ABORTIONS
SUMMARY

●● Sheep and goats

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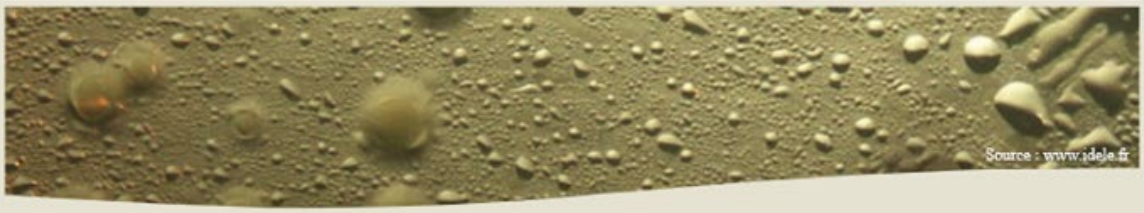


ABORTIONS REPRESENT A REAL THREAT IN SMALL RUMINANT FARMING, BOTH FOR ANIMAL HEALTH AND HUMAN HEALTH.

INTRODUCTION ●●

Abortive diseases often manifest themselves as serious epidemics that may affect more than a third of pregnant females. The economic impacts of these diseases can be substantial.

DEFINITION ●●

An abortion can be defined as : any fetus expelled during gestation or parturition of a stillbirth, excluding cases of dystocia due to maternal fetal disproportion or malposition. In addition, many abortive diseases also lead to the birth of moribund lambs or kids.

The percentage of abortion is considered « normal » if it is ranges between 1 and 5 %.

Unlike other species, abortions in sheep and goats often occur in late gestation. Embryonic mortalities are also common, but more difficult to recognize, since we are talking here about losses of embryos in the first days or weeks of life. The only significant manifestation of affected females is a return to heat.

DIAGNOSIS...

Aborted fetuses look very similar. Therefore, diagnosis should consider the history of the case, the clinical signs observed before, during and after the abortion, and the laboratory test results.

To improve the chances of identifying the cause of abortion, proper specimens must be provided. Aborted fetus and their placentas with cotyledons, should ideally be sent fresh to the laboratory.

MAJOR CAUSES OF ABORTION IN SMALL RUMINANTS IN CANADA :

- TOXOPLASMOSIS
- CHLAMYDIOSIS *
- COXIELLOSIS (Q FEVER) *
- LISTERIOSIS
- CAMPYLOBACTERIOSIS
- VIRAL ABORTIONS : eg. BORDER'S DISEASE, CACHE VALLEY VIRUS
- METABOLIC ABORTIONS : IODINE, ENERGY AND PROTEIN DEFICIENCY

"ATTENTION" ZOONOSIS

** Conditions considered the most frequent or most often diagnosed in Canada.*

CRITERIA FOR IDENTIFYING THE CAUSE OF AN ABORTION :

- Appearance of the fetus and placenta;
- Moment of pregnancy where abortion occurred;
- Clinical state of the aborted female or group of females affected;
- Usual percentage of abortion in the herd;
- Percentage or number of abortions in the group where abortion occurred;
- Treatment administered in the last weeks, handling in the last 2 weeks, etc.

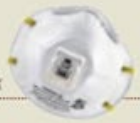
In small ruminants, almost 60 % of abortion cases submitted to the laboratory receive a precise diagnosis, identifying the causative agent involved. For other cases, the absence of etiological diagnosis can be explained in different ways, including :

- Decomposition of the aborted fetus and placenta is too advanced (significant delay between fetal death and expulsion by the female or submission to the laboratory);
- Mother's disease caused a cessation of pregnancy;
- Abortion due to nutrition or toxic problems;
- Submission of insufficient placental tissue.

