

# Understanding Cache Valley Virus in Saskatchewan Sheep Flocks

Written by Dr. John Campbell (WCVM) - Based on an outbreak scenario dated around December 2024 - February 2025

## What Happened?

During November and December, sheep producers across Saskatchewan noticed an unusual number of stillbirths, abortions, and lambs born with skeletal deformities. Vets and producers suspected Cache Valley Virus (CVV), a mosquito-borne viral disease common in North America, as the cause.

In response, the Disease Investigation Unit at the Western College of Veterinary Medicine (WCVM) launched a project to encourage producers to send affected lambs for examination at Prairie Diagnostic Services (PDS). This project was funded by the Saskatchewan Ministry of Agriculture and the Sustainable Canadian Agricultural Partnership. An additional local disease investigation was led by Dr. Fritz Schumann (WCVM) and Dr. Kyla Cutts (Warman Veterinary Services) and focused on several affected flocks near Saskatoon.

## What Did We Do?

A total of 29 lambs from 12 different flocks were sent to PDS between December and mid-February. Each lamb underwent a post-mortem by a veterinary pathologist. Tissue samples were sent to the Animal Health Laboratory in Guelph for PCR testing to detect CVV. Some samples were also tested at the Texas Veterinary Medical Diagnostic Laboratory for antibodies. Additionally, most lambs had their tissues examined for other potential causes of abortion.

## What Did We Find?

Out of the 29 lambs, **20 (69%) tested positive or were suspected to have CVV**, affecting 8 out of the 12 flocks (67%).

### Common Signs in Affected Lambs

- **Joint stiffness and fusion (arthrogryposis):** Found in **100%** of confirmed CVV cases but also appeared in 22% of negative cases.
- **Poor muscle development:** Seen in **75%** of CVV cases, but other conditions can also cause this.
- **Spinal deformities:** Almost all CVV-positive lambs (**95%**) had curved, bent, or fused spines, including conditions like kyphosis (humpbacked), lordosis (inward spine curve), or scoliosis (sideways spine curve).
- **Brain abnormalities:** **80%** had hydrocephalus or hydranencephaly, where parts of the brain were missing and replaced with fluid.
- **Shortened lower jaw:** Found in about **50%** of cases.

## Confirming Cache Valley Virus

PCR testing at Guelph confirmed CVV in about **70% (14/20)** of suspected cases. Some lambs with typical CVV symptoms tested negative, likely because the virus was no longer present at birth.

In the 4 flocks where CVV was **not** confirmed:

- One had **Ureaplasma infection**.
- One had **Campylobacter fetus infection**.
- One had **goiter** in all submitted lambs.
- One was **undetermined**, as the only submitted lamb had been scavenged.
- One CVV-positive lamb also tested positive for **Q fever (Coxiella)**.

These results highlight why post-mortems are important—similar symptoms can have different causes, and proper diagnosis helps prevent future losses.

## Why Was CVV So Widespread This Year?

While we can't say for sure, we do know CVV has been in Saskatchewan for over 10 years. A 2014 study by WCVN and the Saskatchewan Ministry of Agriculture found that **65% of sheep** and **94% of flocks** had exposure to the virus.

Like many mosquito-borne diseases, CVV may follow cycles based on mosquito infection rates and flock immunity levels. Since so many sheep were affected this year based on producer reports, flocks may now have higher immunity, reducing cases in the next breeding seasons. However, **how long immunity lasts is unknown**.

A similar virus in Europe, **Schmallenberg virus**, causes the same problems in sheep and goats and tends to reappear every **3-5 years**.

## Can We Prevent CVV?

There is **no vaccine** for Cache Valley Virus. The only way to reduce risk is to **avoid exposing ewes to mosquitoes during the first 48 days of pregnancy**. Some strategies include:

- Adjusting the breeding schedule to avoid peak mosquito season.
- Keeping early-pregnancy ewes away from mosquito-heavy areas.

