LHPA Rotation Case Report No 1: *Ruminal Tympany/Hypocalcaemia*

**History:**

The 5 year old Holstein cow, found dead. The cow has been in the springer paddock and on a transition ration for about two weeks. The cow had been observed on the afternoon of 15th April 2010 to be in ‘early labour’ (first stage labour) but appeared comfortable and was subsequently not inspected until early the following morning, when she was found dead.

**External Examination Findings:**

The cow was found dead, on her right side, with two front legs and the nose of a calf presented in the birth canal. There was a significant volume of vomitus evident on the ground in front of the cow and in the mouth, and the left abdomen was notably bloated. There was only a small amount of dung passed in the vicinity. The only other visible abnormalities on the carcass were udder and ocular damage obviously inflicted by pest animals (ie foxes and crows), and there was no obvious sign of struggle (minimal disturbance to the ground in the close vicinity of the cow). When the carcass was rolled over onto her left side, a significant volume of gas was released from the rumen; this was clearly heard as the air passed up through the trachea and out of the mouth. Rigour was setting in and the carcass was fresh.

**Gross Pathology**

A thorough post-mortem examination was carried out on the carcass, and the following gross pathological lesions were observed;

- *Large twin calves wedged in the pelvic canal:* two large calves were found to be wedged in the birth canal; this is likely to have been the main cause of the dystocia. The dystocia had then possibly been compounded by concurrent hypocalcaemia.
- *Pale abdominal viscera, (intestines and liver):* the abdominal viscera were notably more pale than normal, with a pale liver having the most pronounced colour change, and the intestines were also pale.
- *No blood in caudal vena cava:* the vessel was severed during examination of the abdomen. The pathological significance of a lack of blood in the caudal vena cava was not appreciated at the time of post mortem. However, on reviewing the results and findings of the post mortem, this finding is considered to have been of significance in the pathophysiology of the cause of death (ruminal tympany).
- *Cystic left Kidney:* there was virtually no grossly normal, healthy renal tissue remaining of the left kidney. The kidney was replaced by several large cysts that had decimated the normal architecture of the renal tissue. On reviewing the findings surrounding the cystic kidney, and the observation of a dilated left ureter, the possibility of a blockage has been considered, but
not investigated during the necropsy. The right kidney was at least twice the usual size, and was obviously compensating for the dysfunctional left kidney. Grossly this right kidney appeared normal, other than its size.

- **Congested lymph nodes in the cranial portion of the carcass:** all of the lymph nodes that were examined in the cranial thorax as well as the pre–scapular lymph nodes of the carcass were grossly congested. The lymph nodes in the caudal half of the carcass were grossly normal.

- **Thoracic and Pulmonary haemorrhage and congestion:** there was significant pulmonary haemorrhage with blood clots noted in some bronchioles, and congestion and haemorrhage throughout the thorax and throat. There were also large areas of subcutaneous congestion and ecchymoses on the brisket and the right thorax. Such congestion was absent in the caudal half of the cow.

**Clinical Pathology:**

Aqueous humour was collected from the carcass for clinical pathology. The results came back with a Calcium concentration of 1.17mmol/L, which is below normal calcium (normal Ca >1.4mmol/L), but not below the reference value for hypocalcaemia (Ca deficient <1.1mmol/L). Thus it could be assumed that although these results suggest that the cow was not suffering severe hypocalcaemia, her calcium level was low, and this may have been enough to reduce the cow's ability to regain sternal recumbency. Urinalysis was normal and there was no suggestion of ketosis.

**Problem List:**

- Twin pregnancy
- Gas build–up in rumen, bloated left abdomen that deflated when the animal was rolled.
- Regurgitation
- Significant congestion and haemorrhage in cranial portion of the carcass, with pale abdominal viscera and empty caudal vasculature (namely caudal vena cava).
- Cystic kidney

**Differential Diagnosis List / Diagnostic Hypothesis:**

On reviewing the history and the clinical findings of the post mortem the following differential diagnosis were considered:

