

## Infectious abortion in sheep\*\*

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**Abstract:** The abortions in sheep are important at various aspects, i.e. economical, animal healthcare or zoonotic. Abortions in sheep may occur sporadically or as enzootic outbreaks. The causative agent of the abortion is investigated if more than 2% of abortions in pregnant animals are registered within the herd. The amount of suspect material to be delivered for examination ranges from 12% to 21% of all registered abortions.

Our research was carried out at the territory of AP of Vojvodina. Over a three-year-period we investigated 367 serum samples obtained from sheep that have aborted. Serum samples were examined for brucellosis, leptospirosis, listeriosis, toxoplasmosis, enzootic abortion (chlamydiosis), Q-fever, salmonellosis.

All examined sera were negative to brucellosis. Leptospirosis was diagnosed in 3.2% cases. Specific antibodies were detected for *L.hardjo* and *L. grippityphosa*. Serotype *L.hardjo* was first identified in cattle at the territory of Vojvodina, and in the recent years it has been also registered in sheep. *T.gondii* was detected in 7.1% abortions in sheep. Presence of specific antibodies against *C.burnetii* was established in 19.6% of investigated serum samples. Vojvodina is considered endemic region for Q-fever, and sheep are the primary reservoir of *C.burnetii* that was confirmed in this research.

**Key words:** abortions, sheep, infectious diseases

## Introduction

Abortions in sheep may be induced by numerous factors, whether of infective or non-infective nature. The abortions in sheep are important at various aspects, i.e. economical, animal healthcare or zoonotic. Abortions in sheep may occur sporadically or as enzootic outbreaks. The causative agent of the abortion is investigated if more than 2% of abortions in pregnant animals are registered within the herd. The amount of suspect material to be

delivered for examination ranges from 12% to 21% of all registered abortions. Research in this field in England established the rate of detection of the etiological agent of abortions, being 32-55% (*Mc Donald*, 1967). Appropriate identification of the causative agent of abortions is often impeded by numerous factors, e.g. negligence of farmers, inadequate sampling, untimely delivery of samples, complex diagnostic procedures associated with high expenses, and quite often lack of corresponding legislation.

### ***Infective abortions***

Infective abortions are caused by bacteria, rickettsia, chlamydia, fungi, protozoan and viruses (*Plant et al.*, 1982; *Vidić et al.*, 1994a,b; *Vidić et al.*, 1995a,b). Pathological changes may develop in the placenta or in fetus causing abortion (specific agents). Abortions may occur as a consequence of generalized infection, thus being considered only one of the symptoms of particular infectious disease. Abortions in sheep mostly occur in the second half of pregnancy. Late abortions are sometimes associated with endometritis, infertility, etc.

- *Brucella melitensis*, *Brucella ovis*, *Brucella abortus*
- *Campylobacter fetus* subsp *fetus*, *Campylobacter fetus* subsp *intestinalis*, *C. jejuni*,
- *Leptospira interrogans* serovar: *pomona*, *hardjo*, *grippityphosa*, *bratislava*
- *Listeria monocytogenes*, *L. ivanovii*
- *Salmonella abortus ovis*, *S. typhimurium*, *S. dublin*, *S. agona*
- *Actinomyces pyogenes*
- *Pasteurella multocida*, *P. haemolytica*
- *Yersinia pseudotuberculosis*
- *Haemophilus somnus*
- rarely *E. coli*, *Bacillus sp.*, *Actinobacillus seminis* etc.
- Chlamydia:
- *Chlamydia psittaci*
- Rickettsia:
- *Coxiella burnetii*,
- *Ehrlichia phagocytophila*.
- Viruses:

- Pestivirus infections (diseases of the mucosa, border disease)
- Akabane virus,
- bluetongue virus

### ***Non-infective abortions***

Such abortions in sheep are mostly sporadic, occurring at any pregnancy stage. The causes of non-infective abortions encompass two groups of factors, i.e. internal and external ones.

Non-infective factors are stress, housing conditions, transport, toxemia, metabolic disorders, nutrimopathy, hereditary factors, physical factors, etc.