Summary of abortions

BASIC PREVENTIVE MEASURES TO APPLY ON THE FARM :

- Limit animal purchases. If purchasing animals, be very careful in your choice of the source flock or herd;
- Ensure adequate quarantine for animals returning from an outside stay (i.e. livestock exposition) or for purchased animals;
- Never place young ewes / goats in the same housing group as adult ewes / goats;
- Perform a clinical examination of the rams / male goats before breeding;
- Avoid presence of cats, dogs and birds in livestock buildings;
- Vaccinate females before breeding if a precise diagnosis has been made and if an effective vaccine is available for the identified disease;
- Make sure that females are in perfect condition at breeding;
- Send females with chronic diseases or whose health would not allow a problem-free pregnancy to slaughter;
- Provide optimal nutrition throughout gestation.



N-95 mask

WARNING ZOONOSIS!

Most infectious abortion agents in sheep and goats are potential zoonotic agents. Here are some basic measures to implement to limit the risks :

- Wear disposable gloves when handling infected aborted fetuses and placentas;
- Remove placentas from lambing pens as soon as they are expelled and dispose of them properly;
- During abortions, limit access to the flock or herd to regular staff only;
- If vulnerable people visit the farm (i.e. pregnant women, children or people with compromised immune system), it is recommended to require gloves and N95 mask to be worn;
- Keep clothes and boots worn in the livestock buildings on the farm and wash them on site;
- Clean and disinfect parturition areas after each period of parturition;
- Remove and apply manure only when conditions are optimal to prevent the formation of airborne dust containing infectious agents (i.e. Q fever agent).

IMPORTANT CONTROL MEASURES :

- Working with the laboratory and a veterinarian are essential to clarify the diagnosis and establish an appropriate treatment plan and preventive approach;
- Abortions should be reported to the veterinarian when a second abortion occurs in the same group of lambing;
- The first aborted fetus and placenta can be kept cold or frozen so they can be added to fresh specimens for submission to the laboratory if subsequent abortions occur;
- Vaccines are available in Canada for campylobacteriosis and chlamydia; they can help reduce abortions caused by these two agents but should not be the only preventive measure;
- A highly effective vaccine exists for Q fever, but its use requires a special import permit (vaccine not licensed in Canada);
- Antibiotics should not be used to control or prevent abortions if their use is not supported by a veterinarian who relies on a clinical diagnosis confirmed by the laboratory.

Source : www.idele.fr

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Une initiative fédérale-provinciale-territoriale

Growing Forward 2
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Canada Québec

Translation: Saskatchewan Sheep Development Board thanks to funding from Growing Forward 2, a Canada and Government of Saskatchewan initiative. I Thank you to Ms. Corlena Patterson of the Canadian Sheep Federation for the review.

ABORTION SHEET
TOXOPLASMOSIS

●● Sheep and goats

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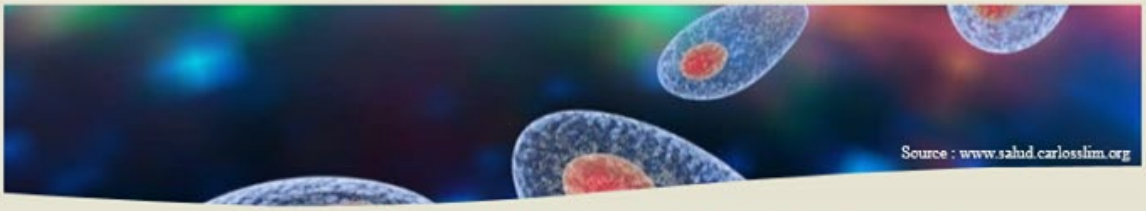


TOXOPLASMOSIS IS A PARASITIC DISEASE THAT CAN CAUSE ABORTIONS IN SMALL RUMINANTS. CATS REPRESENT A SIGNIFICANT RISK.