From our study, most affected lambs were born in **November, December, and January**, meaning their mothers were bred in **June, July, and August**—right when mosquitoes are most active.

## What's Next?

Thanks partly to this project, Prairie Diagnostic Services **can now run PCR tests for CVV in Saskatchewan** instead of sending samples to Guelph.

This research was only possible because of the producers who submitted lambs for testing. Some flocks lost **up to 50% of their lambs** to CVV, so understanding the disease is critical for future prevention.

We sincerely thank all the producers and veterinarians who participated, the Saskatchewan Sheep Development Board for their hard work in promoting the project and recruiting producers, and Prairie Diagnostic Services for the diagnostic work. Thanks as well to the **Saskatchewan Ministry of Agriculture** and the **Sustainable Canadian Agricultural Partnership** for funding this important work.

### **Take-Home Messages for Producers**

**Cache Valley Virus (CVV)** caused severe lamb losses in Saskatchewan, with **69% of submitted lambs affected** during this specific time period.

#### **Key signs in infected lambs:**

- **Stiff or fused joints** (100% of cases)
- **Spinal deformities** (95%)
- **Brain defects (hydrocephalus, hydranencephaly)** (80%)
- **Poor muscle development** (75%)
- **Short lower jaw** (50%)

**Diagnosis is important!** Some cases were due to **other diseases** like Ureaplasma or Campylobacter, not CVV.

**No vaccine available.** The best prevention is **avoiding mosquito exposure** during the first 48 days of pregnancy.

**Adjust breeding schedules if possible** to limit exposure in June-August, when mosquitoes are most active.

**Good news!** Prairie Diagnostic Services **can now test for CVV in Saskatchewan** thanks partly to this study.

If you suspect CVV in your flock, contact your vet for post-mortem testing to confirm the cause.

LIVESTOCK MANAGEMENT

# Cache Valley Virus can be difficult to prevent in sheep flocks

By John Campbell, DVM, DVSC  
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X in



Several recent cases of stillborn and aborted sheep fetuses have been linked to Cache Valley Virus. Mosquito-borne viruses are difficult to avoid, but one option is to alter the breeding schedule so that sheep are not in the early pregnancy period during the high-risk mosquito season. | File photo

In the past few weeks, Prairie Diagnostic Services in Saskatoon has had some confirmed cases of stillborn and aborted sheep fetuses diagnosed with Cache Valley Virus, a mosquito-borne disease.

The virus is widely distributed in mosquito populations throughout North America and in parts of Central America. It was first identified in 1956 in mosquitoes collected in Utah's Cache Valley, which gives this virus its unique name.

It has been demonstrated in at least four Canadian provinces, 22 U.S. states and in Mexico. However, it took until 1987 for it to be identified as a cause of abortion in sheep with severe central nervous system and musculoskeletal system changes in aborted fetuses.

In 1997, it was also recognized as a very rare cause of human disease.

The virus is only spread to mammals and humans through mosquitoes; there is no direct mammal-to-mammal spread. It was first identified in Canadian sheep in 2012 in malformed lambs in Ontario.



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This virus is maintained in two host populations: an insect population (mosquitoes) and a reservoir vertebrate host that amplifies the infection.

These vertebrate hosts are primarily deer but also include small ruminants such as sheep and goats, as well as horses and cattle. Many other species of mammals have also tested positive.

Like many insect-borne viruses, the late summer and early autumn months are when the highest amount of virus is present in the mosquito population.

A 2014 serological study was carried out in Saskatchewan by a team led by Dr. Fabienne Uehlinger at the Western College of Veterinary Medicine and Dr. Wendy Wilkins at Saskatchewan Agriculture. Sixty-five per cent of sheep were positive and 94 per cent of flocks had at least one sheep positive for the virus. In addition, 20 per cent of cattle, 33 per cent of goats, 69 per cent of horses and 51 per cent of mule deer tested positive.



If a pregnant sheep or goat is infected with the virus by an infected mosquito during early gestation (first 48 days), it can result in early embryonic death, abortions or stillbirth in lambs or kids.