Toxins: vegetable, animal, chemical

Abortions mostly occur at the latest stage of pregnancy. Various infective and non-infective factors may also result in reproductive disorders, delivery of dead or weakly lambs, endometritis, vulvovaginitis, infertility (*Plant et al.*, 1982; *Vidić et al.*, 1995a,b).

The diagnosis is based on anamnesis and pathological findings (macroscopic and microscopic). The following material is used for detection of the causative agent: placenta, fetus, internal organs of the fetus, endocervical swabs. Identification of etiological agents is performed using direct and indirect methods.

direct methods - microscopy, fluorescence, ELISA, peroxidase test, PCR and isolation on nutritive media, chicken embryos and tissue cultures

indirect methods - serological testing aimed at detection of specific antibodies in the paired samples of blood sera. Most frequently applied methods are agglutination, RVK, AGID, ELISA, IFA, SN-test, etc.

## **Material and methods**

Our research was carried out at the territory of AP of Vojvodina. Over a three-year-period we investigated 367 serum samples obtained from sheep that have aborted. Serum samples were examined for brucellosis, leptospirosis, listeriosis, toxoplasmosis, enzootic abortion (chlamydiosis), Q-fever, salmonellosis.

## **Results and discussion**

All examined sera were negative to brucellosis. Leptospirosis was

diagnosed in 3.2% cases. Specific antibodies were detected for *L.hardjo* and *L. grippotyphosa*. Serotype *L.hardjo* was first identified in cattle at the territory of Vojvodina, and in the recent years it has been also registered in sheep. *T.gondii* was detected in 7.1% abortions in sheep. Presence of specific antibodies against *C.burnetii* was established in 19.6% of investigated serum samples. Vojvodina is considered endemic region for Q-fever, and sheep are the primary reservoir of *C.burnetii* that was confirmed in this research. Specific antibodies to *C.psittaci* (enzootic abortion of sheep) were detected in 18.6% sera of sheep that aborted. Specific antibodies to *Salmonella abortus ovis* were confirmed in 2.5% serum samples, whilst the lowest rate of seropositive findings (1.2%) was obtained for *L.monocytogenes*.

Our investigation of infective agents responsible for abortions in sheep failed to identify the causative agent of the abortion in 47.8% of investigated samples.

*Listeria monocytogenes* causes infections in a wide range of animals, including humans. *Listeria* infection causes two distinct group of symptoms, i.e. nervous symptoms, and abortion and death of the fetus. The abortion rate is usually low but may rise to 15 %. *Plant et al.* (1988) noted that listerial abortion is more common in conditions of high humidity, probably because such environmental conditions are favorable for the survival of the organism. It has been suggested that ewes may be infected at the time of service. In one case, rams had a purulent discharge on the hairs of the prepuce, from which the organism was isolated. However, *Mc Donald* (1967) emphasized that *L.monocytogenes* is not transmitted as a venereal disease, but all evidence points to ingestion as the main route of infection. Abortions in sheep usually occur from the twelfth week of pregnancy onwards, with retention of placenta and metritis. The abortion form may lead on to the septicemic form if the fetus is retained. The fetus is delivered dead. *Plant et al.* (1988) reports on typical late-term abortions with necrosis and thickening of the fetal membranes and enlarged cotyledons. The liver of the fetus is usually enlarged, and milliary creamy-white lesions 1-2 mm in diameter can be observed.

Enzootic abortion of ewes is caused by infection with chlamydial organism and occurs mainly in lowground flocks, where intensive shepherding of lambing time is practiced. Animals, which abort, are usually immune in the subsequent years. However, it is usual for susceptible animals to be infected around lambing time, but not to abort until the next year. Infection takes place by ingestion. Most of the abortions occur in the last weeks of gestation. There are abortions in late pregnancy, inappetence,

depression, indermediate lameness with no apparent lesions. During the first one or two seasons abortion may be as high as 20-25 % of the flock, and thereafter it settles down to about 5 %.

