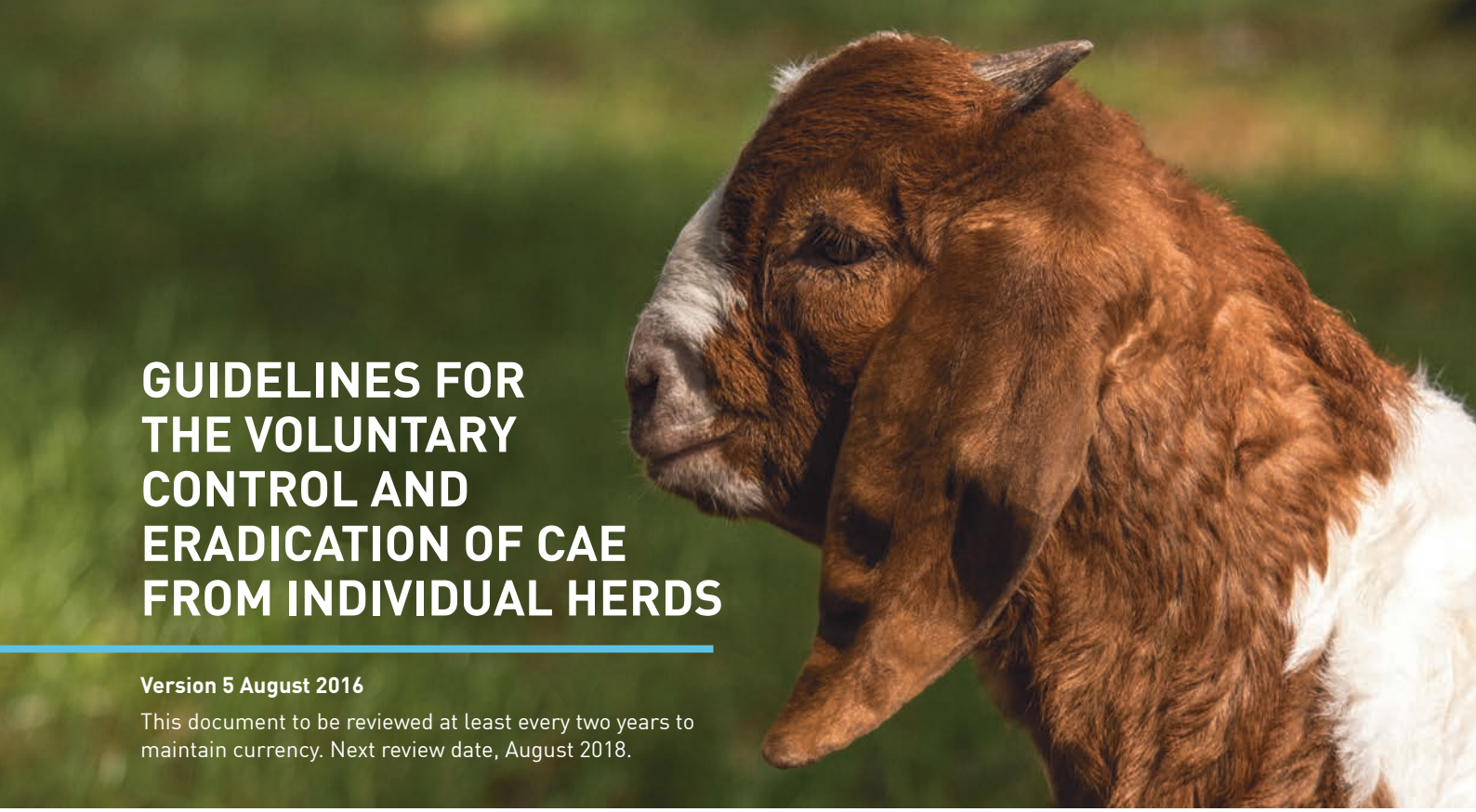

GUIDELINES FOR THE VOLUNTARY CONTROL AND ERADICATION OF CAE FROM INDIVIDUAL HERDS

Version 5 August 2016

This document to be reviewed at least every two years to maintain currency. Next review date, August 2018.

Introduction

The dairy goat industry, through its representatives on the Goat Industry Council of Australia (GICA), have requested the development of voluntary guidelines to assist producers control and eradicate Caprine Arthritis Encephalitis (CAE) from their herds.

