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What bovine practitioners need to know about caseous lymphadenitis

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Abstract

Caseous lymphadenitis (CL) is one of the costliest, but most under-appreciated infectious diseases of sheep and goats, often leading to premature culling or death. *Corynebacterium pseudotuberculosis* in sheep and goats results in lifelong infection, with reoccurring abscesses of the peripheral and/or internal lymph nodes and the associated clinical signs. Transmission is by direct contact and indirectly by contamination of feeders, equipment, and the environment. Diagnosis is by abscess culture or necropsy. The serologic test has limitations but can be used to detect exposure to the organism; it may be used to facilitate segregation or culling in herds with low incidence of CL or to exclude introduction of infected animals. Premises hygiene, vaccination, segregation of herd by disease status, and isolation of clinical animals during treatment are the main strategies used to control CL in heavily infected herds. Intensive management of clinical abscesses with early detection of ripening abscesses, animal isolation until the abscess is healed, lancing abscesses in an isolation environment, and preventing cross-contamination of premises and potential fomites are keys to successful management. Vaccination can be used to reduce the number of animals with abscesses and the number of abscesses per animal, thereby reducing the overall herd exposure in endemic herds. Control and eradication of CL requires long-term commitment to an integrated management approach to reduce environmental contamination and prevent direct transmission in the herd or flock.

Key words: sheep, goats, caseous lymphadenitis, CLA

Résumé

La lymphadénite caséuse (LC) est l'une des infections les plus coûteuses bien que très peu reconnue chez les moutons et les chèvres. Elle mène souvent à la réforme prématurée ou à la mort. La bactérie *Corynebacterium pseudotuberculosis* cause une infection à vie chez les moutons et les chèvres avec récurrence d'abcès des nœuds lymphatiques périphériques et/ou internes et des signes cliniques associés.

La transmission se fait par contact direct et indirectement par la contamination des mangeoires, de l'équipement et de l'environnement. Le diagnostic se fait avec la culture des abcès ou par la nécropsie. Le test sérologique comporte des limites mais peut être utilisé pour détecter l'exposition de l'organisme. On peut aussi l'utiliser pour faciliter la ségrégation des animaux et la réforme dans les troupeaux avec une faible prévalence de LC ou pour prévenir l'introduction d'animaux malades. L'hygiène des installations, la vaccination, la ségrégation du troupeau selon le statut de maladie et l'isolement des animaux présentant des signes cliniques durant le traitement sont les principales stratégies utilisées pour contrôler la LC dans les troupeaux fortement infectés. La gestion efficace de la situation implique plusieurs éléments essentiels tels que la régie intensive des abcès cliniques avec détection précoce des abcès en développement, l'isolement de l'animal jusqu'à ce que l'abcès soit guéri, le crevage des abcès dans un environnement isolé et la prévention de la contamination croisée des installations et des vecteurs passifs potentiels. La vaccination peut être utilisée pour réduire le nombre d'animaux avec des abcès et le nombre d'abcès par animal ce qui permet de réduire l'exposition de tout le troupeau dans les troupeaux endémiques. Le contrôle et l'éradication de la LC exigent un engagement à long terme à une approche de gestion intégrée pour réduire la contamination environnementale et prévenir la transmission directe dans le troupeau.

Introduction

Caseous lymphadenitis (CL, CLA, contagious boils) can be one of the most costly lifelong infections in a goat herd or sheep flock. Abscesses caused by *Corynebacterium pseudotuberculosis* result from lifelong infection with reoccurring abscesses of the regional lymph nodes. Draining of external abscesses results in transmission to other sheep and goats by direct contact, as well as spread by indirect contact with contaminated feeders, equipment, and the environment. The organism remains viable for months in the environment and remains a source of long-term transmission by ingestion or inoculation to susceptible sheep and goats. Abscessation of

internal lymph nodes may result in chronic weight loss and premature culling. Definitive diagnosis is by culture of pus from an abscess or by necropsy. Serologic testing with the synergistic hemolysin inhibition (SHI) test will detect exposure to the organism and can be used to exclude imposed and potentially infected animals from herd introduction and as an aid to segregate or remove sheep or goats as part of a herd cleanup program. Serologic testing and segregation or culling may be used in herds with low incidence of CL, while premises hygiene, vaccination, and isolation of affected animals will be main strategies used to control CL in heavily infected herds.

Intensive management of clinical abscesses with early detection of ripening abscesses, isolation of the sheep or goat until the abscess is healed, lancing abscesses in an isolation environment, and preventing cross-contamination of premises and potential fomites are keys to successful management. Fly control will aid in dissemination of the bacterium among goats. Premises disinfection and herd segregation on the basis of infection status will reduce the incidence of new infections in the herd. Vaccination with commercially available sheep CLA vaccine or with autogenous bacterins can be used to reduce the number of sheep and goats with abscesses and the number of abscesses per animal, thereby reducing the overall herd exposure in endemic herds.