Fetal membranes are retained and this is followed by thick, reddish-brown discharge from the vagina, which may persist for three weeks. Affected fetal membranes exhibit leathery edematous thickening of the chorioallantois and necrosis of the cotyledons.

Toxoplasmosis was first recorded as a cause of ovine abortion in 1959. Since then it has been found worldwide. Serological surveys indicate that infection in sheep flocks is widespread, with lowground flocks being more frequently infected than hill flocks. Symptoms presented are abortion, stillbirth and sometimes the birth of mummified fetuses and weakly lambs. The manifestations of infection vary according to the time of gestation when it occurs. Infection in early pregnancy leads to fetal death, resorption and apparent barrenness. Infection between 40 and 110 days causes fetal death and abortion. Feed supplies contaminated by cat feces were the common source of infection. In sheep, grey areas are visible in the cotyledons 1-3 mm in diameter. Lambs die and become mummified in the uterus, and show microscopic foci of necrosis in the lungs, liver and cerebral white matter. Sheep rarely abort twice.

Several serotypes of *Salmonellae* have been associated with abortion in sheep. The most prevalent used to be *S. abortus ovis*. In the infections with *S. abortus ovis* the main symptom observed is abortion, usually in the last six weeks of gestation. Affected ewes may exhibit signs of pyrexia, malaise and diarrhea, as well as abortion. The aborted fetus shows subcutaneous edema, serofibrinous fluid in the body cavities and congestion of the internal organs.

Leptospirosis is a disease that may cause ovine abortion (*Vidić et al.*, 1994a,b). In sheep it is commonly asymptomatic. Jaundice, haemoglobinuria or haematuria occur in clinical cases, while abortions have been reported only occasionally. In disease outbreaks in lambs the morbidity may reach 100%, and the mortality rate up to 18%.

Q-fever is a rickettsial disease caused by *Coxiella burnetii*. This organism has been recovered from aborting ewes and from ewes that lambs normally (*Vidić et al.*, 1995a,b).

## Conclusion

Many of the infections discussed cause severe human illness, notably Q-

fever, toxoplasmosis, salmonellosis and listeriosis. Affected placentae and fetuses should always be treated with respect. This is particularly an occupational hazard for shepherds, who are often working under conditions in which it is difficult to maintain appropriate hygiene standards, but is also important for veterinary surgeons and laboratory workers, who may be handling infected animals and aborted material.

## INFEKTIVNI POBAČAJI KOD OVACA

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### Rezime

Tokom trogodišnjeg perioda, praćena je situacija i uzroci pobačaja kod ovaca. Veliki broj infekcija koje izazivaju pobačaj kod ovaca predstavljaju rizik i opasnost i za ljude.

Svi pregledani uzorci seruma ovaca koje su imale pobačaj, bili su negativni na brucelozu. Na leptospirozu je utvrđeno 3,2% pozitivnih nalaza. Specifična antitela utvrđena su za *L.hardjo* i *L. grippotyphosa*. Serotip *L.hardjo* je najpre otkriven kod goveda na području Vojvodine, a poslednjih godina registrovan je i kod ovaca. *T.gondii* je utvrđena kod 7,1% pobačaja ovaca. Specifična antitela za *C.burnetii* otkrivena su kod 19,6 % ispitanih uzoraka seruma ovaca. Vojvodona se smatra endemskim područjem za *Q-groznicu*, a ovce su glavni rezervoar *C.burnetii*, što su iova ispitivanja potvrdila. Specifična antitela za *C.psittaci* (enzootski pobačaj ovaca) dokazana su kod 18,6 % seruma ovaca koje su pobacile. Specifična antitela za *Salmonella abortus ovis* utvrđena su kod 2,5% uzoraka seruma, dok je najniži procenat seropozitivnih nalaza (1,2%) dobijen za *L.monocytogenes*.

U okviru naših ispitivanja infektivnih uzročnika pobačaja, kod 47,8% uzoraka nismo ustanovili uzročnik pobačaja, odnosno ostalo je neotkriveno.

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