

PM Case discussion – ram with abscesses

This case discussion about a ram is to show you how much information you can get out of a PM (when done fresh and properly). Finding out why an animal has died, helps you to maintain the herd's general herd, and to optimize your animal production. We give you the history of the animal, some PM photos, and then follow up with our opinion of the cause of death of the animal as well as management advise.



History

Species: Sheep
Sex: Ram
Age: Adult

The ram died during the night, without showing major signs of illness before death.

PM diagnosis

Below you find some of the PM photos of the actual case.



Figure 1 The ram was recently shorn. He appears to have little body fat when observed externally.



Figure 2 The ram had a big abscess in the knee joint.



Figure 3 The regional superficial lymph node (popliteal lymph node) on this knee was swollen. When it was cut open, it was full of puss.

Dr. Ulf Tubbesing

P.O. Box 50533 Bachbrecht, Windhoek

+264 (0) 81 128 0350 ulft@africaonline.com.na

www.wildlifevetsnamibia.com



Figure 4 Note the lungs, especially the right side is very dark. A normal lung should be pink, uniformly soft and spongy¹. This is suggestive of a pneumonia.



Figure 5 The blood tinged foam in the trachea (windpipe) extending all the way up supports the diagnosis of pneumonia. Normal foam should be clear and limited to the lower 1/3 of the trachea².



Figure 6 The heart appears normal.



Figure 7 The liver shows early signs of autolysis (PM change) but an abscess containing pus is visible on cut surface



Figure 8 The kidneys have a very dark outer layer (cortex) but are normal.

Cause of death

Based on the photos and information provided, we believe the cause of death was acute pneumonia, possibly precipitated by a poor overall body condition and a high pneumonia bacterial challenge in the herd. The abscesses in the lymph nodes, liver and knee joint are likely due to a chronic, debilitating disease called caseous lymphadenitis (also known as CL, CLA or contagious boils) caused by the bacterium *Cornebacterium pseudotuberculosis*.

¹ PM course; PDF Specific organ lesions; page 84

² PM course; PDF PM changes; page 33

Abscesses in sheep and goats

There are a number of bacteria that may cause abscesses in sheep and goats but caseous lymphadenitis (CL, CLA, contagious boils) caused by the bacterium *Corynebacterium pseudotuberculosis* is worldwide one of the most important and costly, lifelong infections in small stock farming.

CLA is a life-long infection with reoccurring abscesses of the regional lymph nodes. Draining of external abscesses results in disease transmission to other sheep and goats by direct contact, and indirectly by contamination of feeders, equipment, and the environment. The bacteria can survive for months in the environment and remains a source of infection to susceptible sheep and goats.

The disease is characterized by abscess formation in or near major peripheral lymph nodes (external form) or within internal organs and lymph nodes (internal form). Both forms of CLA occur in sheep and goats, with the external form being more common in goats, and the internal form more so in sheep.

Control of the disease requires dedication and the application of strict biosecurity measures to reduce the number and prevent introduction of new cases. Even though this disease is primarily a disease of sheep and goats, it can also occur in other species, including fowl and **humans**. This means you must be very careful when handling infected animals or purulent (pus) exudate from active, draining lesions.

Cause³ and mechanism of disease⁴:

C. pseudotuberculosis is an intracellular bacterium that produces a toxin which damages the endothelium (lining cells of all blood vessels). This results in increased vascular permeability and spread of the bacteria.

To establish infection, *C. pseudotuberculosis* must penetrate the skin or mucous membranes. Skin lesions caused by shearing, tagging, tail docking, castration, environmental hazards etc. are the most common site of entry. Contact with purulent material draining from open lesions is the most commonly source infection. Animals may also become infected by inhalation or ingestion of the bacteria.

Once the bacteria have entered the body, they settle in the lymph nodes and occasionally other internal organs. The incubation period (time from infection to start of symptoms) varies from 1 to 4 months, culminating in development of abscesses.