The sporadic *C. pseudotuberculosis* infections in that cause "pigeon fever" in horses and the hemorrhagic-appearing *C. pseudotuberculosis* abscesses found sporadically in cattle are caused by closely related bacteria, but are not transmitted from or among sheep and goats.

Prevention

For flocks and herds without known *C. pseudotuberculosis* infection, intense precautionary measures to prevent introduction of infected animals into the herd and flock, 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 by the use of contaminated blades used on infected animals within or outside of the flock, as abscesses are easily ruptured during shearing; the minor skin abrasion created by shearing blades/combs creates an efficient means of bypassing the host defense created by intact healthy skin. Abscesses in the scrotal region of rams commonly result from inoculation of skin at time of shearing.

Exhibitors of show sheep and goats should take time to disinfect pens (and trailers, if indicated) prior to unloading show animals at fairs and shows. Exhibitors should encourage fair managers to employ veterinarians for health inspections at fairs and shows, and show rules should clearly state the expectation of health status. For example, some fairs may allow enlarged lymph nodes (if not unsightly) but do not allow any evidence that the skin is not intact or that an abscess is

ripening, while other fairs/shows/sales may not allow any evidence of pre-existing infection, such as an abscess scar. Regarding sale animals, breeders of yearling rams may not be aware that the apparently healthy rams they are selling in premium sales may already be infected with CL.

Serologic Testing

Serologic testing is one means of screening new herd introductions for evidence of *C. pseudotuberculosis* exposure and thus excluding both exposed and infected animals for the "zero-tolerance" herd. However, in the endemic herd/flock and in herds/flocks employing vaccination as a control strategy, serologic testing would not be encouraged unless its use would be to segregate groups of potentially infected and presumed uninfected animals.

Using the synergistic hemolysin inhibition (SHI) test, titers of <1:8 for goats are considered negative. Titers between 1:8 and 1:256 are interpreted as evidence of infection or vaccine exposure. In goats (no data are available for sheep), titers >1:512 are highly associated with internal abscess formation.

Monitoring and Disease Surveillance

Successful control for chronic diseases relies on continued disease surveillance. Management decisions regarding disease control grouping, treatment, production, and culling should be based on accurate lifelong records on each animal. Unique individual animal identification (tattoos, ear tags, neck tags, etc.) is needed before permanent accurate records can be maintained to monitor CL and other infectious disease status. Dam disease status and cohort exposure are needed as part of the permanent animal record.

Necropsy surveillance will allow monitoring of the magnitude of clinical CL in the flock or herd and will allow appreciation for the role that abscesses due to CL contribute to the mortality caused by otherwise non-fatal cases of competing diseases in the flock or herd. Planned routine necropsy of selective herd culls as well as deaths will allow monitoring for all major contributors of disease in the herd, not just primary cause of death. Additional testing for tissue copper and selenium, parasites, and other items of interest can help identify concurrent disease problems which may confound the efforts of specific disease control programs such as CL control. Johnes, scrapie, CL, CAEV/OPPV, and mycoplasma can all be monitored by necropsy even though the cause of death may be unrelated to these diseases. Serologic testing for CL may be part of an ongoing control program for the herd or used to screen new herd introductions.

Recommendations for Control of Caseous Lymphadenitis

The best strategy for controlling *C. pseudotuberculosis* infection in infected flocks and herds will depend on the ini-

tial prevalence, resources available to employ management strategies and diagnostic testing, and the owner's philosophy toward herd health management in the herd or flock. A combination of segregation and hygienic treatment (lancing) of abscesses, vaccination, premises clean-up, and prevention of fomite transmission strategies can achieve success in control of the disease. Complete eradication could at some point also involve serologic testing and segregation or removal in the final stages of eradication.

Vaccination

Vaccination with either the commercially available sheep bacterin, goat bacterin where available or with an autogenous bacterin can be a useful part of a control strategy to control CL. Vaccinated animals still may become infected with the organism, but would be expected to have few abscesses during their life, and fewer infected animals would be expected to become clinically affected during their life. The resulting increased herd immunity and decreased environmental contamination help to decrease overall herd/flock exposure. Herd replacement animals should be vaccinated prior to introduction into the adult herd/flock, according to manufacturer's recommendations. Known-infected animals should not be vaccinated; adverse vaccine reactions have been reported in infected goats with some vaccines.

