Lameness in cattle and sheep: sharing methods of treatment and prevention

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explains how many basic dairy cattle lameness principles can also be applied to sheep, to provide a better standard of care for this species

AN article by Rebecca Hubbard, published in *Veterinary Times* (VT43.24), discussed the worrying lack of veterinary surgeons with specialist or, in many cases, even a satisfactory level of knowledge in the area of sheep veterinary care.

The predominant focus of that article was in reference to anthelmintic use in sheep, but this article looks at lameness – another of the most important topics in the sheep veterinary sector.

Lameness is defined as the clinical presentation of impaired locomotion, regardless of cause (Archer et al, 2010). This is not only a huge welfare issue in sheep and cattle, but also of considerable economic significance. It is, therefore, essential that lameness problems in both cattle herds and sheep flocks are correctly addressed – not only promptly, but in the most practical and cost-effective manner.

The lack of sheep veterinary knowledge in practice often, in my view, leaves sheep farmers struggling for good quality advice when problems arise. Since a large proportion of farm animal veterinary surgeons spend most of their time dealing with dairy cattle, their knowledge of the causes and treatment options for this species is often excellent. Up-to-date knowledge and understanding of the same issues in the sheep sector, however, can be lacking in general farm practice.

This article will discuss the most common causes of lameness, in both sheep and cattle, by comparing and contrasting the causal factors, as well as treatment and control protocols in the two species. The aim is to give predominantly cattle biased farm veterinary surgeons the confidence to apply their cattle knowledge to the sheep sector and, therefore, provide a better standard of care to their sheep clients.

Many of the basic principles of lameness control and prevention can be applied to problems in both species and these will also be considered here (Table 1 and Table 2).

In dairy cattle, it is well documented that the four most common causes of lameness are: solar ulcers, white line disease, foul of the foot and digital dermatitis (Archer et al, 2010). Winter (2004) suggests the most significant causes of lameness in sheep are: scald, footrot, white line disease and toe fibromas.

Clearly, the most important starting point is to ensure a correct diagnosis of the problem. An in-depth description of all conditions discussed is beyond the scope of this article, but I would refer readers to the references for more details. The main focus here will be the application of principles of treatment and disease prevention in cattle to the relevant causes of lameness in sheep.

Starting with the infectious causes of lameness – which in cattle are digital dermatitis and foul, and in sheep are scald and footrot – similarities in the various conditions can be seen, particularly when it comes to treatment protocols and preventive strategies.

Superficial infections of the foot

The two conditions that affect the superficial tissues of the foot are scald or interdigital dermatitis in sheep and digital dermatitis in cattle.

In work carried out by Jasmeet Kaler, Laura Green and colleagues (Kaler et al, 2008; 2010a and b; 2012), it has become apparent scald and early footrot are often clinically indistinguishable. If there is evidence of footrot within the group of affected animals, it is prudent to address the problem as footrot, since this is the most likely diagnosis.

A more confident diagnosis of scald/interdigital dermatitis comes in groups of lambs seen with symptoms typical of scald (reddening or blanching of the interdigital space, with some moistness), but no evidence of progression to the more severe condition of footrot and no evidence of footrot within the group or wider flock.

For treatment of scald in this situation, it is helpful to consider the same principles as used for digital dermatitis in cattle. While it may be considered by some that digital dermatitis in cattle is a much more significant condition than scald in sheep, both cause the affected individuals considerable pain and result in poor production.

Both conditions are also treated in a very similar way by cleansing the foot prior to topical antibiotics being applied to the lesion – usually in the form of an oxytetracycline spray.

The reservoir of infection of digital dermatitis in cattle is predominantly infected cows, rather than slurry or the environment (Evans et al, 2012).

In the case of scald, however, the causal organism, *Fusobacterium necrophorum*, is found in the environment and infects the interdigital area following skin abrasion. A foot bathing protocol is frequently introduced to control the spread of infection and prevent further cases in both conditions.

Zinc sulphate, copper sulphate or formalin can be used or, in some situations, the use of the antibiotics lincomycin or tylosin may be necessary. Foot bathing is only effective if the correct product is being used at the correct concentration and in the appropriate situation.