These guidelines have been developed for use by veterinarians in partnership with their goat producer clients to achieve effective CAE control. The guidelines outline the practical steps in testing a herd and the key biosecurity practices to control and eradicate this disease.

About CAE

CAE is a serious disease that causes major production losses in goats world-wide through mastitis, ill-thrift, arthritis, pneumonia, ascending paralysis and brain disease (encephalitis). CAE is also considered an animal welfare issue. There is no cure for CAE.

The disease is also known as 'big knee' and is caused by a lentivirus, which is a 'slow' virus with a long incubation period.

Impact of CAE on Australian dairy goat herds

CAE is a production disease with market access and animal welfare implications for both milking animals (with production losses up to 25%) and for the production of healthy doe replacements.

Other economic impacts include high cull rates due to weight loss and arthritis, reproductive losses and animal deaths. Goats with CAE are more susceptible to other diseases such as Johne's disease (JD), respiratory infections and internal parasites, and do not recover well from sickness generally.

Zoonotic potential and impact on other species

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, but there is a strong cross reactivity between surface glycoproteins on the CAE virus and the HIV virus. It has been postulated that the false positive reactions to HIV in some people may be due to previous exposure to the CAE virus in goat milk.

Similar cross reactivity is seen in sheep that have been exposed to the CAE virus and are then tested for Maedi-Visna disease, which is caused by a related virus in sheep and goats. Currently Australia is free of Maedi-Visna, but some countries require a negative test for export purposes.

Researchers now consider that the CAE virus and the Maedi-Visna virus are so closely related that they should be grouped together and called the Small Ruminant Lentivirus. Goats with CAE should be kept separate from sheep as well as CAE tested negative goats.

animalhealth AUSTRALIA

GICA Goat Industry Council of Australia DAIRY | MEAT | FIBRE | RANGELAND

How CAE spreads

CAE is usually transferred from doe to kid via colostrum or milk. One drink of infected milk is sufficient to cause infection in a kid.

The virus does not cross the placenta and kids born to infected does generally do not have the disease. There is a small risk of the disease spreading to the kid during the birth process if the kid is contaminated with blood from vaginal tears.

The CAE virus attaches to the white blood cells of goats and hence is potentially in every body secretion e.g. milk, oestrus mucus, respiratory mucus, conjunctival secretions, blood from kidding. While it has been isolated from the reproductive tract of bucks, in practice, entire males or semen are less likely to be a source of infection. If embryos are thoroughly washed embryo transfer is not considered a risk, even if the donor doe is positive for the virus.

Contact between adult goats in intensively managed situations, such as dairy goat herds, can lead to infection. The infection is less common in meat, fibre, rangeland and miniature goats under extensive grazing conditions. However, if an infected animal is introduced to a herd, the disease can spread and establish, because even in extensive conditions, goats will congregate and mingle at watering and supplementary feeding/mineral supply points.

People with virus-contaminated hands, clothing and footwear can spread the infection. Milking machines can spread the virus as well. Wash down water from the dairy or housing sheds should be directed into a drainage system and not onto pastures.

Diagnosis of CAE

Detecting sub-clinically infected (asymptomatic) goats is the key to preventing CAE spread so all goats (does, bucks and wethers) in a herd should be tested.

Infected goats are detected by serological (blood) testing. In Australia the preferred test is the ELISA (enzyme-linked immunosorbent assay) test. Repeated blood testing at 3-6 monthly intervals during a 12 month period will detect the majority of infected goats (a very small number may take longer to seroconvert).

The CAE status of goats should be determined in goats six months and older. Adult does should not be tested in the period from one month either side of kidding or within a month of vaccination as inconsistent results could occur.

CAE overseas

Norway and Switzerland have eradicated CAE and other countries have established eradication or control programs. These programs are usually voluntary and based on regular testing, implementation of farm biosecurity and the development of accreditation programs to provide disease free stock.

CAE in Australia

The disease prevalence in Australia is unknown but anecdotal advice acknowledges the occurrence of CAE in dairy herds in all states. Some states, namely NSW, Qld and SA, have accreditation schemes; while in Victoria, CAE is a notifiable disease (which means herds are allowed to have this disease but they are not allowed to knowingly spread the disease to other herds, i.e. cull animals need to be sold to slaughter or another CAE infected herd). In Queensland, goat owners have a General Biosecurity Obligation not to let CAE spread from their property. There is currently no national control program for CAE in Australia, and any move for this would require industry support.

