congenital malformations
- Reproductive abnormalities – freemartins, penile abnormalities

Nutritional factors

- Malnutrition – inadequate protein, energy, trace elements, minerals
- Plant associated – phytoestrogens, teratogens, toxicity

Infectious causes

Testing for infectious causes of poor reproductive performance is indicated in the absence of obvious non-infectious factors, or where there is evidence of dam or sire illness. Not all infectious causes of abortion will result in systemic illness of the dam or sire. Suggested aetiologies and appropriate tests are detailed in the ‘test protocol’ section (Page 6).

The history may help determine whether dam or sire infertility, or both, are likely to be involved. If it is possible that sire infertility is involved, an examination similar to that used at pre-breeding soundness examination (PBSE) of the sires is advised in addition to infectious disease testing. Specific test protocols are detailed in the next section.

Test protocols

Infectious causes of poor reproductive performance in cattle herds

Table 1: Infectious disease affecting bull fertility

Note: Excludes other factors affecting service, for example lameness. Causes of infertility may be transient and resolve by the time of testing. However, consider PBSE in the first instance to rule out long term fertility effects.

Condition	Test	Sample type	Notes
Venereal disease for example, Campylobacter, Trichomonas	Culture and/or microscopy	Sheath washing	Campylobacter testing requires a specific sampling kit subject to additional cost. Contact the sales desk and request RAI 0800 on 03000 600001.
Pyretic agents for example IBR, SBV, Leptospira, BVD, BTV	Serology and/or PCR testing	Example: respiratory swab, EDTA blood, serum	Tests and samples specific to suspected infectious agent. Consider vaccine status for serological tests. Paired serology is more useful, unless demonstrating absence of exposure. Samples for BTV testing sent to the Pirbright Institute.
Balanoposthitis for example IBP, or secondary infection to injury	Serology and/or PCR testing, bacteriology, microscopy	EDTA blood, serum, semen	
Orchitis for example Trueperella, Histophilus	Bacteriology, microscopy	Semen	Report clinical suspicion of brucellosis to APHA field services

Clinical suspicion of BTV infection must be reported to APHA.

Table 2: Infectious disease affecting cow fertility

Note: APHA must be notified of abortions or premature calvings within 24 hours: Brucella testing guidance. If foetal material is available, comprehensive testing of the calf is recommended (see table 3) in addition to statutory Brucella testing where applicable. Where there is suspicion of systemic disease in the dam or several reproductive signs, sampling of 5-6 affected dams is recommended.

Pathogen	Test	Sample type	Notes
Schmallenberg virus	ELISA serology	Serum, milk	Positive serology indicates previous exposure but does not indicate timing of exposure. Testing of yearlings as sentinel animals indicates exposure within the last breeding season.
Bovine Viral Diarrhoea	PCR and/or ELISA serology	Serum, milk	If significant seroprevalence, consider a PI hunt.
Infectious bovine rhinotracheitis	PCR and/or ELISA serology	Nasopharyngeal or ocular swab, BAL fluid, serum, milk	Consider vaccination history and requirement for gE-deleted ELISA testing.
Leptospira	Serology	Serum, milk	MAT and ELISA for *L. hardjo* may be useful as IgM may have fallen by time of abortion.
Salmonella	Culture and/or serology	Faeces, swabs, serum	
Bluetongue	PCR and ELISA serology	EDTA blood and serum	Samples sent to the Pirbright Institute.

Clinical suspicion of BTV infection must be reported to APHA.

Table 3: Testing of aborted or stillborn calves

Note: Comprehensive sampling is recommended where postmortem material is available. Brain cavitation should be reported as suspected BTV infection before considering other causative agents.

All tests listed below are from the APHA bovine abortion package TC0015. This package can be applied to whole fetuses submitted to a VIC or to samples submitted from on-farm investigations.

Sample	**Test**	**Cause of abortion**
Placenta including multiple cotyledons and intercotyledonary membrane	Gross examination for placentitis and stained smear	*Coxiella burnetii* (Q fever) and *Brucella*
Foetal stomach contents collected aseptically ideally using a vacutainer through the stomach wall	Bacteriology	Bacterial causes including *Campylobacter* and *Salmonella*
Spleen (Fresh)	PCR	BVD
Liver (Fresh)	Additional bacteriology	Bacterial causes including *Campylobacter*
Brain (Fresh)	PCR	SBV, *Neospora caninum*
Maternal blood – clotted	MAT	*Leptospira hardjo*
	ELISA	*Neospora caninum,* BVD, IBR

Table 4: Testing of brain cavitation and dummy calves

Note: Consider reporting suspicion of in utero Bluetongue virus infection in the first instance. Other congenital diseases can cause brain cavitation for example BVD or porencephaly of Limousin calves.

Pathogen	Test	Sample type	Notes
Bluetongue	PCR and ELISA serology	EDTA blood and serum, spleen	Consider with weak or 'dummy' calves. Samples sent to the Pirbright Institute.
Schmallenberg virus	PCR and/or ELISA serology	Brain, foetal fluid, serum	If typical cases of arthrogryposis are PCR negative, consider calf/dam serology.
Bovine viral diarrhoea	PCR and/or ELISA serology	Spleen, serum	Avoid antigen ELISA in calves <30 days old
Inherited disorder	Histopathology and possible genetic analysis	Fixed brain plus ear tissue	Consider the breeding history

Clinical suspicion of BTV infection must be reported to APHA.