It is essential the feet of both the sheep and cattle are cleansed prior to foot bathing in any of the above products, to ensure full effectiveness of the treatment. In both conditions, individual animals can be treated, but preventive strategies of foot bathing should apply to the whole group.

Deeper infections of the foot

When we consider the more severe infectious condition of footrot in sheep, it is more applicable to make comparisons in terms of treatment with foul or interdigital necrobacillosis in cattle. Footrot in sheep – as with foul in cattle – is an invasive process and requires treatment in the form of systemic antibiotics, plus potentially topical treatment also.

Studies carried out by Wassink et al (2010) and Kaler et al (2010a and b) indicated the

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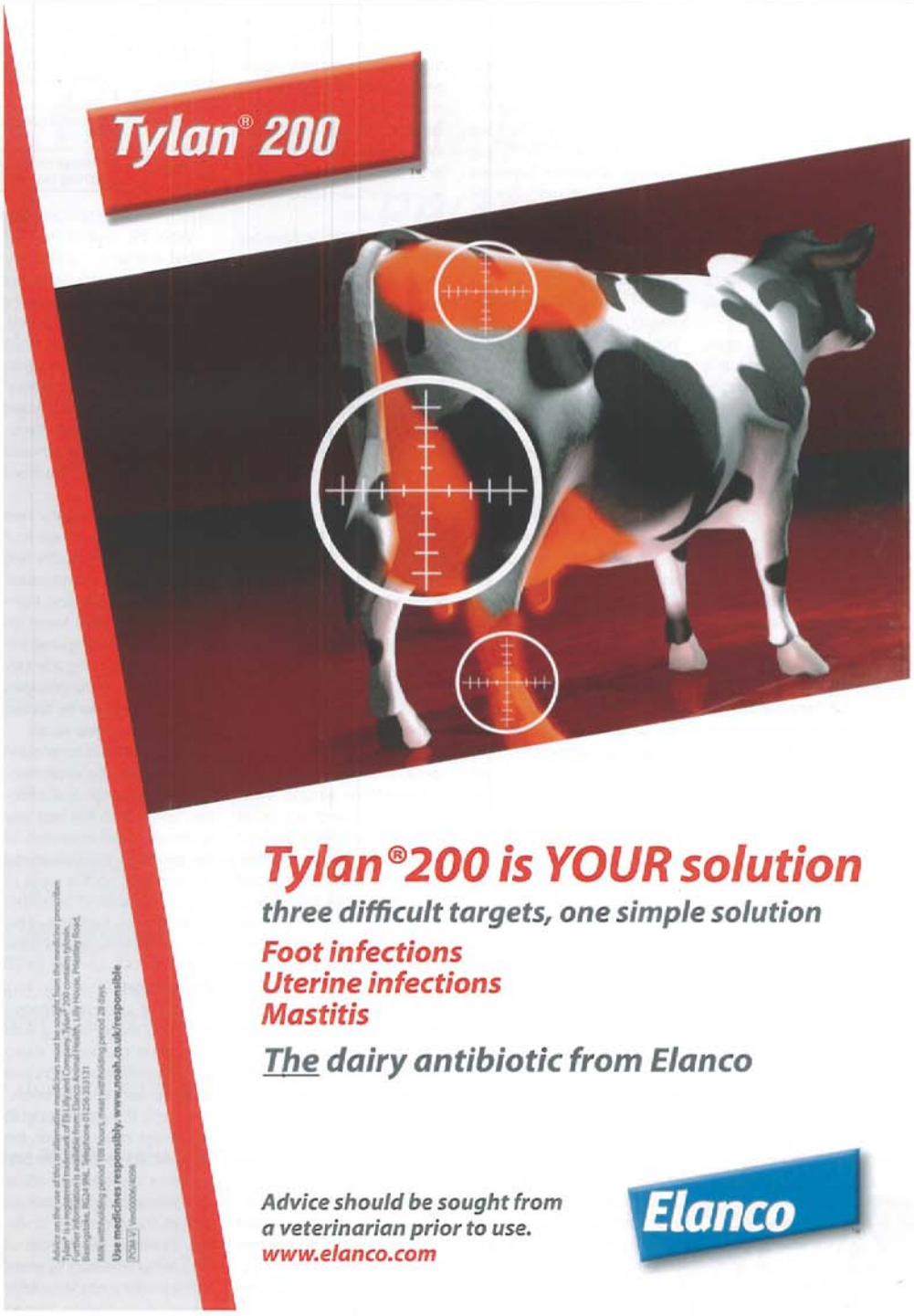