C. pseudotuberculosis is hardy in the environment and can survive on bedding etc. for 2 months and in soil for 8 months. The presence of organic material, shade, and moisture prolong survival in the environment.

Diagnosis:

The diagnosis is based on suggestive symptoms as well as necropsy findings and serology, but a culture of pus from an unopened abscess is needed to confirm it.

³ In veterinary language; etiology

⁴ In veterinary language; pathogenesis

Symptoms:

The presence of an external abscess, especially in locations of peripheral lymph nodes in small ruminants, is highly suggestive of CLA. Recurrence is common and can be months later.

The external CLA is characterized by:

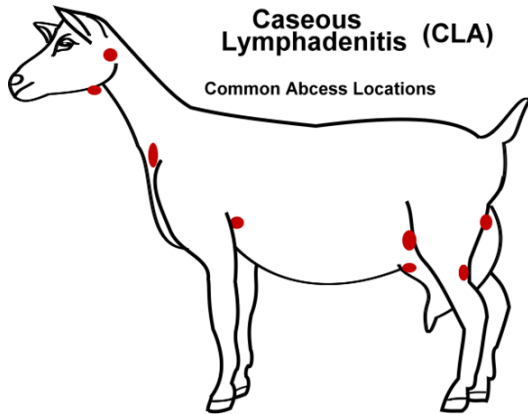


Figure 9 Abscesses in the region of superficial lymph nodes. Common sites of development include the submandibular, parotid (around the head), prescapular (in front of the shoulder joint) and prefemoral (in front of the thigh) nodes. © [Goat-link](#)



Figure 10 If left untreated, these lesions eventually mature into open draining abscesses. The skin lesions eventually heal with scarring. © [Nadis](#)



Figure 11 The pus is odourless and varies in consistency colour from greyish white to green. Consistency: In goats commonly soft and pasty while commonly thick and caseous (like cottage cheese) in sheep.

The internal form of CLA usually presents as chronic weight loss and failure to thrive. Other clinical signs depend on the organs involved, which may include any of the major organ systems. Lung and liver are common sites of visceral (internal organs) involvement. The internal form is more common in sheep.

The incidence of abscesses and development of clinical disease with either the external or internal form increases with age.

Dr. Ulf Tubbesing

📍 P.O. Box 50533 Bachbrecht, Windhoek

☎ +264 (0) 81 128 0350 ✉ ulft@africaonline.com.na

🌐 www.wildlifevetsnamibia.com

PM examination:

These PM findings are suggestive for CLA:

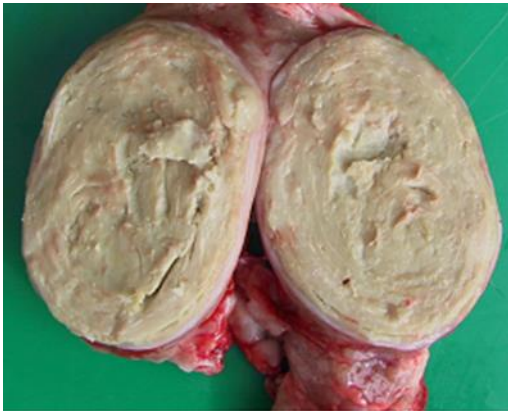


Figure 12 Lymph nodes are characterised by the lamellar ("onion-ring") appearance containing yellow-green viscous pus with a toothpaste-like consistency. In goats, the abscesses are less organized, and the exudate may be soft and paste-like. © [Nadis](#)



Figure 13 The internal form of CLA is characterised by abscesses in internal organs like the liver or lungs © [Kevin Washburn](#)