AGENT INVOLVED ●●

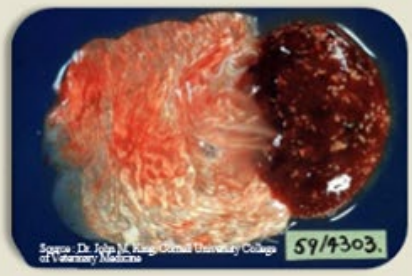
Toxoplasmosis is caused by a protozoa called *Toxoplasma gondii*. It is a microscopic parasite that can survive in the environment for a very long time. Disinfectants are not effective in destroying this parasite eggs (oocysts) present in the environment.

CLINICAL SIGNS ●●

Sheep and goats are intermediate hosts of Toxoplasma, resulting in the development of tissue cysts in their muscles. After ingestion of the oocysts, the parasites spread via the bloodstream to the lymphatic nodes where they will replicate within the sheep or goat. If a ewe or doe is pregnant, the parasites will lodge themselves in the placenta and induce a serious infection that can spread to the fetus and cause abortion. Otherwise they can lodge themselves in muscle tissue and become encysted.

WATCH OUT FOR CATS !

An infected cat that excretes *Toxoplasma gondii* can contaminate the food and the environment of up to 200 farm animals. Kittens are most likely to be excreters.



Source : Dr. Julia M. King, Cornell University College of Veterinary Medicine

THE CAT : PRINCIPAL HOST OF FARMS ●●

Only cats can complete a whole cycle and excrete *T. gondii* eggs into the environment. Infection in this species is mostly asymptomatic, making it difficult to screen infectious individuals. Since cats can become infected by eating **rodents or raw meat, it is important to feed them well so that they do not hunt, to dispose of dead animal carcasses and to remove placentas and aborted fetus properly!** Cats alone cannot control vermin on a farm.

TRANSMISSION ●●

Small ruminants become infected mainly through the ingestion of oocysts. Recently infected cats can pass millions of oocysts in their stools within a few days, even if the contagious phase lasts only a short period of time. They can easily contaminate feed in feeders or in storage, drinking water and bedding.

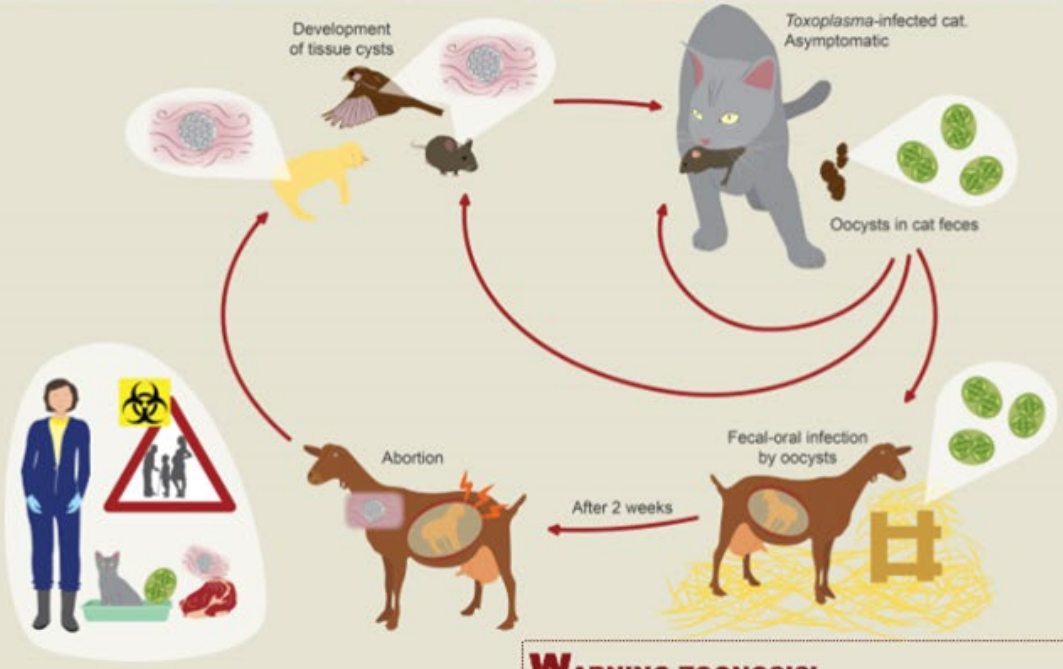
INFECTION BEFORE 40 DAYS OF GESTATION :
resorption of embryos
INFECTION BETWEEN 40 AND 120 DAYS :
mummification, maceration and abortion
INFECTION AFTER 120 DAYS :
premature births, stillbirths and weak newborns

