

# PRELIMINARY INVESTIGATIONS OF STREPTOCOCCAL ARTHRITIS IN YOUNG LAMBS

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## Role of streptococci in arthritis in young lambs

Arthritis (syn. polyarthritis, infectious polyarthritis, septic polyarthritis, joint ill) has long been recognised as a common and important disease of lambs and there are many references to it in the early veterinary literature of the eighteenth and nineteenth centuries. The first bacteriological investigations of arthritis in young lambs, dating from the 1920s, found that streptococci were the most common cause of the disease (Cornell and Glover, 1925). For example, in the 1930s Blakemore attributed 50 out of 55 outbreaks that he investigated to streptococci (Blakemore and others, 1941). In more recent times, authors have tended to attribute arthritis in young lambs to a wide range of bacteria, including *E.coli*, *A. pyogenes*, *Fusobacterium necrophorum* and staphylococci (Angus, 1991). While all of these bacteria can and do infect the joints of young lambs, they are relatively uncommon causes of arthritis. A recent analysis of records from Veterinary Investigation Centres (VICs) in England and Wales showed that streptococci cultured from 169 of 212 (80%) bacteriologically positive joints of sheep less than one year of age (Figure 1) (Watkins and Sharp, 1997). Most of the lambs with streptococcal arthritis were less than three weeks old when submitted for examination and all were less than six weeks old. Although not based on a random sample, these findings indicate that streptococci are still the major cause of arthritis in young lambs in England and Wales.

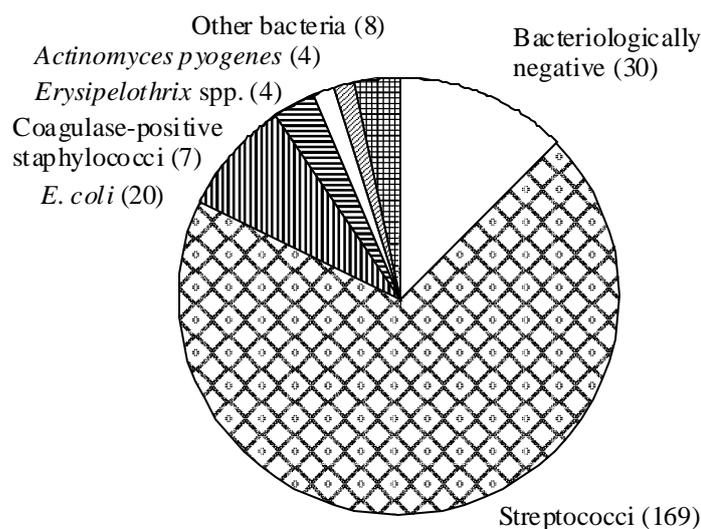


Figure 1. Bacteria cultured from the arthritic joints of 242 sheep less than 1 year old presented to Veterinary Investigation Centres between 1993 and 1996.

## The bacterium

The causal streptococcus is  $\alpha$  haemolytic and belongs to Lancefield's group C. In these respects it resembles *Strep. dysgalactiae*, a mucous membrane commensal and cause of mastitis in cows. However, most ovine isolates do not ferment lactose, while *Strep. dysgalactiae* does; they also differ in not fermenting sorbitol, a property possessed by approximately half of the strains of *Strep. dysgalactiae*. Further work is required to characterise the ovine streptococcus and to determine its relationship with other members of Lancefield's group C.

## Clinical features of the streptococcal arthritis

The clinical and pathological features of naturally occurring streptococcal arthritis were investigated as part of a case-control study conducted by the Veterinary Laboratories Agency in 1997 and 1998. The preliminary results of the autopsy of 27 cases in 1997 will be described here.

### Age

The initial signs occurred in lambs when lambs were less than three weeks of age, the majority in the first week of life. These results are in keeping with observations in the field where lambs greater than four weeks of age do not acquire streptococcal arthritis.

### Initial signs

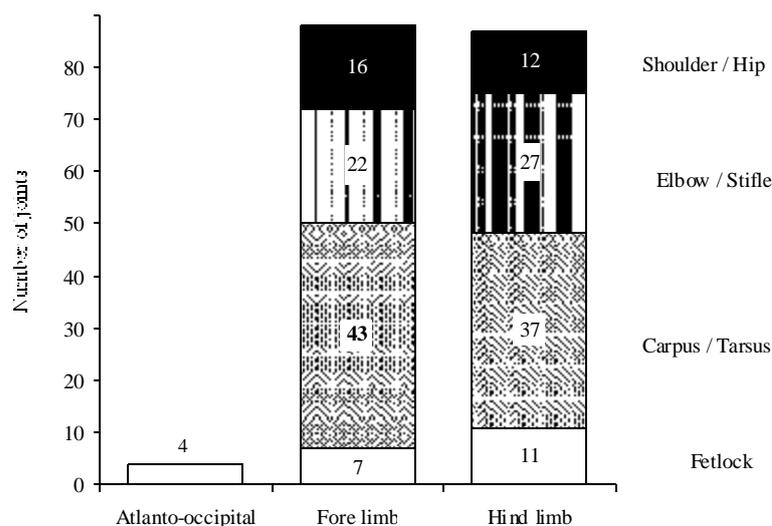
The most common initial clinical sign is lameness but some lambs are found recumbent and a small number dead (Table 1). Recumbancy is a reaction to intense pain and is sometimes associated with osteomyelitis (see below). Many recumbent lambs will stand after administration of analgesic drugs. Death in the early stages of the disease is usually due to localisation of infection in the heart and severe myocarditis.