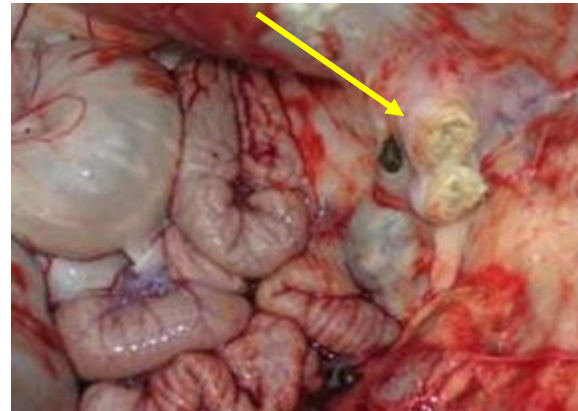


Figure 14 Internal form of CLA, with an abscess in a mesenteric lymph node © [Kevin Washburn](#)

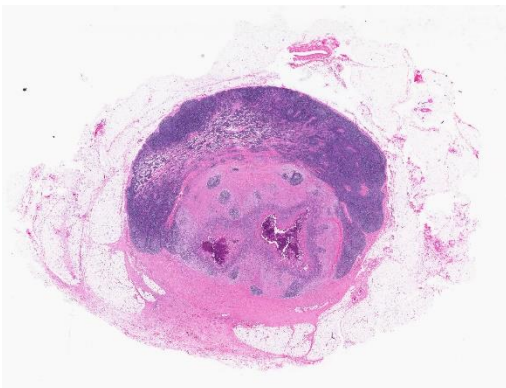


Figure 15 Lymph node of a sheep that died of CLA © [Joint Pathology Center](#)

As you probably know, it is always important to collect samples during a PM. Tissue samples for example are sent to the lab. A pathologist will then be able to see several indications of this disease under the microscope. It goes to far to explain them all, but one example of what a pathologist will likely see is Figure 15, where you see a sample of a lymph node of a sheep that died of CLA under the microscope. About 50% of the lymph node is affected by the abscess. The darker C-shape at the top is an abscess, while the lighter pink and purple inside and below is the normal lymph node.

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Serologic testing (testing for antibodies against the disease):

Serologic testing (with this test you test for antibodies against the disease in the blood) detects exposure to the organism and can be used to identify exposed and potentially infected animals in a herd. Premises hygiene, vaccination and isolation/culling of clinically affected animals should be the main strategies used to control the disease in heavily infected herds. These tests are used to identify, separate or remove infected animals as part of a herd cleanup program in herds with a low incidence of CLA.

Before introducing new animals into a herd, examine them carefully and specifically look for swollen lymph nodes, draining sores as well as scars over areas where lymph nodes are positioned. You may also apply serologic screening to avoid introducing any animals that have either been exposed or infected into a "zero-tolerance" herd.

These tests have little use in heavily infected herds and in vaccinated herds since the majority of animals will test antibody positive.

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✉ P.O. Box 50533 Bachbrecht, Windhoek

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🌐 www.wildlifelivetsnamibia.com

Monitoring and disease surveillance:

Successful control for this disease relies on continued disease surveillance and excellent record keeping. It is thus essential that each animal is clearly and permanently identified (ear tags etc.). Records of the disease status as well as prior exposure of mother and herd members are needed as part of the permanent animal record.

Good clinical and PM surveillance enables you to monitor the magnitude of disease in the herd and its overall significance compared to other diseases in the herd. Serologic testing for CLA may be part of ongoing control program for the herd or used to screen new herd introductions.

Treatment of affected animals:

Antibiotic treatment of *C. pseudotuberculosis* is usually unsuccessful due the intracellular site of the bacteria and the fibrous capsule surrounding the lesions. Careless lancing of the lesions results in contamination of the environment thus increasing the potential for disease spread to the rest of the herd. Abscesses frequently recur after drainage and flushing with antiseptics.

Farmers must thus realise that CLA is an incurable, persistent, recurrent disease. In a commercial herd infected with CLA treatment should not be attempted. Culling affected animals is the best approach. If a farmer insists on treating infected animals, he must be aware of the infective nature of the pus and wound exudates and the fact that the bacteria can survive in the environment for months.