THE INFECTED FEMALE DEVELOPS ANTIBODIES THAT PROTECT HER THROUGH THE REST OF HER LIFE. THUS, IN THEORY, A SHEEP/GOAT THAT GETS INFECTED WHILE IT IS NOT PREGNANT WILL BE IMMUNIZED WITHOUT FURTHER COMPLICATIONS, AND A SHEEP/GOAT WILL HAVE ONLY ONE ABORTION CAUSED BY TOXOPLASMOSIS IN ITS LIFETIME!

SOME FACTS ABOUT TOXOPLASMOSIS :

- Few oocysts are needed to infect a sheep or goat;
- The uterus can be affected two weeks after ingestion of oocysts;
- Abortions can begin 4 weeks after ingestion;
- There may be fetal loss at any time during gestation;
- Except for abortion, the infected ewe or doe has very few clinical signs.

Diagram of the development of Toxoplasmosis protozoan



DIAGNOSTIC

The diagnosis is mainly made by a **pathological examination and molecular tests** carried out in the laboratory from the aborted fetus and the placenta.

PREVENTION

The main prevention is the **strict control of cats** (sterilized and healthy cats, covered food tanks). Providing them with litter for their needs will prevent defecation in the feeding area (feeder, trough) and storage.

TREATMENT

No vaccine is currently available in Canada. Even though Deccox cannot eliminate the condition, it can be used to HELP control it. Consult your veterinarian practitioner.

WARNING ZOONOSIS!

TOXOPLASMOSIS IS ZOONOTIC, AND IS TRANSMISSIBLE TO HUMANS. Its transmission occurs through the consumption of raw or undercooked meat contaminated with the encysted form of the protozoa, poorly washed vegetables contaminated with cat stools, and by contact with cat excrement (wear gloves when cleaning the litter and cover the sandboxes where children play).

Clinical signs in humans generally resemble flu-like symptoms: fever, muscle pain, headache. Watch out for people at particular risk, such as pregnant women, children, immunocompromised people and the elderly.

SOME ADVICE TO LIMIT INFECTION :

- Cleaning and disinfection of sheep pens (very few disinfectants are effective against oocysts). A good cleaning is therefore essential;
- Vermin control;
- Sterilization of cats to prevent them from reproducing;
- Make sure that cats do not defecate in food;
- Keep clean litter in the pens;
- Personnel hygiene measure (gloves, hand washing, etc.).

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ABORTION SHEET
Q FEVER

●● Sheep and goats

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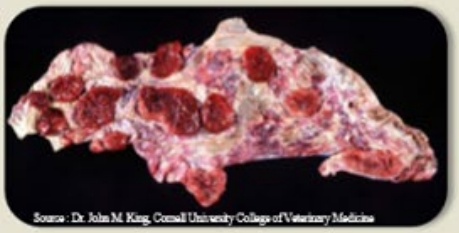
**Q FEVER IS A ZOONOTIC DISEASE OF BACTERIAL ORIGIN PRESENT ALL OVER THE WORLD.
THE MAIN DOMESTIC RESERVOIR OF THIS BACTERIUM IS RUMINANTS.**

AGENT INVOLVED ●●

Q fever is caused by a bacterium called *Coxiella burnetii* that has a worldwide distribution with the exception of New Zealand and Antarctica. This disease is endemic and the seroprevalence increases with herd size. It is higher in dairy farms than in meat-producing farms. The bacterium is extremely persistent in the environment.