Principles of CAE control

There are two pathways which can be followed for the eradication of CAE. The first is a test and cull, based on three monthly testing and segregating the test negative animals. The second pathway is a snatch-rear and segregation of the new born animals as a separate herd thereby establishing two herds. For the latter approach to succeed, a robust biosecurity plan must be in place and a closed herd maintained. Both methods have been used successfully in Australia and overseas.

METHOD ONE - TEST, CULL AND ISOLATE

Steps:

1. Conduct baseline testing for the herd, as in a whole herd test.
2. Cull all test positive animals or isolate positive does until they have kidded and then remove from the herd. Kids should be 'snatched' at birth, physically separated by at least a solid wall and reared away from the doe by following the procedures described in the fact sheet *Snatch rearing and pre-weaning kid management in goat enterprises*.
3. Repeat testing every 3-6 months and cull all test positive animals or isolate positive does until they have kidded and then remove from the herd.
4. Repeat process until the herd returns two negative whole herd tests, six months apart.

General

The aim of any disease control program is to carry out an initial herd test to understand the level of disease already established and to then set about breaking the disease transmission cycle, while at the same time reducing herd levels of disease by removing infected animals that could act as a source of further disease spread. More frequent testing at three monthly intervals (rather than the standard six monthly testing) will generate a status more quickly. For herds with a known infection level monthly testing and culling will enable a more speedy return to a negative status.

Control and eradication of CAE from the herd may take several years and the speed at which this occurs will depend on the level of infection at the start of the program, the level of culling of infected animals and the frequency of testing that the owner is prepared to carry out.

1 **Identify the disease status of the herd.**

HOW?

By whole herd ELISA test repeated after 3-6 months from the first herd test.

2 **Limit the introduction of disease entry into the herd and disease spread within the herd.**

HOW?

1. Purchase goats that are accredited free for CAE or from herds that have had a whole herd negative CAE test within the previous six months (obtain copy of lab report or veterinary certificate) and are accompanied by a fully completed and signed National Goat Health Declaration.
2. Follow the National Kid Rearing Plan for rearing young stock.

3 **Reduce the level of disease through hygienic kid rearing, culling of infected stock, segregation of infected animals.**

WHEN?

Start hygienic kid rearing practices immediately, and cull all test positive animals or isolate positive does until they have kidded and then remove from the herd. Kids should be 'snatched' at birth, physically separated by at least a solid wall or double fence and reared away from the doe by following the procedures described in the fact sheet *Snatch Rearing and pre-weaning kid management in goat enterprises.*

4 **Monitor progress in disease control through regular testing, currently serology (blood), but in the future this could be with bulk milk tests.**

HOW AND WHEN?

Whole herd test every three months until the herd has two negative tests at least six months apart. Then test annually or biennially.

5 **Apply for accreditation once disease freedom has been established and monitor the herd annually through blood testing.**

WHO?

Contact your state department of agriculture to obtain more information about accreditation plans.

METHOD TWO – SNATCH REAR AND SEGREGATE

Steps:

1. Snatch rear and segregate all kids in an area physically separated and operating under a robust biosecurity plan. This area should be completely separate in all aspects of management from the parent herd. A solid physical barrier should be used, as a minimum.
2. Test the snatch-reared kids before they enter the negative tested milking herd.
3. Cull the oldest age group in the positive tested herd when the next 'clean' generation enters the negative tested milking herd.
4. Continue to maintain biosecurity until the original positive tested herd has been completely culled.
5. Conduct a whole herd test to confirm status.
6. Thoroughly clean and disinfect the original sheds before allowing the clean tested negative herd access to these areas.

General

In addition to developing a biosecurity plan to reduce the risk of disease entry into the new herd, monitoring of all disease control steps is critical in the original herd to ensure there is no further spread and breakdown in the herd.

All cull animals should be sold for slaughter only.

The steps to follow are summarised below and are designed to minimise the disruption to any commercial milking herd.

1

Snatch rear all kids at kidding and remove to a clean new shed, physically isolated from the original herd.

Maintain physical separation and biosecurity in both milking herds.

Monitor the disease status of snatch-reared kids.

HOW?

Follow guidelines in the fact sheet *Snatch rearing and pre-weaning kid management in goat enterprises*.

HOW?

Maintain closed herds and avoid sharing of milking and feeding equipment.

Test the snatch reared kids before they join the test negative milking herd.

Cull the oldest generation of goats from the positive herd when the next 'clean' generation enters the test negative milking herd.