**Dystocia and hypocalcaemia:** the cow was in labour when she died, and there was no real evidence of distress, or agitation (the ground surrounding the cow was relatively undisturbed). The awkward position she was in (head facing downhill, on sloping ground) and the lack of signs of struggle suggests that she was potentially suffering muscle weakness due to hypocalcaemia. Due to the fact that this cow was carrying twins, the cow’s metabolic demand for both energy and calcium is likely to have surpassed the supply of calcium leading to hypocalcaemia. Although the hypocalcaemia is unlikely to have been the cause of death, it is highly likely that the calcium deficiency was enough
to cause weakness and recumbency. The weakness could have been compounded by the fact that the twin foetuses were wedged in the pelvic canal. The cow would subsequently have had to use excessive energy straining to try and deliver the calves, while the hypocalcaemia would have caused an increased rate of muscle fatigue. The effect of this reduction in strength was likely to have influenced the of the cow ability to remain sternal during the calving process. As a result of the muscle fatigue, the cow is likely to have become cast in lateral recumbency and become unable to correct herself back into sternal recumbency.

**Bloat:** As a result of becoming cast in right lateral recumbency, it is hypothesised that the cow developed secondary ruminal tympany, or free-gas bloat. The ruminal distension subsequently results in compression of the diaphragm with resultant respiratory distress, and increased intraabdominal and intrathoracic pressure, leading to decreased venous return and death, (McGavin & Zachary, 2007).

**Discussion:**

Failure of eructation of gas can result in the development of ruminal tympany. Eructation relies on ruminal contractions, tension receptors in the wall of the dorsal ruminal sac, and receptors in the cardia region. The eructation reflex is initiated by tension receptors in the medial wall of the dorsal ruminal sac, by means of the dorsal vagus nerve. The contractions then begin in the dorsal and caudadorsal ruminal sacs and spread forward in order to move the gas cap ventrally to the cardia. Receptors in the cardia region then detect the presence of gas which is then eructated. If these receptors are covered by fluid the cardia remains firmly closed, (Radostits et al 2007). Subsequently, in recumbent animals where the cardia is covered in fluid, there is a functional obstruction preventing the eructation of gas, and the animal will subsequently develop free-gas bloat. Bloat can also develop secondary to ruminal stasis, which can occur in cases of hypocalcaemia. However in this case, although the calcium level was low, it is unlikely that the deficit was great enough to cause ruminal stasis, and that the bloat developed secondary to the lateral recumbency. This hypothesis is also supported by the fact that there was very little faeces that had been passed, or that were going to be passed.

The characteristic findings of bloat on post mortem examination include; significant congestion and haemorrhage of the lymph nodes of the head and neck, epicardium, and upper respiratory tract; Intra-bronchial haemorrhage may be present, and the lungs are compressed; and the liver is pale due to expulsion of blood from the organ, (Radostits et al, 2007, McGavin & Zachary, 2007). As it can been seen, the post mortem examination findings are consistent with these characteristic pathological lesions of ruminal tympany. The most reliable post-mortem indicator of bloat is the ‘bloat line’.

Although the post-mortem findings noted were suggesting of bloat being a secondary complication resulting in death, a more definitive diagnosis of ruminal tympany could have been given if the ‘bloat line’ was present and was recognised at the time of post-mortem. The bloat line is a sharp demarcation between the congested proximal oesophagus and the bloodless distal oesophagus at the thoracic inlet, (McGavin & Zachary, 2007).
The clinical pathology results obtained from the aqueous humour sample returned a result indicating that the cow post-mortem calcium levels were not below the reference range for hypocalcaemia. Work by Hanna et al (1990) indicated that the usefulness of estimating ante-mortem serum calcium values from post-mortem eye-fluid was limited. However the Department of Industry and Investment Vet lab manual (2005) will analyse post-mortem aqueous humour samples for estimation of calcium, as was done in this case. Thus it can be seen that although post-mortem sample analysis can be carried out, it only provides an estimate of ante-mortem mineral status, therefore results must be evaluated in conjunction with other clinical findings and observations. This was demonstrated in this case, where although the clinical pathology results suggested that the cow was not suffering from severe hypocalcaemia, the other findings including: lack of evidence of struggle, abnormal calving position, and twin foetuses all suggested that this cow was likely to have been suffering significant hypocalcaemia.

The death of this cow could potentially have been prevented if a different course of action had been taken. Firstly if the cow had been more closely monitored, the dystocia could have been managed, through an assisted calving. An assisted calving may have been enough to prevent this cow from becoming recumbent, however if she was already recumbent then treatment for hypocalcaemia would have most likely prevented the lateral recumbency that subsequently resulted in failure of eructation and development of ruminal tympany.