TRANSMISSION ●●

Although several animal species can be infected with *C. burnetii* (including birds and domestic carnivores), **ruminants are often the main cause of its transmission to humans.** Livestock management with accumulated bedding and solid manure may partly explain why small ruminant farms are particularly affected. Handling and application of manure contributes to the spread of the bacterium in the environment in the form of aerosols. **Humans living or traveling within a few kilometers of infected herds are therefore at greater risk of becoming infected.**



Above : placenta of a sheep with Q fever.

CLINICAL SIGNS ●●

Animals infected with the bacteria are very often asymptomatic. If it is symptomatic, **the main clinical manifestations are late- term abortions, stillbirth, anorexia and metritis.** Whether the infected animal is asymptomatic or not, it can excrete bacteria in birth products (placenta, aborted fetus, liquids) as well as in feces. The bacteria can also be found in urine and milk, but these excretion routes are of lesser importance in the transmission of the disease.

DIAGNOSTIC ●●

It is essential to send placentas and aborted fetuses to the laboratory for a complete necropsy. In addition to determining the cause of abortion, the analysis can characterize the risk of transmission to humans.

TREATMENT ●●

Since antibiotics do not prevent the excretion of the bacteria and thus do not reduce the risk of transmission to humans, it is not recommended to institute an antibiotic treatment during a Q fever outbreak in a farm.

Herd vaccination is a better approach since it helps control abortions and reduces the shedding of the bacteria, thereby reducing the bacterial burden in the environment. **The vaccine (COXEVAC®) is not registered in Canada, but it is possible to obtain a restricted import permit** (from the Canadian Food Inspection Agency).

SOME FACTS ABOUT Q FEVER :

- The main mode of transmission is by inhalation of contaminated aerosols: fine particules suspended in the air ,transported on clothing or other vectors;
- One gram of infected placenta can contain up to 1 billion bacteria;
- A single bacterium is enough to infect a human by inhalation;
- The bacterium can survive many months in the environment or on wool.

Diagram of the contamination by the bacterium *Coxiella burnetii*

PREVENTION

To prevent transmission in a herd and to humans :

- Isolate aborted females for at least 3 weeks and keep an appropriate biocontainment of this section;
- Adequately dispose of abortion waste (in accordance with the regulations in place) :
  - Put it with household garbage after placing the products in a double sealed garbage bag;
  - Bury it (75 m from a stream and 150 m from a drinking water intake, and cover carcasses with caustic lime and two feet of soil);
  - Compost it in adequate installations.
- Maintain proper hygiene in parturition areas;
- Ensure that manure piles remain moist to limit dust formation;
- Let the manure compost for at least 90 days before applying on land;
- Avoid applying manure and transporting small ruminants when the weather is dry and windy;
- Bury the manure immediately after it has been applied on land.

WARNING ZOONOSIS!

Q FEVER IS A ZOONOTIC DISEASE AND IS THEREFORE TRANSMISSIBLE TO HUMANS.

Clinical signs in humans resemble flu-like symptoms : fever, severe headache, feeling of discomfort, nausea, muscle pain, etc. Q fever can also cause abortions in pregnant women, and atypical pneumonia, hepatitis and endocarditis in a small proportion of those infected.

PREVENTION OF TRANSMISSION TO HUMANS:

- Handling and destruction of parturition (or abortion) products should be done safely : wearing disposable gloves and N-95 mask, disposition of these products should be done in accordance with the regulations in place;
- Limit visitors' acces to the facilities during parturition periods (prohibit during abortions), especially children, pregnant women, the elderly and people with compromised immune system;
- Be vigilant when consuming raw milk products.