Always milk the 'clean' herd first and then the unknown/infected status does last. Clean the milking machine thoroughly after each milking session.

2

Repeat process until there is only one herd (the new negative tested herd).

HOW?

Cull the oldest age group annually, no exceptions and maintain a closed herd.

While in theory it is possible to eradicate CAE from a herd through testing and removal of carrier animals only, this can take many years and a lot of dedication. Removing the oldest cohorts speeds up the eradication process considerably.

Testing procedures

To confirm a herd status currently all goats over the age of six months and in good health must be tested at least twice at a minimum of six monthly intervals to establish a negative herd status.

Animals which are due to kid or have recently kidded (one month) should be excluded from testing. They should not have been vaccinated within the last month for any disease. Goats must also be in good health and not stressed by rough transport.

All goats must be ear tagged, or tattooed to ensure they are permanently identified.

This ensures that if a positive result comes back, the result can be reliably matched to the animal.

Samples are collected into plain vacutainers or bottles suitable for clotted samples. Each labelled filled, container should be held upright and placed in an esky and once clotted add the freezer brick and chill the samples. Haemolysed samples are unsuitable for testing.

The preferred test is the ELISA test, which is a common laboratory technique, used to measure the concentration of antibodies in the goat's blood. Samples should be despatched directly to the laboratory within 48 hours of collection. Ensure the laboratory used is NATA accredited for CAE testing. For further guidance on sample and test selection please contact your state agricultural department. The laboratory submission form should be fully completed with the owner's name, address and contact details, the individual identification of the sampled animals and the property identification code of the property on which the animals were sampled.

What constitutes a positive test result?

The laboratory will report as positive any sample that has CAE antibodies. As goats with CAE cannot rid themselves of the virus as it is protected within the goats own cells, the presence of antibodies means that goat is carrying the virus and is infectious, even if not showing any clinical signs.

What constitutes a negative test?

A negative test means that the goat has no antibodies to CAE and hence either has never been exposed to the virus or exposed so recently it has not yet had time to develop any antibodies.

Interpreting results

(From https://labtestsonline.org/understanding/features/reliability/start/1)

Although a test that is 100% accurate is ideal, in practice, test methodology, instrumentation and laboratory operations all contribute to small but measurable variations in results. The small amount of variability that typically occurs does not usually detract from the test's value and statistically is insignificant. The level of precision and accuracy that can be obtained is specific to each test method but is constantly monitored for reliability through comprehensive quality control and quality assurance procedures. Compared to many disease blood tests, the CAE tests are very accurate and precise, mainly because goats are infected with the virus for life.

Sensitivity and Specificity

The tests that a provider chooses in order to diagnose or monitor a medical condition are based on their inherent ability to distinguish whether you have the condition or do not have the condition. Depending on the symptoms and medical history, a provider will order tests to confirm a condition (tests with high sensitivity) or tests to rule out the condition (tests with high specificity).

Sensitivity

Sensitivity is the ability of a test to correctly identify individuals who have a given disease or condition. Highly sensitive tests have few false negatives.

Specificity

Specificity is the ability of a test to correctly exclude individuals who do not have a given disease or condition. Highly specific tests have few false positives.

Test results

1. Tests are NEGATIVE: If there are no positive or inconclusive results for any individual goats, the result of the herd test is negative.
2. Tests are INCONCLUSIVE: Goats classified by the testing laboratory as having an inconclusive result must be isolated and retested within 30 days of the inconclusive test to clarify their status and the status of the herd.
3. Tests are POSITIVE: If one or more goats return a positive laboratory test result during any test of the herd for CAE, accreditation status must be suspended immediately. The herd status is suspect.

The herd cannot become accredited or re-accredited without further investigation by the veterinarian to confirm the infection status of the ELISA positive goats. This will involve a review of herd management, clinical examination of suspect goats and additional laboratory testing.

Animals classified as ELISA positive, together with any kids raised on their milk, must be isolated immediately to prevent further spread of the disease.

If confirmed positive goats are detected in a herd, and if the owner wishes to progressively eradicate the CAE, the veterinarian should advise the owner regarding the development of a disease management program.

The herd may be run on a two herd system (infected and non- infected herds). A kid rearing program that includes removal of progeny of infected does at birth, cleaning of kids to remove any birth fluids and use of colostrum and milk replacement must be conducted.