If the infection is in the first month of gestation, it may result in early embryonic death and the result is pregnancy rates that are much lower than usual in the flock.

Between 32 and 48 days of gestation, the virus can cause severe congenital abnormalities of the fetus, affecting both the nervous system and the musculoskeletal system. These lambs can be aborted or stillbirth and will often have various brain abnormalities, such as hydrocephalus and enlarged skulls, or severe musculoskeletal abnormalities, such as a twisted spinal column, fused joints and abnormal limbs (arthrogryposis) and underdeveloped muscles.

It appears that these adverse clinical syndromes are mainly seen in small ruminants such as sheep and goats. Adverse consequences of infection in horses or cattle have not been identified consistently.



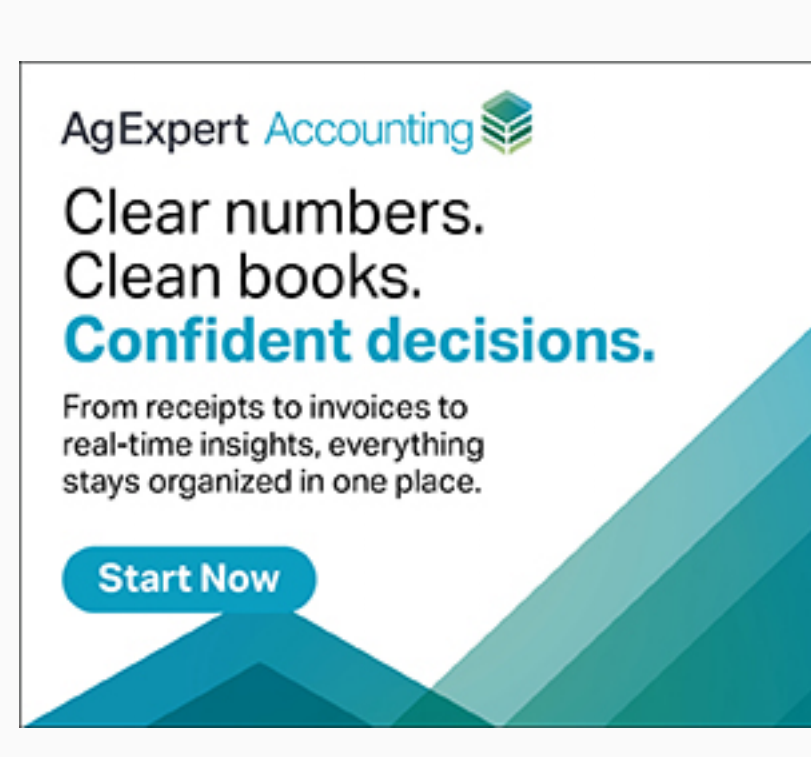
Clinical symptoms are limited to the impacts on the fetus. The ewe will not have clinical disease and the virus in the bloodstream can only be detected for about two weeks after infection. The virus is also difficult to demonstrate in the aborted fetus, making diagnosis particularly challenging.

Unfortunately, it is difficult to prevent this viral cause of abortion because no vaccines for Cache Valley Virus infection are available.

The only potential way to prevent infection is to limit the exposure of pregnant sheep in the first 50 days of gestation to mosquitoes. Obviously, it is almost impossible to avoid mosquitoes in grazing animals such as sheep.

However, producers could perhaps alter the breeding schedule so that the sheep are not in the early pregnancy period during the high risk mosquito season.

The good news is that sheep that become infected will develop immunity and will be unlikely to abort in subsequent pregnancies due to this virus.