Follow these treatment guidelines for abscesses:

- 🐾 Wear gloves and apply good hygiene - The disease can be transmitted to humans!
- 🐾 Carefully monitor animals to detect ripening abscesses before they burst.
- 🐾 Isolate infected animals until the abscess is ripe and ready to be lanced (the skin over its surface is hairless, immovable, soft and thin-walled).
- 🐾 Abscesses should be lanced in the isolation area (away from usual housing and handling areas)
- 🐾 Restrain the animal securely. Use a scalpel blade to incise over softest part of abscess. To ensure proper drainage and avoid premature wound closure (and relapse of the abscess), make sure that the incision is big enough and ideally in a X shape.
- 🐾 Express pus into plastic bag to minimize environmental contamination.
- 🐾 Once pus has been expressed, insert a gloved finger (with gauze over fingertip) and explore abscess to remove pus sticking to the capsule (wall) of the abscess. When all the pus has been removed from abscess, flush with either hydrogen peroxide or a solution of iodine and water in a syringe until no further pus comes out.
- 🐾 Repeat this step daily until there is no more drainage from the wound. Make sure the wound stays open to allow the abscess to heal from inside out.
- 🐾 Apply fly/insect repellent daily.
- 🐾 Keep patient in "abscess pen" isolation until the wound is completely healed (scabs may contain infective material).
- 🐾 Disinfect surrounding hair coat or skin area with disinfectant (e.g. F 10) or diluted bleach before returning the recovered animal to the herd.
- 🐾 Be sure to note the abscess on herd/flock records.

- 🐾 This protocol applies to superficial abscesses only. Deep abscesses that have not localized to be adherent to the skin must be handled more gently to avoid infection and inflammation of surrounding tissue. Flush these with diluted povidone iodine solution or F 10 rather than hydrogen peroxide. Occasionally surgery (whole abscess cut out without opening) is needed to safely treat abscesses near vital structures.
- 🐾 Discard (burn) all contaminated material from treating contagious abscesses carefully.
- 🐾 Store abscess-treatment supplies and equipment separately from “clean” medications and equipment to avoid cross- contamination.
- 🐾 Avoid contamination of clothing with discharge from abscess. Change clothes or coveralls before handling other animals if abscess pus contaminates them.
- 🐾 Fly control to minimise spreading of the bacterium.
- 🐾 Premises disinfection and herd segregation on the basis of infection status will reduce the incidence of new infections in the herd.

Prevention and Control:

The overriding goals of any control program should be to eliminate the disease from the herd and to reduce the number of new cases either from the spread of disease within the herd or from new animal introductions to the farm.

The initial disease prevalence in a herd, combined with diagnostic resources available and the owner’s philosophy toward herd health management, will determine the strategies used. A combination of isolation and hygienic treatment (lancing) of abscesses, vaccination, premises clean-up and prevention of transmission via pus on clothes, shearing equipment, cough droplets etc. are the cornerstones in the control of this disease. Complete eradication will eventually also involve serologic testing and segregation or removal of infected/ seropositive animals (testing positive for the disease).

Animals identified as infected should ideally be culled immediately. If this is not possible, they should at least be isolated from the rest of the herd, thus establishing “clean” and “infected” groups. Older (having a higher likelihood of being infected) and genetically less valuable animals should, over time be eliminated from the herd. Lambs and kids from infected dams can be raised on pasteurized colostrum and milk away from infected animals. Disinfect the umbilicus of lambs and kids after birth and consider applying antibiotic sprays.

However, the internal form of CLA and animals incubating the disease are likely to maintain infection within the “asymptomatic clean” group, thus limiting the success of this management approach.

Prevention

For flocks and herds without known *C. pseudotuberculosis* infection, intense precautionary measures to prevent introduction of infected animals into the herd and preventive measures to prevent exposure of animals to infected animals and contaminated equipment and facilities are to be highly encouraged. Shared equipment for shearing/clipping should be avoided or disinfected carefully before use.