IMPROVE HYGIENE MEASURES ON THE FARM :

- Wash hands after contact with contaminated material or animals;
- Change out of clothes and boots before leaving the farm;
- Wash farm clothes separately (hot water);
- Avoid wearing these clothes in the house or in public places.

*** These measures are especially IMPORTANT during parturition and abortion episodes ***

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ABORTION SHEET
VIRUSES

Sheep and goats

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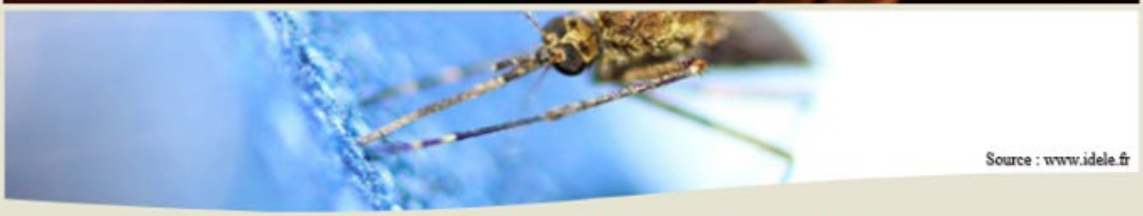

Source : www.idele.fr

IN SMALL RUMINANTS, ABORTIONS OF VIRAL ORIGIN ARE NOT THE MOST COMMON, BUT THEY CAN SOMETIMES BE ASSOCIATED WITH SIGNIFICANT OUTBREAKS. AMONG THE VIRUSES CAUSING ABORTIONS, CACHE VALLEY VIRUS AND BORDER DISEASE VIRUS ARE PRESENT IN CANADA.

INTRODUCTION

Unlike cattle farms in Canada where two viruses are common cause of abortion (IBR and BVD viruses), abortions of viral origin are infrequent in small ruminants. However, they must be considered as a possible cause of abortion since their presence in Canada has been confirmed by serological studies. The two viral infections that are described in this sheet are *CACHE VALLEY VIRUS (front)* and *BORDER DISEASE VIRUS (back)*.

CACHE VALLEY VIRUS...

Cache Valley virus (CVV) can be transmitted to humans and small ruminants through the bite of infected mosquitoes. **It is therefore a vector-borne zoonotic disease.** The circulation of CVV in Canada has been demonstrated by the presence of antibodies in several sheep flocks and by clinical cases of congenital malformations and abortions in sheep and goats. The risk of abortion and congenital malformations is especially high when ewes and does in early gestation are grazing when mosquito populations are high.

TO PREVENT CVV INFECTION, IT IS RECOMMENDED TO REDUCE POSSIBLE CONTACT BETWEEN MOSQUITOES AND EWES IN EARLY PREGNANCY :

- AVOID DRY PONDS AND OTHER STAGNANT WATER SOURCES;
- GRAZE WELL DRAINED PASTURES;
- AVOID GRAZING DURING THE FIRST THIRD OF GESTATION (DURING MOSQUITO SEASON);
- APPLY ANY OTHER MEANS OF MOSQUITO CONTROL WHILE RESPECTING THE ENVIRONMENT.

CLINICAL SIGNS

The main congenital malformations observed following a CVV infection are arthrogryposis (bilateral stiffness of the joints), scoliosis, torticollis, abnormalities of the head, and underdeveloped muscle mass. Sometimes only abortions without congenital malformations are observed. In humans, CVV infection is associated with meningitis and encephalitis.

DIAGNOSTIC

Samples (aborted fetus / stillbirth, placenta, female serum) should be submitted to provincial laboratory for necropsy so the cause of abortion or congenital malformation can be determined.

TREATMENT

There is no treatment or vaccination to control the Cache Valley virus. However, it is important to find the cause of abortions / malformations to adjust, if necessary, the management of females in gestation at pasture.

Congenital malformations caused by CVV.