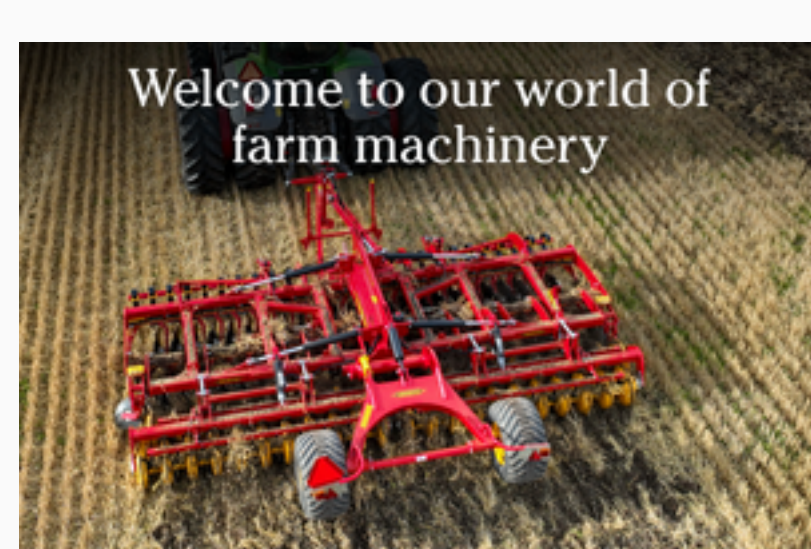
In some of the current outbreaks of Cache Valley Virus abortions, we think that the sheep were infected in late July or early August of last year.

At some point in the late summer or early fall, mosquito populations start to drop off and eventually we should see abortions due to this virus decline.

As well, because this is a very seasonal disease, it corresponds to the seasonality of the mosquito populations.

Producers who have an unusually high rate of abortions or stillbirth in their flocks should work with a veterinarian to submit aborted fetuses to the diagnostic laboratory to get an accurate diagnosis. There are many other causes of abortion in sheep and goats, and some of the other viruses can also cause malformed fetuses.

In Saskatchewan flocks, there is an initiative to provide free testing on abortion cases funded through Saskatchewan Agriculture and the vet college's disease investigation unit. This is a time-limited program, and a local veterinarian can help submit those samples.



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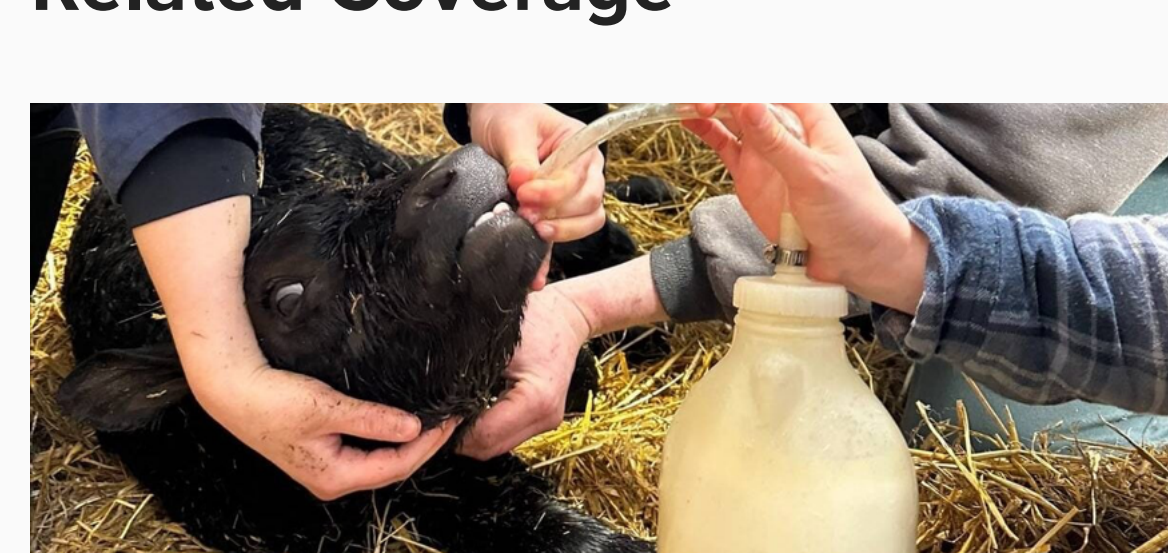
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