**Conclusion:**

A diagnosis of ruminal tympany secondary to lateral recumbency was determined to be the cause of death in this animal. The lateral recumbency was assumed to be the result of the combined effects of dystocia and the mild hypocalcaemia being experienced by the animal, or alternatively it was also considered possible that the dystocia was the direct result of the hypocalcaemia.

**Bibliography**


Pregnancy Toxemia this Winter and Spring

By Andrew Lamont, Veterinary Student, Charles Sturt University

Mild weather and good rainfall over the summer and early autumn period has resulted in good pasture growth and stock are generally in excellent condition. A lack of recent significant rainfall events, some heavy frosts and a cooler change has arrested plant growth and reduced pasture quality across the district. While good late summer conditions provided a break from feeding stock, supplementary feeding of cows and ewes may be required over the next few months to help combat the effects of pregnancy toxemia in animals giving birth this winter and spring.

Pregnancy toxemia is caused by insufficient nutrition of cows and ewes in late pregnancy or early lactation. It is most commonly seen in older ewes carrying multiple fetuses. Excessively fat (CS≥4) or skinny (CS≤2) stock are at higher risk although this condition can occur in any animal. Stock may appear to be in good condition when first affected, however, their level of nutrition will usually have fallen lately as a result of pasture damage from frost, dry conditions or from the more nutritious feed being eaten out.

When animals are metabolizing fat for energy, a number of breakdown products such as ketone bodies are also produced. In high quantities, these substances reduce the appetite of stock, resulting in further fat breakdown being required to meet the expanding needs of the late term foetus. This produces additional ketone bodies, perpetuating the problem, eventually resulting in the death of the affected animal.

It has been proven that 70% of lamb and calf growth occurs in the last 2 months of pregnancy. In the last 4 weeks of pregnancy, ewes carrying twins will require nearly twice the energy and protein as they do for maintenance. This energy deficit cannot be met from the breakdown of fat alone when animals are grazing low to medium quality pastures. With late term fetuses restricting the size and function of the rumen, this deficit is best corrected by feeding high energy concentrates such as grain. Flock losses of up to 30% of ewes and over 50% of lambs have been recorded when poor late term nutrition results in pregnancy toxemia.

The earliest signs of pregnancy toxemia include a reduced aggressiveness at feeding, reduced body condition, aimless wandered and fine muscle tremors. This develops over 2-4 days to anorexia, blindness, recumbency, coma and death in severe cases. Early diagnosis and correction of herd/flock nutrition should prevent significant outbreaks. Treatment of animals that are no longer eating can be expensive and unrewarding; it is rarely economically viable in sheep. Treatment of cattle involves giving large doses of propylene glycol or glucose, fluid and electrolyte replacement therapy and making high quality feed readily available. Inducing pregnancy reduces the stress on the cow/ewe although offspring may not always be viable.

For any further advice contact your local district veterinarian at the following offices;
Bega (02)64921283
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Introduction

Ovine footrot is a contagious dermatitis that infects the hooves of sheep and goats. Footrot is a notifiable disease in NSW under the Stock Diseases Act, 1928. In 1988 the NSW Footrot Strategic Plan was launched with the aim of improving sheep welfare and productivity through the progressive eradication of virulent footrot. The program has been successful, and as of July 2009, 100% of the state is a protected area for footrot (<1% of farms affected in that area), with no remaining areas listed as controlled (1-10% of farms affected) (NSW Agriculture, 2006; NSW government Industry and investment, 2009; Seaman & Evers, 2006; VEIN, 2008).

Footrot causes hoof and claw lesions which result in lameness. The lameness’s compromise the welfare and reduce production of infected animals. Production and economic losses are due to reduced wool growth and quality, reduced ewe fertility and weaning numbers, reduced growth rates, reduced price attainable from increased numbers of cull stock and an increase in the incidence of cutaneous myiasis (flystrike) (Kennan, Dhungyel, Whittington, Egerton & Rood, 2001; NSW Agriculture, 2006; Seaman & Evers, 2006; VEIN, 2008; Wani & Samanta, 2005).

Virulent footrot (VFR) is highly contagious, with young stock most susceptible and Merino sheep more susceptible than crossbreds. Ovine footrot does not affect cattle, but is contagious to goats (Seaman & Evers, 2006; Wani & Samanta, 2005). As NSW is considered a protected footrot area, any cases of footrot or suspected footrot are required to be reported to the District Veterinarian (DV) (NSW Agriculture, 2006).