Infectious causes of poor reproductive performance in sheep flocks

Table 5: Infectious disease affecting tup fertility

Note: Exclude other factors affecting service, for example, lameness. Causes of infertility may be transient and resolve by the time of testing, however, consider breeding soundness testing in the first instance to rule out long term fertility effects.

Condition	Test	Sample type	Notes
Balanoposthitis for example pizzle rot, orf, secondary infection to injury	Bacteriology, electron microscopy	Swab, skin crust/scab	
Orchitis, for example Corynebacterium, Trueperella	Clinical examination, bacteriology	Semen	Report clinical suspicion of brucellosis to APHA field services
Pyretic agents for example Mycoplasma, Pasteurellaceae, TBF, BTV	PCR and ELISA serology	EDTA blood and serum	Samples for BTV testing sent to the Pirbright Institute

Clinical suspicion of BTV infection must be reported to APHA.

Table 6: Infectious disease affecting ewe fertility

Note: If abortion and/or stillbirth are the main sign with no dam illness, comprehensive testing of the lamb(s) is recommended (see table 7). Where there is suspicion of infectious disease, dummy lambs, or several reproductive signs, sampling of 5-6 affected dams is recommended.

Pathogen	Test	Sample type	Notes
Schmallenberg virus	ELISA serology	Serum	Positive serology indicates previous exposure but cannot determine timing of exposure in adults; testing of yearlings as sentinel animals indicates exposure within the last year.
Border Disease	PCR and/or ELISA serology	Serum	If significant seroprevalence consider a PI hunt.
Toxoplasmosis	ELISA or LAT serology	Serum	Consider vaccination status. Negative maternal serology can be used to rule out exposure.
Subacute fluke	Egg detection in faeces or coproantigen ELISA	Faeces	Other clinical signs may include loss of condition and anaemia.
Tickborne fever	PCR	EDTA blood	
Bluetongue	PCR and ELISA serology	EDTA blood and serum	Samples sent to the Pirbright Institute.
Iceberg diseases for example MV, Johne's	PCR and/or ELISA serology	EDTA blood and serum	

Clinical suspicion of BTV infection must be reported to APHA.

Table 7: Testing of aborted or stillborn lambs

Note: Comprehensive sampling is recommended where postmortem material is available. Brain cavitation should be reported as suspected BTV infection before considering other causative agents.

All tests listed below are from the APHA small ruminant abortion packages TC0011 (fetuses +/- placenta from one dam) and TC0012 (fetuses +/- placentae from two dams). These packages can be applied to whole fetuses submitted to a VIC or to samples submitted from on-farm investigations.

Sample	Test	Cause of abortion
Placenta including multiple cotyledons and intercotyledonary membrane	Gross examination for placentitis and stained smear	Chlamydia (EAE), Coxiella (Q fever) and Brucella
Foetal stomach contents collected aseptically ideally using a vacutainer through the stomach wall	PCR	Toxoplasma gondii
Foetal stomach contents collected aseptically via a syringe and needle or with a vacutainer	Bacteriology	Bacterial causes including Campylobacter species and Salmonella
Spleen (Fresh)	PCR	Border disease
Liver (Fresh)	Additional Bacteriology	Bacterial causes including Campylobacter species
Brain (Fresh)	PCR	SBV
Maternal blood – clotted	Ab ELISA	Chlamydia abortus
	LAT	Toxoplasma gondii
	Ab ELISA, PCR	Border disease

Table 8: Testing of brain cavitation and dummy lambs

Note: Suspicion of in utero Bluetongue virus infection must be reported to APHA in the first instance.

Pathogen	Test	Sample type	Notes
Bluetongue	PCR and ELISA serology	EDTA blood and serum, spleen	Consider with weak or 'dummy' lambs. Samples sent to the Pirbright Institute.
Schmallenberg virus	PCR and/or ELISA serology	Brain, foetal fluid, serum	If typical cases of arthrogryposis are PCR negative, consider lamb/dam serology.
Border disease virus	PCR and/or ELISA serology	Spleen, serum	

Clinical suspicion of BTV infection must be reported to APHA.

Related information

1. Investigating Poor Scanning Rates in Sheep Flocks | SRUC
2. APHA guidance on sample and test selection - GOV.UK
3. Official Veterinarian Training
4. Bluetongue: how to spot and report it - GOV.UK
5. Bluetongue: how to spot and report the disease - gov.scot
6. Bluetongue virus (BTV) | GOV.WALES

Abbreviations

Ab	Antibody
APHA	Animal and Plant Health Agency
BAL	Bronchoalveolar lavage
BVD	Bovine viral diarrhoea
BTV	Bluetongue virus
EDTA	Ethylenediaminetetraacetic acid
ELISA	Enzyme-linked immunosorbent assay
IBP	Infectious balanoposthitis (associated with herpes virus)
IBR	Infectious bovine rhinotracheitis
LAT	Latex agglutination test
MAT	Microscopic agglutination test
MV	Maedi visna
PCR	Polymerase chain reaction
PI	Persistently infected
SBV	Schmallenberg virus
TBF	Tick-borne fever
VIC	Veterinary Investigation Centre