Source : MAPAQ

SOME FACTS ABOUT CACHE VALLEY VIRUS :

- Humans become infected strictly by mosquito bite, and not by contact with infected sheep or goats;
- Global warming could contribute to spreading this disease in Canada in the future.

Abortions of viral origin

BORDER DISEASE ...

Border disease is a viral disease of sheep and goats caused by a pestivirus closely related to the bovine viral diarrhea virus (BVD). Although clinically poorly diagnosed in Canada, the prevalence of sheep infected with Border disease virus was estimated at nearly 10% in a serological study conducted in the early 2000s. BVD is widely distributed in Canada cattle herds and can also infect sheep and goats by causing a similar disease.

TRANSMISSION

Border disease virus is spread mainly from mother to fetus (vertical transmission) and from one sheep / goat to another (especially by persistent carriers).

CLINICAL SIGNS

Border disease is also called *Hairy shaker disease* which refers to the appearance of affected lambs that often have tremors and abnormal wool (hair appearance). Other clinical signs observed include infertility, macerated or mummified fetus, stillbirths and weak newborns. When infection occurs during the first third of gestation (see table), some lambs / kids are born immunotolerant, persistant viremia and diarrhea, ocular and nasal discharge, and breathing difficulties can be noted.

DIAGNOSTIC

The diagnosis of Border disease can be made by viral isolation and serology of affected individuals.

PREVENTION

- Slaughter of affected subjects and permanent carriers (persistent viremia);
- Caution should be taken when comingling species.

Time of female infection and clinical signs

Early gestation (First third)	Abortions (mummified or macerated fetuses) or live but immunotolerant newborns (permanent carriers and excretors of the virus, but do not develop the disease).
Mid-gestation (Middle third)	Lambs / kids develop the characteristic signs of Border disease, including tremors and abnormal wool.
Late gestation (Last third)	Normal or weak lambs / kids not carrying the virus, but having antibodies.

TREATMENT

There is no specific treatment for Border disease.

OTHER VIRAL CONDITIONS ...

Other viral conditions can cause abortions, include **Bluetongue disease, Rift Valley fever and Schmallenberg virus**. These conditions have never been reported in Canada, but the risk of introduction remains.

CATTLE WITH BVD CAN TRANSMIT THE DISEASE TO SMALL RUMINANTS AND THE CLINICAL SIGNS WILL BE SIMILAR TO THOSE OF BORDER DISEASE. SINCE SHEEP CAN ALSO TRANSMIT SOME DISEASES TO CATTLE, CAUTION SHOULD BE TAKEN WHEN COMINGLING SPECIES.

STORY OF A CASE :

A farmer making the transition from dairy cattle production to a dairy sheep farm placed about 30 heifers in a pen near one where ewes were being bred. Five months later, he called his veterinarian to ask about shaking lambs with weird wool.

Clinical diagnostic : clinical signs of Border disease (here BVD). Blood samples from the heifers found one of them was immunotolerant, so she continually excreted the BVD virus. In this case, the slaughter of the immunotolerant heifer and the infected lambs completely stopped the condition in this farm.

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ABORTION SHEET
NON-INFECTIOUS

●● Sheep and goats

ABORTIONS DO NOT ALWAYS HAVE AN INFECTIOUS CAUSE. AN ABORTION CAN BE THE CONSEQUENCE OF A METABOLIC OR NUTRITIONAL DISORDER, OR IMPROPER LIVESTOCK MANAGEMENT.

INTRODUCTION ●●

Abortions in sheep and goats are not always infectious. It is therefore important to consider non-infectious causes when dealing with abortions in a group of pregnant females. If no infectious agent is diagnosed in the laboratory, we can change the diagnostic approach and question the diet and the herd management. New analysis may be requested from the laboratory as needed. **The nutrient deficiencies that are described in this sheet are *the IODINE DEFICIENCY (front) and the ENERGY AND PROTEIN DEFICIENCY (back).***

IODINE DEFICIENCY...