Segregation of Infected Sheep and Goats

Detection of animals with clinical disease is very difficult, as enlarging lymph nodes may be masked by thick hair coat (especially in winter) or heavy fleece. Routine palpation of superficial lymph nodes during animal handling and identifying animals with suspicious enlargement will facilitate isolation of clinically affected animals in the endemic herd or flock. While the risk of contamination (and transmission risk) from an external abscess may be able to be visually assessed, abscesses shedding bacteria from the pharynx and respiratory tract cannot be detected. In flocks with intense segregation programs, serologic testing can be used to segregate presumed infected or exposed animals from seronegative animals.

Segregation of Animals after Lancing Abscesses

Animals with open or draining abscesses are at highest risk of 1) directly infecting other sheep and goats, and 2) heavily contaminating the environment, thus contributing to long-term environmental challenge or magnitude of risk. Common concentration areas like working corrals and chutes and milking parlors are common points of maximum exposure. Animals with open abscesses should be milked by hand and kept out of the milking parlor until the abscess is healed. Alternate handling facilities and isolation areas should be used until the skin surface is completely healed.

Every deviation from that standard (e.g. dry but scabbed abscess site) results in increased risk of effective exposure to another animal and increased risk contamination of the environment.

Best Practices for Lancing Abscesses

Abscesses are ready to lance when they are bald over the surface and the skin is immovable over the hairless surface. This surface should be soft and thin-walled. Lancing abscesses before they are sufficiently localized superficially can result in cellulitis of surrounding tissues. Always wear gloves to lance or flush abscesses; producers sometimes do not recognize the importance of this practice! Abscesses should be lanced away from usual goat housing and handling areas. Collect all pus and contaminated materials into a plastic trash bag for incineration or disposal. Avoid contamination of clothing with discharge from abscess, and change clothes or coveralls before handling other animals if abscess pus contaminates them. Shoes, jackets, and other outer clothing are commonly overlooked as potential fomites.

To lance an abscess, restrain sheep or goat securely, and incise over softest part of abscess with scalpel blade. Use of a #12 blade allows an outwardly directed incision and reduces risk of unintentional wound extension. Express pus into plastic bag to minimize environmental contamination. The incision should be large enough (in "+" or "0" shape) to allow abscess to drain and be flushed until drainage stops, in order to prevent closure of the capsule before the abscess cavity has granulated in, otherwise it will refill with pus. Once pus has been expressed, insert a gloved finger (with gauze over fingertip) and explore abscess to remove pus adhering to the capsule (wall) of the abscess. When all the pus has been removed from abscess, flush with either hydrogen peroxide or tincture of iodine in a catheter tip syringe (but note that abscesses must be superficially localized for these to be used, as they damage healthy tissue). When the abscess has been flushed thoroughly (no pus comes out with fluid), applying an astringent wound powder in the abscess cavity of superficial abscesses can hasten their resolution. On successive days, flush abscess again if any drainage is present. Keep the wound open to allow the abscess to heal from inside to outside; apply fly/insect repellent daily. Keep the sheep or goat in "abscess pen" isolation until the wound is completely healed if possible, as scabs may contain infective material. Disinfect the surrounding hair coat or skin area with povidone iodine solution or dilute bleach before returning the animal to the herd or flock once the abscess is healed. 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. If a deep abscess occurs, flush with diluted povidone iodine solution instead of tincture of iodine or hydrogen peroxide; other techniques such as

marsupialization or surgical excision of intact abscess may be needed to safely treat abscesses near vital structures.

Carefully discard all contaminated material from treating contagious abscesses. Maintain dedicated supplies and equipment to be used for treating contagious abscesses, and store all abscess-treatment supplies and equipment separately from “clean” medications and equipment to avoid cross-contamination between clean and abscess-associated supplies. In dairy animals, do not lance or medicate abscesses in the milking parlor to avoid risk of contaminating milking equipment or milkers’ hands or clothing.

Eradication

Once the herd or flock prevalence is at a low enough level that the owner could consider removing infected animals to eradicate disease, serologic testing could be used to segregate potentially exposed animals from presumably naïve animals. 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. Before any decision to entirely eradicate disease is made, the herd owner

should consider 1) what action will be taken for test-positive animals in the future, 2) will all animals be screened before introduction into the herd/flock to contaminated facilities and animals, and 4) whether the owner is willing to make a multi-year commitment to assure completion of the program.

Once eradication is achieved, owners should develop a group of trusted trading partners with similar health management philosophy to continue successful animal breeding without jeopardizing the health status of the herd or flock.

Conclusion

Caseous lymphadenitis can be one of the most costly lifelong infections in a goat herd or sheep flock. Intensive management strategies are needed to prevent introduction of this disease into susceptible flocks and herds, and to control and eradicate the disease in flocks with pre-existing infection. Efforts to control and eliminate *C. pseudotuberculosis* from sheep and goat flocks and herds lead to lower mortality from other diseases in the population and to enhanced overall herd health.