Table 1  
Common presenting features of Streptococcal arthritis

Lameness	19
Recumbancy	6
Found dead	2

### Affected joints

Following bacteraemia, streptococci can localise in any synovial joint (including the atlanto-occipital joint) and occasionally in other organs also. The carpal and tarsal joints are most commonly affected and there is no difference in distribution between left and right or between fore and hind limbs (Figure 3). Affected joints are not swollen in the acute stage of the disease and diagnosis based on clinical examination of a single animal can be difficult; the disease must be distinguished from nutritional muscular dystrophy, spinal abscess, delayed swayback, border disease, nephrosis and weakness due to starvation. Later the joints become swollen with pus and there may also be periarticular oedema and swelling. Occasionally, pus discharges to the exterior though as most affected lambs are now treated with antibiotics this feature occurs less commonly than previously.



**Figure 3. Macroscopically affected joints in 27 lambs with streptococcal arthritis.**

### Pathological features of streptococcal arthritis

#### Affected joints

Bacteria localise in the joints after a short period of bacteraemia. Infection of the synovial membrane is accompanied by infiltration of inflammatory cells, initially neutrophils and later monocytes and plasma cells. Both bacteria and inflammatory cells occur in the joint space. Streptococci invade bone via capillary blood vessels and may extravasate in the epiphysis and metaphysis and give rise to a severe, often necrotic osteomyelitis. Bacteria may also colonise and penetrate the cartilage of the growth plate and the articular surface although gross erosions are not a feature of the disease. Occasionally there is periarticular oedema and fasciitis which may be necrotic and spread very rapidly distally and proximally from the affected joint.

#### Other sites of localisation

Like most other systemic streptococcal infections, there may also be localisation in the heart valves, myocardium, meninges and iris. Of these sites, the myocardium is most frequently infected although in the 1930s there was localisation in the heart valves in 25% of lambs with streptococcal arthritis (Blakemore and others, 1941).

#### The umbilicus

Most lambs with streptococcal arthritis do not have obvious omphalitis (navel ill). However, in the majority, either the umbilical vessels were infected or were severely infiltrated with neutrophils on histological examination. In these animals it is highly likely that the navel and umbilical vessels were the portal of infection. In a minority of affected lambs, however, there was neither bacteriological nor histological evidence of an ascending infection of the umbilical vessels and it is likely that in these animals infection was by another, unknown, route.

### Treatment, prevention and control

Treatment is by parental administration of antibacterials. The drug of choice is probably penicillin G which should be given for ten days to eliminate infection from joints as some strains of the causal streptococcus are resistant to tetracyclines. Response is largely dependent on the duration and degree of

inflammatory changes in the joint capsule and in bone and lambs rarely make a full recovery. However, many treated animals eventually reach slaughter weight, though usually many weeks after unaffected lambs.

At present there are no satisfactory means of preventing streptococcal arthritis and control will not be possible until the factors which predispose lambs to the disease are known. Some measures, while not guaranteeing freedom from disease, should be implemented in an outbreak. The navel should be dipped in disinfectant as soon as possible after birth and again after the lamb has been licked dry. Tincture of iodine is widely used and is probably the disinfectant of choice but care must be taken to ensure that the dip cup is kept free of organic material and disinfectant regularly replaced if the cup itself is not to become a means of spread of infection. If stomach tubes are used regularly for the administration of colostrum, they should be disinfected between lambs.

Lambing pens are a potential site of build up of infection and they should be cleaned, disinfected and well strawed to reduce the likelihood of transfer of infection between successive ewes and lambs. Most affected flocks have a high stocking density of ewes in lambing sheds or paddocks and it should be reduced where streptococcal arthritis recurs year after year.

In some regards the disease lends itself to control by vaccination of the ewe and passive transfer of colostral antibody to its lamb. Whether this will be a practical proposition in future will require research into the antigenic components of the causal streptococcus and into the degree of protection elicited by antibody to these antigens.

## References

- Cornell, R.L. and Glover, R.E. (1925). Joint Ill in Lambs. *The Veterinary Record*, 5, 833-839.
- Blakemore, F., Elliott, S.D. and Hart-Mercer, J. (1941). Studies on Suppurative Polyarthrititis (Joint-ill) in Lambs. *Journal of Pathology and Bacteriology*, 52, 57-62.
- Angus, K. (1991). Arthritis in lambs and sheep. *In Practice*, 13, 204-7.
- 4Watkins, G.H. and Sharp, M.W. Bacteria isolated from arthritic and omphalitic lesions in lambs in England and Wales. *The Veterinary Journal* (accepted for publication, 1997).