SPOTLIGHT

This article is part of our regular Spotlight series of clinical and topical features aimed specifically at the large animal veterinary practitioner

LAMENESS IN CATTLE AND SHEEP: SHARING METHODS OF TREATMENT AND PREVENTION – from page 11

most effective treatment for footrot involved systemic antibiotic treatment, with foot paring contributing little or no value to the overall healing process.

This is a relatively new concept, but is certainly very comparable with the treatment of foul in cattle, where systemic antibiosis is the treatment of choice, occasionally followed by corrective foot paring at a later date, once the infection has been resolved. This can also be applied to sheep that have recovered from footrot.

The choice of antibiotic, as well as dose rate used, is certainly worth reviewing with clients, as lameness treatments are often carried out by stockmen, frequently with little veterinary input. Treatment failure and disease escalation in both sheep flocks and cattle herds comes at a high price, with poor welfare and huge production losses.

While foul in cattle is predominantly an individual animal problem, the causes and, therefore, preventive strategies for this disease can certainly be applied across a whole herd basis, as they relate predominantly to the environmental conditions in which the animals are living.

For footrot in sheep, again, treatment of the individual is necessary (along with isolation if practical), but this is generally considered a whole flock problem, with preventive strategies applied to the whole of the affected group a vital component in the fight against this disease.

The infectious nature of footrot and the presence of bacteria on the feet of infected animals – which can then be passed on to uninfected individuals – means the control strategies for footrot in sheep are more comparable to those for digital dermatitis in cattle. Improving environmental conditions underfoot for both cattle and sheep will go a long way to preventing both of these diseases.

In the case of footrot, specific predisposing factors include wet, overcrowded conditions during housing at lambing time or outdoors at pasture. For foul in dairy cattle, again, wet conditions due to poor slurry management can be a problem, as well as stony ground or poorly maintained cow tracks.

Conditions less commonly seen, but by no means less significant, are contagious ovine digital dermatitis (CODD) in sheep and superfoul in cattle. Superfoul is a more systemic form of foul in the foot, in which the bacteria involved can be resistant to some antibiotics.

CODD is a severe infection of the deeper tissues of the foot, often resulting in complete shedding of the hoof horn capsule. This condition, like super foul in cattle, requires more intensive antibiotic treatment strategies and should be considered an extremely serious problem if it is found in a flock.

Diseases of the white line

White line disease in both sheep and cattle can be a significant cause of lameness. In dairy cattle, this problem is frequently addressed as an individual animal problem. The cause is the breakdown of horn joining the sole and wall horn allowing foreign bodies to track into the white line (Archer et al, 2010).

In sheep, white line disease would often be considered as a flock problem, where causal factors such as breed, environmental conditions and diet may all play a role. Perhaps in cattle, the herd as a whole should be more closely assessed if a number of cases of white line disease are seen. The starting point is, of course, lameness records, which can often be poor on dairy farms.

Many lame dairy cows are treated directly by the herdsman and records often only kept if antibiotics are administered. White line disease in both sheep and cattle is treated effectively by foot paring.

Diseases affecting the corium

There is no known equivalent in sheep for solar ulcers – a common cause of lameness in dairy cattle. The condition in sheep that could most closely be compared to solar ulceration in cattle, however, is toe fibroma/granuloma.

Solar ulcers are caused by disrupted sole horn production, following repeated or continuous injury to the germinal cells within the sole corium under the palmero/planto distal edge of the distal phalanx. This results in chronic inflammation and pathological exposure of the corium (Archer et al, 2010). As a result, the horn growth increases exponentially around the damaged area and this worsens the condition.

The aetiology of solar ulceration is not fully understood, but dietary and hormonal factors affecting pedal bone support certainly play a role, as well as environmental and social factors influencing cow lying times and forces acting on the feet. Poor foot trimming has also been seen to be the cause of solar ulceration.