Aetiology and pathogenesis

*Dichelobacter nodosus* (previously known as *Bacteroides nodosus*) is the primary bacterial agent, which causes ovine footrot. *D. nodosus* is a gram negative, obligate anaerobic, bacillus bacteria (Abbott & Lewis, 2005; Cheetham, Tanjung, Sutherland, Druitt, Green, McFarlane, et al., 2006; Ghimire, Whittington, Dhungyel, Joshi & Egerton, 2002; Kennan, et al., 2001; Moore, Wassink, Green & Grogono-Thomas, 2005; Radostits, Gay, Hinchcliff & Constable, 2007; Wani & Samanta, 2005). Ovine footrot occurs in 3 forms, benign, intermediate and virulent. Benign footrot (BFR) causes a transient infection in the hoof with mild lameness, which is not associated with any losses of economic or production importance. Intermediate footrot (IFR) may cause underrunning occurring in the hooves, but typically in less than 10% of the flock. The severity of IFR is less, compared to the virulent from. VFR is the more highly infective and aggressive manifestation of the disease with high production and economic losses, causing moderate to severe lameness in infected sheep (Abbott & Egerton, 2003; Glynn, 2009; Seaman & Evers, 2006; Wani & Samanta, 2005).

Although *D. nodosus* is the primary cause of ovine footrot, there are a number of other bacteria that will colonise in the hoof once its integrity is compromised. The most notable of these associated bacteria is *Fusobacterium necrophorum*, which causes ovine interdigital dermatitis (OID) (Abbott & Lewis, 2005). There are a number of different strains of *D. nodosus*, which have a range of virulence’s and cause disease of varying severity. The bacteria will not infect hooves when they are dry and healthy. The hooves must be compromised before becoming susceptible to infection. Compromised hooves are the result of exposure to damp pasture conditions for prolonged periods, which cause the interdigital skin to become macerated and easily damaged (Radostits, et al., 2007; Seaman & Evers, 2006). Pre-existing claw and interdigital lesions, such as OID or grass seed penetration, will predispose hooves to *D. nodosus* infection.

The bacteria will only survive for up to 4 days outside the hoof, even under the most favourable conditions. At least 6 weeks of rainfall averaging 50 mm per month and mean daily temperatures consistently between 10-20°C are required for survival of *D. nodosus* outside the host. Bulky, lush pastures, especially those containing a high percentage of moisture-retaining herbage eg. clover or capeweed are most risky for spread of *D. nodosus*. Ideal environmental conditions along with close and repeated contact of sheep are required for spread (Abbott & Lewis, 2005; Moore et al.,...
Footrot will not spread between infected and non-infected sheep in hot, dry conditions. Virulent disease, however, has the capacity to continue to persist in infected hooves during non-spread periods (Radostits, et al., 2007; Seaman & Evers, 2006). Thus, there are both infective, host and environmental conditions required for disease occurrence and progression (Abbott & Lewis, 2005; Seaman & Evers, 2006).

The infection begins as a moist dermatitis in the interdigital skin. *D. nodosus* produces the proteolytic enzyme protease, which breaks down the proteinaceous tissues of the hoof. The proteolytic activity allows *D. nodosus* to progressively invade the hoof of the host. In the benign form of the disease, the immune mechanisms of the animal are capable of mounting an immune response to the bacteria before underrunning of the hoof occurs. The virulent disease is much more aggressive and will cause underrunning of the hoof before the host immune system has adequate time to respond to the invasion. Underrunning of the hoof begins on the axial aspect of the heel of the claw, at the skin-horn junction. The more virulent the bacteria, the more aggressive and rapid the progression of lesions craniolaterally. The most severe presentation of footrot is complete underrunning of the keratinous hoof from the underlying epidermal tissues, such that the underrunning reaches the toe and the abaxial wall of the hoof (Abbott & Lewis, 2005; Kennan et al., 2001; Moore et al., 2005; Radostits, et al., 2007; Seaman & Evers, 2006). The degree of invasion of the hoof and type of lesion can be graded from 1 to 5, depending on the progression and severity of the lesions (Appendix 1).

### Diagnosis of footrot

#### Field Diagnosis

Footrot diagnosis is, in essence, a field diagnosis. Diagnosis is a professional task covered under the Veterinary Surgeons Act, 1986. In NSW, the footrot diagnosis policy states that footrot must ultimately be diagnosed by either a DV or VO. Any private vet or ranger that suspects or diagnoses footrot must report this to the DV (NSW Agriculture, 2006).

