

# Caprine arthritis encephalitis (CAE)

August 2017, Primefact 857, second edition  
Animal Biosecurity and Welfare, NSW DPI

Caprine arthritis encephalitis (CAE), commonly known as 'big knee', is caused by a lentivirus or 'slow' virus associated with nervous disorder (encephalomyelitis) in kids and slowly-developing disease syndromes in older goats.

Symptoms can vary markedly between animals. Most well managed goats will show no obvious clinical signs.

The virus occurs mainly in improved dairy goat breeds CAE is spread primarily by infected colostrum and milk. Control programs have been conducted in many countries but CAE is still causing problems in dairy goat populations world-wide, including within NSW.

CAE is a market access issue. The International Organisation for Animal Health (OIE) sets a minimum standard for live goat imports that includes:

- the animals showed no clinical sign of CAE on the day of shipment
- animals over one year of age tested negative for CAE in the 30 days prior to shipment, or
- CAE has not been diagnosed in the sheep and goats in the flocks of origin clinically or by testing in the past 3 years, and no sheep or goat from a flock of inferior health status has been introduced into these flocks during this period.

CAE is also an animal welfare issue and causes major production losses through mastitis, ill-thrift, arthritis, pneumonia, ascending paralysis and encephalitis in kids.

## The virus

The CAE virus belongs to a family of viruses (lentivirus) that can integrate into the DNA of a host cell and then use the host's own cell to reproduce itself (retrovirus). Once a host cell is infected, it remains infected for life. The only way to remove infection is to destroy the infected cell.

The CAE virus infects mainly white blood cells and travels through the body inside these cells. Any secretion that contains white blood cells (milk, blood, saliva, tears, respiratory secretions) will contain the virus. It can also be found in the cells surrounding ova (egg cells) and in semen.

Antibodies to the virus don't provide protection but are good indicators of exposure and infection. It can take two months, and rarely up to two years, for antibodies to develop after exposure to the virus.

The virus is very susceptible to inactivation by heat (56 degree C for 10 minutes) and by chemical disinfection, but is resistant to UV. It does not survive well outside the host as it is cell associated.

## The disease

The disease occurs when the cells carrying the latent virus mature and multiply in different body 'target' organs – mammary gland, lungs, tendons sheaths, joints and nervous tissue.

The clinical signs that can occur in an infected goat are mainly due to the body's reaction against the virus infected cells.

Clinical signs include:

- viral mastitis, increased white blood cells in the milk. May 'Hard udder' (indurative mastitis)
- arthritis in any joints, due to inflamed tendon sheaths and joint linings ('big knee'),
- pneumonia
- progressive paralysis.

Kids less than 6 months of age are more likely to show disease of the nervous system.

Most CAE infected goats show no clinical signs, especially when well managed but does may have viral mastitis.

Clinical signs can begin if an infected goat is stressed e.g. poor nutrition and overcrowding.

## Epidemiology

CAE spreads mainly by kid goats drinking infected milk. Adult goats can also be infected by exposure to infected milk droplets during milking.

CAE can also be spread by respiratory secretions, saliva and tears when goats are kept in close quarters.

Infection may be spread by blood on gear such as vaccination needles, tattooing equipment, dehorning and foot/hair shears, or through exposure to open wounds.

Venereal spread in semen and in utero spread to kids, are less likely but can occur.

The virus usually enters a clean property in an infected goat. The goat may test antibody positive or negative because of a delay between infection and the development of antibodies.

## Zoonotic risk

People drinking milk from infected does can develop antibodies to the CAE virus. There is no evidence that this contact has resulted in persistent viral infection.

The surface glycoproteins on the CAE virus and the HIV virus cross react. It has been suggested that exposure to the CAE virus in goat milk may lead to false positive reactions to HIV in some people.

## CAE risk factors

The **least-risk herd** is a CAE accredited herd or a herd that has no introductions (closed herd) and annual negative whole herd blood tests.

A **low to moderate risk herd** is a herd with a history of negative testing that buys in goats (open herd). Goats bought from CAE accredited herds or from closed herds with a good testing history would pose a low risk. Goats bought from herds with no testing history present a moderate to high risk (even if the purchased goat is tested).

A **high risk herd** is a herd that has not tested all goats over 12 months of age in the last 12 months (including goats that had previously been tested negative or were sourced from tested herds), regardless of introduction policy.

Low risk factors include:

- extensive management where single doe/kid(s) units predominate and where goat to goat contact is minimal (commercial fibre and meat goats)
- kids fed pasteurised milk (heated to greater than 56 degrees C for a minimum of 10 minutes)
- strict hygiene in the use of common equipment or when handling goats.

High risk factors include:

- feeding pooled milk to kids and/or adult goats,
- exposure to feed or water contaminated with body fluids
- keeping goats in close confinement

- sharing unsterilized equipment between goats
- persons handling a number of goats (especially udder or mouth) from different sources
- untested goats being milked as a common group
- mixing of goats from different farms at one site, e.g. at shows and sales.

Shows, sales and any other venues where goats are kept from multiple sources are a significant transmission risk. The risk increases the longer the goats are kept together.

## CAE control

The key to preventing CAE spread is to detect infected goats that have no signs of disease.

Infected goats are detected by serological testing. The most accurate test is the ELISA test although some countries still use the less specific AGID test.

Repeated blood testing over 12 months will detect most infected goats (a very small number may take longer to seroconvert).

All goats 6 months and older should be tested. Do not test adult does in the month either side of kidding as inconsistent results could occur. Do not test goats within a month after any vaccination.

Animal Health Australia (AHA) and The Goat Industry Council of Australia (GICA) have developed '[Guidelines for the Voluntary Control and Eradication of CAE from Individual Herds](#)'. These should be used with the '[National Kid Rearing Plan](#)' to reduce the risk of CAE. The National Kid Rearing Plan is designed to reduce the risk of infection with Johne's disease and CAE by animal identification, good on farm biosecurity, use of a [National Goat Health Statement/Declaration](#), an annual review of the Plan, record keeping and hygienic practices.

## CAE Certification

Dairy goat herds are at greater risk of CAE infection because the goats are managed intensively.

Both the testing history of the adult herd (especially in the last 12 months), and information on the herd management is used to certify CAE risk status.

If the herd is not accredited and there is no CAE testing in the last 12 months, all animals over 6 months of age should be tested. Any ELISA positive animal indicates that infection could be present in the herd and the CAE status of the herd is positive.

Further information on CAE Accreditation can be obtained from the [DPI website](#) or [Animal Health Australia's website](#). Voluntary Guidelines for the Control and eradication of CAE can be downloaded from the [Goat Industry Council of Australia website](#).

## More information

- Local Land Services, Tel: 1300 795 299
- To view details of your LLS region: <http://www.lls.nsw.gov.au/>
- Tel: 1800 680 244, Animal Biosecurity and Welfare,
- Department of Primary Industries at [biosecurity@dpi.nsw.gov.au](mailto:biosecurity@dpi.nsw.gov.au)

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ISSN 1832 6668

PUB17/560