Interestingly, the metabolic stress experienced by sheep around the time of parturition does not have such devastating consequences on the feet of sheep, as is often seen in dairy cattle at this time.

In toe granulomas in sheep, the corium is exposed, usually due to overzealous foot paring, and repeated insult to the tissues of the corium results in granulation tissue proliferation. In this condition – as with solar ulcers in cattle – overgrowth of the hoof horn is common and will worsen the condition.

Treatment of both conditions primarily involves paring of the horn over the top of, and around, the damaged corium. In the case of toe granulomas – in addition to foot paring – the granulation tissue should also be excised and a pressure bandage applied to prevent soft tissue regrowth.

Preventive strategies

As with all infectious diseases in all species, an important measure for control is to prevent entry into the herd or flock in the first instance by ensuring good biosecurity.

This applies not only to bought-in animals, but also to those animals that may have been sent off farm for a period of time, prior to returning to the home farm later. In cattle, this may include heifers going off to a heifer rearer or in sheep, young animals sent away to keep for a year.

Animals should be inspected closely, ideally before they return to the farm, but certainly prior to contact with the rest of the herd or flock and isolated for 28 days to allow any signs of disease to become apparent. Foot bathing of incoming stock can also be very beneficial. Disinfection of equipment used by foot trimmers, contractors and veterinary surgeons between premises is essential.

Prevention of the spread of infection within a herd or flock (biocontainment) is also vital. This involves good hygiene when examining and trimming feet, with disinfection of equipment between individuals. In sheep, the use of a mobile handling system to prevent infection build up in yards where sheep are frequently gathered will also help to prevent the spread of disease.

Gravel/lime around water troughs and in handling pens will prevent poaching of ground, which can propagate infection. Ideally, infected animals should be isolated during treatment to prevent the spread of infection to unaffected animals, but this is not always practical in either dairy herds or sheep flocks.

Vaccination is a preventive option in sheep flocks with footrot that unfortunately is not available for infectious lameness in cattle, and should be considered on individual farms on a case-by-case basis.

Selective culling is strongly recommended in sheep flocks where there are individuals that suffer repeated cases of footrot. This not only reduces the reservoir of infection, but also builds genetic resilience within a flock that breeds its own replacements.

TABLE 1. Summary of infectious causes of lameness in sheep

	Footrot (early/benign lesions – indistinguishable from scald or severe)	Interdigital dermatitis (scald; where there is no evidence of footrot in the group)
Causal organism	*Dichelobacter nodosus* and *Fusobacterium necrophorum*	*Fusobacterium necrophorum*
Location of lesions	Starts in the interdigital area, often as a sequel to, or indistinguishable from, interdigital dermatitis (scald) and can result in separation of hoof wall and sole, with varying degrees of severity	Interdigital space. Often affects more than one foot
Transmission	Infection with specific bacteria carried by infected sheep alongside opportunistic environmental bacteria – often as a result of injury to the interdigital skin	Environmental bacterium, as a result of trauma to the interdigital skin
Treatment	Systemic +/– topical antibiotics	Cleansing the area well, followed by topical antibiotic treatment of individuals
Control	Improve environmental conditions (foot bathing may help); rapid treatment of infected animals and isolation during treatment to break the cycle of infection	Foot bathing; improve environmental conditions for the whole flock

TABLE 2. Summary of infectious causes of lameness in cattle

	Foul of the foot (interdigital necrobacillosis)	Digital dermatitis
Causal organism	*Fusobacterium necrophorum*	*Treponema* species (possibly *Dichelobacter nodosus* and others)
Location of lesion	Interdigital skin. Affects deeper layers of the dermis and subcutis, with varying severity	Caudally in skin adjacent to heel horn, but can occur in other areas. Often affects more than one foot
Transmission	Opportunistic infection with environmental bacteria, often as a result of injury to the interdigital skin	In an environment populated by other infected individuals. The role of microtrauma to the skin to allow entry of bacteria is speculative
Treatment	Systemic and topical antibiotics	Cleansing the area well, followed by topical antibiotic treatment of individuals
Control	Improve environmental conditions (foot bathing may help)	Foot bathing; improve environmental conditions for the whole herd

While the value of the individual animal is significantly higher in dairy herds, lameness is one of the most likely reasons given for culling in a dairy herd. Dairy cattle with poor foot conformation, as a result of previous disease or genetic factors, have a significantly increased susceptibility to further lameness problems and should be removed from the herd where possible.