Some nutrient deficiencies can cause abortions. **The most frequently encountered in Canada is iodine deficiency. A diet deficient in iodine is the most common cause of goiter.** Consumption of certain plants or foods (known as goitrogens) can also cause a goiter by decreasing the absorption of iodine or by modifying its metabolism.

DIAGNOSTIC ●●

The diagnosis is usually easy to make when the clinical signs include an abnormally large thyroid.

PREVENTION ●●

A sufficient intake of iodine at all times and for all the animals on the farm can prevent this nutrient deficiency.

CLINICAL SIGNS ●●

Iodine deficiency or goiter can be recognized quite easily when the thyroid is highly developed as shown in the picture below. Goiter can occur at any age and the most common clinical signs are: weight loss, emaciation, scarce wool, swelling of the face, thickened skin, weakness, lethargy, decreased fertility and decreased milk production. Goiter can also cause late-term abortions, weak newborn lambs and kids, and a thyroid that is easily palpable or more developed than normal.

TREATMENT ●●

Following the readjustment of iodine in the diet, animals recover easily and quickly from the condition. Iodine powder can be used, diluted in water or incorporated into the diet. **Beware of excess! It can cause iodism, that can result in nervous and hyperactive animals: it is then necessary to stop the treatment.**

SOME FACTS ABOUT IODINE DEFICIENCY :

- The following plants and foods are potentially goitrogenic : white clover, soybeans, peas, cabbages;
- Females at their first lambing are more likely to give birth to offspring with a goiter (nutrient requirements are greater because they have not completed their growth);
- If the flock is deficient in iodine, it is recommended to check the herd diet program to ensure that there are no other deficiencies;
- An iodine-selenium relationship is reported in thyroid function, so beware of selenium deficiency.

Non-infectious abortions

ENERGY AND PROTEIN DEFICIENCY...

Inadequate energy or protein intake will inevitably result in smaller and weaker lambs / kids. In both cases, the diagnosis may be misinterpreted for an abortion caused by *Chlamydia*. In addition, an energy deficiency will increase the risks of pregnancy toxemia, which is often the cause of abortion.

CLINICAL SIGNS

A deficient diet in mid-gestation will have a significant impact on the development of the placenta and will result in the birth of smaller lambs / kids.

A deficient diet in late-gestation, may lead to the onset of pregnancy toxemia or hypocalcemia, and the death or the birth of smaller and weaker lambs / kids. It can also lead to insufficient colostrum production that can turn into insufficient milk production.

AN INCREASING NUMBER OF SHEPHERDS SELECT THEIR FEMALE TO BE MORE PROLIFIC. THIS IS A REAL CHALLENGE TO ENSURE OPTIMAL NUTRITION AT ALL TIMES, PARTICULARLY IN LATE GESTATION.

PREVENTION

- Ensure an adequate nutrition program and serve quality feedd in sufficient quantity;
- Analyze feed before changing rations;
- Perform metabolic profiles as needed to monitor the general condition of the animals.

DIAGNOSTIC

Diagnosis is based mainly on the general condition of the animals, their body score and the verification of the nutrition program. The metabolic profile performed in the laboratory for groups of ewes / goats in gestation can help diagnos nutritional deficiencies.

TREATMENT

Treatment consists of readjusting rations to restore the energy and protein levels to adequately meet the nutritional needs of the flock. It is also possible that the farmer, with his veterinarian, has to treat females to prevent pregnancy toxemia and hypocalcemia until the situation is remedied.

OTHER CAUSES OF NON INFECTIOUS ABORTIONS:

- Stress;
- Excessive handling;
- Overcrowding;
- Excessive heat;
- Transportation;
- Toxins in the diet or toxic plants;
- Intake of some medication such as dexamethasone;
- Copper deficiency;
- Plants containing a lot of estrogen;
- Manganese or vitamin E-Se deficiency, etc.

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