Milking practice

Reference: *Best Management Practices for Dairy Goat Farmers*, Compiled and written by Clara Hedrich, with assistance from Dr. Chris Duemler, DVM, and Dan Considine

Goats with CAE can spread the virus to other goats by sharing milking machines. Only a small amount of milk is needed to spread the virus. CAE positive goats must be milked last.

The dairy is the area of greatest risk for cross contamination on the farm. This is the main 'common area' for goats on the farm with animals using the space twice a day every day. This means that if an eradication program is in place through snatch rearing and the development of a 'clean' herd, it is paramount that the clean herd be milked first every time followed by the unassessed and potentially infected herd last. Milk is the main source of disease risk and needs to be treated as a biohazard in this circumstance. Spilt milk needs to be cleaned up as soon as possible. The dairy area must be cleaned down thoroughly between milkings.

The milking machine should be maintained to a high standard of cleanliness to ensure milk is flowing away from the udder quickly and efficiently and at the correct pressure to avoid udder damage and milk leakage into the surrounding environment. To this end a low line is recommended over a high or mid line. The air holes in the cluster must also be maintained for efficient milk flow. Milking machines should be serviced regularly.

Best milking practise should always be adhered to with gloves being worn. Back flush systems are a help if not dipping clusters in an approved disinfectant solution. It is also highly recommended between goats.

A hazard analysis of this area is needed to minimise risk of cross contamination

Feeding kids

CAE can be transmitted to kids drinking infected colostrum and milk. Young kids are most susceptible to becoming infected because their immune system is not fully developed and are at greater risk if they are allowed to suckle, or consume colostrum or milk, from any doe that is infected with CAE. It is best to provide kids with colostrum from a herd with a current negative herd tested status for CAE and JD. Colostrum can be frozen for six months so it is possible to source colostrum from a goat herd with a negative herd tested status and store it for future use. Alternatively obtain colostrum from dairy cattle

in a JD Market Assurance Program. Artificial colostrum is also commercially available. Kids need colostrum for their first feed. Ideally they should be given 10% of their body weight of colostrum within the first 24 hours.

Rear kids on artificial milk replacer, pasteurised goats milk or milk from goats in a low risk herd (e.g. a CAE accredited herd or a herd that has a negative tested status see definition section for further information).

Pasteurised goats milk can be used but it requires well maintained systems and dedication to achieve a satisfactory result. Details can be found in the Technical note *Snatch rearing and pre-weaning kid management in goat enterprises.*

The CAE virus is destroyed by pasteurisation (check milk temperature during the process by using a thermometer). Different coloured buckets should be used for pasteurised milk and non-pasteurised milk and food colouring added to the latter to ensure unpasteurised milk is not inadvertently given to kids.

Follow the *'National Kid Rearing Plan'* available at http://www.animalhealthaustralia.com.au/what-we-do/endemic-disease/goat-health/goat-national-kid-rearing-plan/

Housing kids

Snatch kids from positive tested does at birth (i.e. be at the birth and ensure the doe does not get to clean the kid(s) and that the kids do not touch surfaces on which there could be secretions) and dry to remove birth secretions. Put kids into separate cardboard boxes until washed so they cannot suck off the blood from each other. Dip their naval cords with a strong iodine solution to prevent joint ill.

All snatched kids should be tested multiple times before entering the dairy to identify any test positive animals. Removal from the herd before reaching milking age and entering the main herd is critical. Where the disease status of the herd is unknown, inconclusive or positive, then the replacement 'snatch' kids should be maintained as a separate herd until the original herd has been culled.

Move snatched kids to a kid rearing area that is thoroughly cleaned to remove faecal and potential mucus contamination and well away from goats of unknown and known positive disease status for CAE.

Maintaining herd segregation

Goats that have tested as true CAE positive and are yet to be culled should be kept separated from the rest of the herd, and milked last. Ideally double fencing and at least one metre of space to avoid nose to nose contact or a solid wall.

If showing goats or attending milk test events, ensure your goats are kept away from goats of unknown CAE disease status by at least 1.8 metres or use solid screens to prevent nose to nose contact. Ensure no milk is used for kids if it has been in a communal test weigh bucket. Wash all buckets and equipment before reusing with either phenolic or quaternary ammonium compounds.

Biosecurity on-farm

The greatest risks for the spread of CAE virus is through the movement of infected milk, colostrum and goats. Biosecurity activity should be aimed at preventing the introduction of infected animals and products onto a farm.