The DairyCo Healthy Feet Programme determined four success factors for healthy feet in cattle: low infection pressure, good hoof shape and horn quality, low external forces on the feet and detecting lame animals early, intervening promptly and effectively. These principles can and should also be applied directly to the sheep sector.

With all cases of lameness in both species, the implementation of prompt and effective treatment is the best way to ensure rapid resolution of the problem, improve animal welfare and, in the case of infectious causes of lameness, prevent further escalation of the disease within the herd or flock.

Conclusion

Once the correct diagnosis has been made, dealing with a lameness problem in sheep uses many of the basic principles applied in dairy cattle lameness.

Clearly, the more in-depth knowledge of a condition the veterinary surgeon has, the better he or she is able to advise on treatment options, disease control and prevention strategies. However, the shortage of farm animal veterinary surgeons with specialist sheep knowledge means, in my opinion, farmers are often short-changed when it comes to good advice for tackling lameness problems in their flocks.

Having some ability to relate lameness problems in sheep to conditions seen in dairy cattle should enable even the most inexperienced – and perhaps reluctant – dairy practitioner to deal with lameness issues that arise in the sheep under his or her care.

While the principles are very similar in both sheep and cattle, the approach to the problem of lameness tends to take the form of a more flock-based approach in sheep, whereas in dairy cattle, treatment of the individual animal can often be the priority.

I would argue, however, that in both species, consideration of the factors that have resulted in the lameness – whether in an individual or whole group – will often result in a whole flock or whole herd-based approach to prevention.

● Please note some drugs mentioned within this article are used under the cascade.

References and further reading

Archer S et al (2010). Lameness in UK dairy cows: a review of current status. *In Practice* **32**: 492-504.

Atkinson O (2013). Practical and effective management of foot lameness in dairy herds. *In Practice* **35**: 171-182.

Blowey R (2005). Factors associated with lameness in dairy cattle. *In Practice* **27**: 154-162.

DairyCo (2013). *Technical information*, www.dairyco.org.uk/technical-information

Duncan J S et al (2012). Impact of footrot vaccination and antibiotic therapy on footrot and contagious ovine digital dermatitis. *Vet Rec* **170**(18): 462.

Evans N J et al (2012). Host and environmental reservoirs of infection for bovine digital dermatitis treponemes. *Vet Microbiol* **156**(1-2): 102-109.

FAI Farms. *The Five Point Plan for Reducing Lameness in Sheep*, www.fwi.co.uk/assets/getasset.aspx?itemid=5244754

Hubbard R (2013). Quandary over shortage of sheep vet specialists. *Veterinary Times* **43**(24): 1.

Kaler J et al (2008). Recognition of lameness and decisions to catch for inspection among sheep farmers and specialists in GB. *BMC Vet Res* **14**(4): 41.

Kaler J et al (2010a). Randomised clinical trial of long-acting oxytetracycline, foot trimming and flunixin meglumine on time to recovery in sheep with footrot. *J Vet Int Med* **24**(2): 420-425.

Kaler J et al (2010b). Factors associated with changes of state of foot conformation and lameness in a flock of sheep. *PREVET* **97**(3-4): 237-244.

Kaler J et al (2012). A clinical trial comparing parenteral oxytetracycline and enrofloxacin on time to recovery in sheep lame with acute or chronic footrot in Kashmir, India. *BMC Vet Res* **31**(8): 12.

The Merck Veterinary Manual.

University of Reading (2007). *Available calculator models*, www.fi models.reading.ac.uk/models.htm

Wassink et al (2010). A within farm clinical trial to compare two treatments (parenteral antibacterials and hoof trimming) for sheep lame with footrot. *PREVET* **96**(1-2): 93-103.

Winter A (2004). Lameness in sheep 1. Diagnosis. *In Practice* **26**: 58-63. ■

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