When score 1 and 2 lesions (Appendix 1) are observed, it is difficult to differentiate between BFR, OID and early VFR. Score 3 and 4 lesions may also be observed with BFR in naive and young sheep, but these lesions will resolve spontaneously when pastures dry off (Radostits, et al., 2007; Seaman & Evers, 2006). It is suggested and preferable that all 4 hooves of 100 sheep are examined and foot scored. Foot scoring details can be recorded and analysed using a sheet similar to that in Appendix 2. These foot scoring sheets are also used by the diagnostic labs in conjunction with testing to determine whether the infection is likely to be BFR or VFR. Footrot lesions are diagnosed as virulent when >1% of the flock presents with score 4 lesions. If <1% of the flock are score 4 lesions, VFR cannot be ruled out as it may be the early presentation of virulent disease (Seaman & Evers, 2006; VEIN, 2008).

#### Laboratory Diagnosis

Lab testing for footrot is a useful tool in determining the virulent nature of the footrot in complicated cases. It is also used as a confirmatory diagnostic tool to support field diagnosis. The testing procedure involves a gelatin gel test. The gelatin gel test method cultures *D. nodosus* for 2 days, allowing adequate time for production of the protease enzyme. The protease enzyme activity is then measured to determine its heat stability as follows; Non-heated isolates are compared to isolates heated at 68 °C for 8 minutes. Isolates are classified as stable if >10% of the protease enzyme remains active post heating. A negative result is recorded if less than 4% remains. For isolate activity between 4 and 10% it is classified as equivocal, which cannot be determined from this test whether the isolate would cause VFR or BFR. In the case of equivocal isolates, environmental conditions and host immunity would likely dictate the manifestation of the footrot as either VFR or BFR. Stable (thermostable [S]) isolates tend to be associated with VFR, and unstable (thermolabile [U]) isolates indicate a BFR strain. There are many intermediate strains that
occur, which tend to be classified as S, but present clinically as BFR (National footrot reference laboratory, 2009; Palmer, 1993; VEIN, 2008). In these cases further testing needs to take place.

Within the past 3 years there has been the development of another test that can be used in conjunction with the gelatin gel test. The intA test is a PCR-based test, which involves the detection of a gene known as intA gene. The presence of the gene (intA positive) has been proved to be closely associated with VFR. Absence of the intA gene (intA negative) is strongly suggestive of BFR, irrespective of whether the isolate is identified as stable from gelatin gel testing (Cheetham et al., 2006; NSW Agriculture, 2006). 91% of farms with isolates identified as stable and intA negative were diagnosed as benign on field diagnosis. 92% of farms with at least one stable intA positive isolate have VFR (Cheetham, et al., 2006). These test are not 100% affective, so must be coupled with field observations. Testing using intA is only available when a full field investigation has been performed, which includes the examination, footscoring and recording of 100 sheep (NSW Agriculture, 2005).

Case Profile

The case study farm is an 1100 head Merino, self-replacing sheep property in the Hume LHPA district. This farm has been diagnosed VFR in the past, but was released from quarantine in 2002 on the basis of a successful, approved footrot eradication program (AFEP). It is now believed that the quarantine release may have occurred without sufficient evidence of freedom from footrot, compared what is considered appropriate by the current DV and rangers. There is the potential that lesions have remained dormant since 2002, due to unfavourable environmental conditions for the bacteria to proliferate and spread. The incidence of footrot on neighbouring farms must also be considered to determine disease source (I. Masters & T. O’Brien, personal communication, December 14, 2009).

In November 2009, the property owner/operator noticed a number of lame sheep. After closer observation of hoof lesions, the farmer suspected footrot and contacted the district veterinarian (DV) at the Hume LHPA, Gundagai office. The DV and animal health ranger scheduled a farm footrot investigation on 3 December, 2009. The hooves of 30 sheep, of mixed sex and age, were examined and secateurs were used to further investigate hoof lesions. Footrot hoof scores ranged from 3a to 5 (Appendix 1) in over 30% of examined sheep. Lesions of affected sheep on the property can be seen in Figures 1 and 2. The impact of footrot on production is evident in Figure 3. Swabs were taken from 7 affected sheep and sent to EMAI for culture and identification. The results of the test may take up to 6 weeks to culture. Generally the longer the isolates take to culture, the more benign the bacteria. Any stable isolates are then sent for intA testing to determine if the isolate is true virulent strain.