To assist producers establish an on-farm biosecurity plan they should reference the *National Farm Biosecurity Manual for grazing animals* as a starting point. http://www.farmbiosecurity.com.au/toolkit/plans-manuals/national-farm-biosecurity-reference-manual-grazing-livestock-production/

However, these steps alone are unlikely to prevent the entry of CAE into a herd. Additional steps are set out below.

Livestock

Manage the introduction and movement of livestock in a way that minimises the risk of introducing or spreading infectious disease.

Ensure all introduced goats (purchases, agistment, and breeding) have been sourced from accredited free herds for CAE and MAP herds for JD.

Introduced goats should be quarantined and tested twice at 2-6 monthly intervals before release into the general herd.

Feed and water

Quality of stockfeed and water is fit for purpose including:

Only feed colostrum and milk from CAE accredited free herds and JDMAP herds.

People, equipment and vehicles

People, equipment and vehicles entering the property are controlled to minimise the potential for property contamination.

Milk infected goats in a herd last and keep the two herds (infected and test negative separate at all times).

Maintain a second set of equipment (buckets, feeders, tattoo equipment, tagging equipment, drench guns or any animal husbandry equipment) for test positive animals and clean thoroughly before and after use.

Clean milking equipment thoroughly after its use on infected animals.

Animal health management

Prevent and control animal diseases on-farm by regularly monitoring livestock health.

Test herd at least six monthly to monitor disease status unless the herd is part of an assurance scheme.

Biosecurity breakdowns

The following omissions are likely to cause biosecurity breakdown in an on-farm control program and must be addressed to assist the producer achieve a CAE disease free herd.

1. Introduced goats not having been sourced from CAE accredited negative herds. Despite these goats low risk status, they should be held in isolation and retested after six months before joining the main herd.
2. Failure to obtain a fully completed and signed National Goat Health Declaration to confirm the negative disease status of purchased goats.
3. Breakdown in kid rearing hygiene or grazing management practices.
4. Failure to carry out regular six monthly whole herd tests to monitor for any biosecurity breakdowns which may be compromising the control program or assurance status.
5. Using non-approved tests which may fail to detect a biosecurity breakdown in a control program or assurance status.
6. Failure to isolate test positive reactors and cull from the herd.
7. No records of NVD and relevant species Health Declarations (goats, sheep, cattle and alpacas) for purchased, or leased stock and for agisted stock or short term introductions (e.g. bucks and/or does for service).
8. Using same drench gun, multiple use of needles, hoof and tattoo/tagging equipment for test negative and test positive herds.
9. Milk cross contamination in dairy or exchange of body fluids between test negative and test positive herds.

APPENDIX ONE

Definitions

Caprine Arthritis Encephalitis virus

A viral disease of goats with no cure or treatment. CAE is considerably more contagious than and serological response to the virus can occur within three months after exposure. It is also called the Small Ruminant Lentivirus.

Approved veterinarian

An Approved Veterinarian that has been accredited under the Accreditation Program for Australian Veterinarians (APAV) and approved by the relevant state Chief Veterinary Officer where this is required for the purposes of CAE Testing and Accreditation programs.

Pasteurised milk

Milk can be held at 72 degrees Celsius for 15 seconds in a pasteuriser (eg Dairy Tech Inc Platinum Series Pasteurisers) or 63 degrees Celsius for 30 minutes in a conventional pasteuriser. Most failures arise from not heating the milk long enough or at a high enough temperature. Pasteurisation is also effective for assisting with the management of JD and other pathogens. Pasteurised milk should have different coloured buckets and food dye added so no possibility of non-pasteurized milk being fed to kids.

Negative tested herd status

This is achieved when two whole herd blood tests (all goats older than six months of age) is conducted at a six month interval, and all results are negative for Caprine retrovirus/ CAE using an approved ELISA test.

Goats which are infected but antibody negative at the first test will be positive at the second test in the majority of cases (for example kids which have been infected at birth).

Accreditation

Once negative tested herd status is achieved, producers may apply for accreditation under the current state rules. There is no national accreditation scheme at this stage.

In addition to the requirement to test regularly and maintain strong on-farm biosecurity practices, any confirmed positive goats must be physically isolated from the main herd or sold for slaughter within 30 days of testing positive.

After removing confirmed positive animals, the rest of the herd is required to have two negative tests 6-12 months apart to regain accreditation.

This program must be auditable with audits conducted in accordance with the business rules of the accreditation program. The supervising veterinarian must be satisfied all infected goats have been slaughtered before proceeding with the required testing for CAE Accreditation.