Many sheep flocks are accidentally infected at shearing through the use of contaminated blades previously used on infected animals within or outside of the flock. Minor skin trauma caused by shearing create an efficient means of bypassing the host defence of the intact skin. The young and disease-free animals are shorn first, then the older animals while known infected animals, esp. those

Dr. Ulf Tubbesing

📧 P.O. Box 50533 Bachbrecht, Windhoek

☎ +264 (0) 81 128 0350 ✉ ulft@africaonline.com.na

🌐 www.wildlifelivetsnamibia.com

with lesions should be shorn last. Shearing wounds should immediately be treated with a topical disinfectants or antibiotic spray. Clipper blades must be disinfected between animals and shearers should wear clean overalls.

Bacteria can survive in dip solutions, infecting freshly shorn sheep that have skin abrasions. Adding zinc sulphate to the dip at a rate of 1 kg/ 1000 L may reduce bacterial survival, however, dip tank solutions should be kept as fresh as possible. Animals should ideally be dipped a few days after shearing to enable shearing wounds to heal first.

Owners should remove hazardous items (barbed wire, exposed nails, rough feeding/watering troughs etc.) from the environment to decrease injury and potential CLA transmission.

To avoid infection via the oral route, disinfect dosing guns between animals and work atraumatic.

Exhibitors of show sheep and goats should take time to disinfect show pens prior to unloading show animals at the show grounds. Encourage the employment of veterinarians for health inspections at shows, and show rules should clearly state the expectation of health status (don't allow animals with enlarged lymph nodes, active skin lesions, suggestive skin scarring or abscesses). Breeders with CLA infected stock should not sell apparently healthy animals without disclosure to prospective buyers.

Vaccination

Vaccination should only be considered when all attempts have been made to rule out the predisposing factors. Vaccination will not cure the problem but help reduce the occurrence.

The vaccines are not 100% effective and will not cure infected animals. They can, however, be used in infected herds to reduce the number of animals with abscesses and the number of abscesses per animal, thereby reducing the overall herd exposure. **Known-infected animals should not be vaccinated. To avoid unwanted vaccine reactions**, vaccines should only be used in the species for which they are registered and in accordance with manufacturers recommendations.

Vaccination of young replacement stock should be considered, and older infected animals should be gradually culled from the herd. If disease eradication is the end goal, vaccination should be stopped once the disease prevalence in the herd is low. From then on all seropositive **unvaccinated** animals should culled (previously vaccinated animals will have antibodies against the disease and will thus test positive without necessarily being infected). In "clean" herds with no history of CLA, vaccination is not recommended.

Eradication

Before a decision is made to entirely eradicate disease, the farmer should consider:

- 🐾 What action will be taken for testing positive animals in the future.
- 🐾 How all new animals will be screened before introduction into the herd.
- 🐾 Measures to be taken to prevent exposure of the herd to contaminated facilities and animals.
- 🐾 If he is willing to make a multi-year commitment to assure completion of the program.

Once the disease prevalence in a herd is at a low level, start removing infected animals. Also use serologic testing to separate potentially exposed animals (testing +) from presumably naïve animals

Dr. Ulf Tubbesing

📧 P.O. Box 50533 Bachbrecht, Windhoek

☎ +264 (0) 81 128 0350 ✉ ulft@africaonline.com.na



🌐 www.wildlifevetsnamibia.com

(testing -). Animals testing positive in the “naïve” group can then be removed through regular testing, and either sold or moved to the “exposed” herd at another location.

Once eradication is achieved, replacement breeding stock must be purchased from disease-free flocks whenever possible. Consider developing a group of trusted trading partners with a similar health management philosophy to ensure continued animal breeding without jeopardizing the health status of the herd. Purchasing animals from sources with unknown histories puts “clean” herds at risk. Newly arrived animals should be examined thoroughly for any signs of CLA (abscesses or scars near peripheral lymph nodes and/or enlargement of the latter). They should remain isolated from the rest of the herd or flock until their serologic status is known. Only animals that are seronegative and show no evidence of present or past CLA lesions should be allowed to enter the herd or flock.

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 +264 (0) 81 128 0350  ulft@africaonline.com.na

 www.wildlifevetsnamibia.com