The field diagnosis concluded that the infection is VFR, but lab testing is used for conformation and completeness. As NSW is protected for footrot, surveillance testing is paid for by Industry and Investment, NSW (NSW DPI). This is of benefit to the farmer, as they do not have the added costs of lab testing.

Lab testing results were returned 2 weeks later. Testing isolated D. nodosus from each of the 7 swabs cultured, all of which were stable isolates (Appendix 3). IntA genetic test results are to follow.

Footrot can be extremely expensive to eradicate. It typically costs around $1/head to turn sheep when paying a contractor, which typically occurs 3-4 times at minimum before released from quarantine. There is also money lost when selling infected sheep straight to slaughter and the inability to sell to other farms. There are also the costs associated with replacing culled stock and the labour involved in the mustering and handling of sheep for the contractor to inspect.
Figure 1. Photograph of a footrot infected sheep, score 5. The claw on right has been trimmed with secateurs to reveal underrun, necrotic tissue. Photo: Becci Robson, 2009.

Figure 2. Footrot affected lamb. There is significant inflammation of the interdigital skin, as well as ridging of the horny hoof. This hoof was trimmed to reveal a score 3c lesion. Photo: Becci Robson, 2009.
Figure 3. Photograph of footrot affected sheep (left), compared to sheep of the same age and bloodline run in the same paddock, unaffected by footrot. Photo: Becci Robson, 2009.

Quarantine Protocols

Once virulent footrot has been diagnosed by the DV, the infected property is required to undergo quarantine for the duration that the property is deemed to be infected. The property owner was invited to have a meeting with the DV at the Gundagai LHPA office. Here the case was discussed and the owner was read the undertaking (Appendix 4) to ensure an understanding of all aspects of the undertaking and quarantine process before signing. The main restrictions of the undertaking are as follows:

- No stock are to be moved onto the property without notification and consent of the DV
- No stock are to be moved off the property except in a vehicle going straight to an abattoir or other slaughter sale approved by the SVO. The DV must be notified of numbers being sent.
- If the land is going to be sold, the DV must be notified within 7 days of sale.
- Accurate records are to be kept of stock movements onto and off the property of the duration of the undertaking
- Implementation of an eradication program as approved by the DV or VO
- By signing the undertaking, the owner is giving the DV permission to notify the neighbouring properties, in confidence, of the quarantine.

The DV and animal ranger then discussed an eradication program with the farmer and a qualified footrot contractor has been arranged to perform the first inspection and identification of infected sheep. The first ‘tip’ will eliminate the majority of infected sheep. Sheep are to be reassessed every 3-6 weeks (Seaman & Evers, 2006) and in this case, sheep will be tipped every 4 weeks until 2 clean tips have been achieved.
All questions from the farmer were answered through the meeting and there was clarification of the requirements and activities that will occur over the next few months. The undertaking was signed. The names of all neighbours were taken from the owner and letters sent to neighbours, similar to that in the Appendix 5 template. All neighbours must be notified under law and have stock examined by the DV and/or animal health ranger. The DV and the ranger then initiated an inspection and cull program for eradication on this farm (Appendix 6). The eradication and cull program states that:

- All stock must be mustered when examination and culling operations are taking place
- Proposed release from quarantine will not occur until:
  - 2 sequential turns result in no infected sheep being detected in the non-spread period (summer)
  - All sheep present as clear following a challenge period over the next spread period (winter-spring)
- All stock must be clearly branded at each inspection and stock to be culled will have a red brand placed on the head
- All infected stock are to be immediately segregated from clean stock until disposal
- Stock are not permitted to be footbathed, treated with antibiotics or vaccinated within 6 weeks of inspection unless approved by the DV. There is a potential for these practices to mask the presence of VRF, such that it is not effectively eradicated from the flock.
- Time frames for all stock to be sold after each inspection are noted.

Eradication occurs in the non-transmission period of the hot dry months. This is the most desirable period for eradication because no new footrot cases are emerging. This allows all diseased stock to be identified and removed (NSW Agriculture, 2005; NSW Agriculture, 2006; Radostits, 2007).

**Release from quarantine**

The farm cannot be released from quarantine until all infected stock have been removed from the property. This is quantified by inspection by a qualified footrot contractor with no infected stock found on 2 consecutive inspections. Release can only occur after the sheep have been challenged over the spread period, to ensure that there are no potential dormant lesions that have remained unidentified. A DV or qualified footrot contractor (under the supervision of the DV) must then perform the release inspection which occurs at least 6 weeks after the start of the spread period (NSW Agriculture, 2005; NSW Agriculture, 2006).

After release from undertaking, a farmer must be vigilant in checking sheep during the next spread period and whenever sheep are yarded, to ensure no further infection and/or spread. Once released from quarantine, all neighbours will be notified and the owner will be issued with the release from undertaking document (NSW Agriculture, 2005; NSW Agriculture, 2006).

**Conclusion**

Despite NSW being a 100% protected area for footrot, cases are still occurring. The only cases that are documented are those detected by rangers at sheep sales, or those investigated either as a matter or surveillance or due to disease investigation by the DV. It is likely that there are more cases than those reported, due to a number of farmers attempting to disguise or hide infections in their stock. This is an offence under the livestock diseases Act, 1924. It is believed that since the eradication of highly virulent strains from NSW, detection and eradication of footrot has become more difficult as the strains now causing infection are less aggressive, although still virulent. Weather conditions due to drought in the past few years have made conditions for footrot progression and spread unfavourable. These unfavourable conditions may have masked the potential incidence of virulent footrot in NSW, such that the incidence is largely underestimated.
Appendix 1  Footrot scoring guide

Score 1
Slight to moderate inflammation with some erosion between the claws. There is no underrunning or erosion of the skin or horn.

Score 2
The skin between the claws is inflamed and raw. This condition may involve part or all of the soft horn on the inside of the claws. There is no underrunning of the horn.

Score 3a
Separation of the skin horn junction with underrunning extending no more than 5 mm.

Score 3b
Underrunning no more than halfway across the heel or sole.

Score 3c
More extensive underrunning of the heel or sole but not extending to the outside edge of the sole of the claw.

Score 4
The underrunning extends to the outside edge of the sole of the claw and involves hard horn.

Score 5
This is a severe form of the disease involving the sole, with extensive inflammation and underrunning of the hard horn of the hoof.

(Seaman & Evers, 2006).
## Appendix 2

### FOOTROT SCORING DETAILS

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(Adapted from NSW Agriculture, 2005)
LABORATORY REPORT

To: PO BOX 21 GUNDAGAI 2722 NSW
Fax: 02 6944 1867

Owner: 
Property: 

Copies: 

Job Manager: Andrew Thompson
Job Type: Sheep
Merino (poll & horn)

Date Sampled: 3 Dec 2009
Date Sent: 3 Dec 2009
Date Received: 4 Dec 2009

Samples Received: 7 x GELATIN GEL SWABS

History

Age: (Mixed age group) Sex: Mixed sex group No. at Risk: No. Sick: No. Dead:

Owner rang lame sheep. Upon inspection found a range of scores 3s-5 also a lot of dry lesions. Very confident virulent. Use lab test for confirmation.

Invoice payable by Industry & Investment NSW - Footrot

Conclusion

Dichelobacter nodosus Stable Gel

Comments

IntA genetics test results to follow.

Andrew Thompson
Veterinary Pathologist
**EMAII Bacteriology**

**Dichelobacter Culture and Gelatin Gel Testing (Footrot)**

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Please note that as from 1/1/2010 histology pots will no longer be returned.

**Copies**

John Seaman (fax 02 6381 3740 + SA) (hold)
DV HUME (GUNDAGAI) (fax: 02 6944 1867)
Appendix 4

Undertaking under Section 11 of the Stock Diseases Act 1923

This Undertaking is given because of the presence or suspected presence of footrot in sheep and goats (“the disease”) on the lands described as: .................................................................

..................................................................................................................and for all other lands*
owned/occupied by me in the .............................................. Rural Lands Protection District (“the land”).

This undertaking applies to all sheep and goats now or at any other time on the land (“the stock”).

I, (name) ..................................................................................................................
of (residential address) ..........................................................................................

undertake to the Minister for Primary Industries from the date of this undertaking for a period of 3 years to comply with the following requirements, unless or until an inspector releases me from this Undertaking.

Requirements

1. I will not move any of the stock onto or off the land, or cause or permit any of the stock to be moved onto or off the land, except in a vehicle going direct to:
   • an abattoir where the stock are to be slaughtered; or
   • a slaughter-only sale approved by a Senior Field Veterinary Officer, or
   • a facility approved by the Director, Animal and Plant Biosecurity, or otherwise in compliance with a permit or an order issued by an inspector.

2. I will inform the District Veterinarian for the Rural Lands Protection District within 7 days if I cease to be the owner or occupier of the land.

3. I will inform an inspector, as requested by that inspector, about any previous movement of any of the stock onto and off the land to assist with veterinary investigations of the disease.

4. I will keep accurate written records of all movements of the stock onto and off the land, showing the class and number of the stock and their origin and destination, and any other stock records specified in writing from time to time by an inspector. I will make these records available to an inspector on the inspector’s request.

5. I will inform the owner or person in charge of any stock that are now on the land, or are proposed to be brought onto the land before the stock come onto the land, that the stock cannot move off the land except in compliance with clause 1 of this Undertaking, and that the other conditions of this Undertaking must also be complied with.

6. I will develop a footrot eradication program as approved by the District Veterinarian or a Veterinary Officer employed by the Department of Primary Industries (located in the Western Division of NSW), by -/-/----- (insert date). I acknowledge that this program may need to be revised if footrot is not eradicated as planned. I agree to develop a new approved footrot eradication program within 21 days of being requested to do so by the District Veterinarian or Veterinary Officer. I will comply with all the conditions of the approved footrot eradication program.

(Ininsert or attach any further conditions of this Undertaking)

I authorise an inspector, for disease control purposes, to advise other persons about the disease status of the land and the stock as set out overleaf. I have read and understand the requirements of this Undertaking and the information overleaf.

Signature of owner/occupier giving undertaking .................................................................
Acceptance of Undertaking

I, ......................................................................................................................... Inspector,
pursuant to section 11(4) of the Act, accept this undertaking on behalf of the Minister for Primary Industries.

Signature of Inspector accepting undertaking) ..........................................................
(Date) ......................................

Effect of Undertaking

- The land is by virtue of section 11(2) of the Act deemed to be a quarantine area.
- Section 20H(1)(c) of the Act states that failure to comply with the terms of an undertaking under section 11 of the Act is an offence.
- It is an offence under section 20I(1) of the Act if stock are found straying within or out of a quarantine area.
- The undertaking may be released by an inspector in writing when the inspector is of the opinion that it is appropriate to do so having regard to policy relating to the relevant disease control program.

Disclosure of Confidential Information

An inspector may advise:
- your neighbours;
- persons who have obtained stock from the land, and persons from whom you have obtained stock;
- any other person who is in charge of stock which an inspector reasonably believes have, are, or may become infected with a disease on account of the presence or suspected presence of the disease in the stock on the land which is subject to this undertaking; and
- the Department of Primary Industries who may notify relevant interstate authorities.

Inspectors are under instructions to only divulge the minimal amount of confidential information in accordance with policies and procedures relating to the relevant disease control program.

It is necessary that the above persons be advised so that they can take steps to protect their own property and stock. These persons are also informed that the information cannot be passed on to other persons, made public or used for any other purpose, and that disclosure of this information is unlawful.

Queries

Any queries regarding this undertaking or applications for the issue of permits should be directed to an inspector at the Rural Lands Protection Board Office who may be contacted on telephone ..............................................

Note: * Inspector to delete “and for all other lands”, if not applicable.

(UT: 92CTD91 T/9502)

(NSW Agriculture, 2005)
Appendix 5

NEIGHBOUR QUARANTINE ADVICE LETTER
(Note that this letter does not provide for the possibility that the neighbour is the source)

To (Name and Address of Neighbour)

ADVICE OF SCHEDULED DISEASE TO ADJOINING OWNERS

This letter is to advise you that footrot in sheep and goats, a proclaimed disease under the Stock Diseases Act 1923 is present or suspected of being present on the land described below which has been placed under quarantine.

It is understood that you occupy land adjoining the affected area. This advice is given to you so that you may take steps to prevent the spread of disease to ensure that stock on your land do not become affected. This information should be treated as confidential to the owners of the Holding described below. This information cannot be passed on to other people, made public or used for any other purpose, other than for assessing and minimising your own flock disease risk.

DESCRIPTION OF LAND

Affected Holding ..........................................................

(Signed) .........................................................
Inspector, Stock Diseases Act, 1923
Date ..............................................................

The following comments and suggestions are offered for you to consider.

1. CHECK YOUR STOCK IMMEDIATELY. Sheep and goats are susceptible stock.
2. Keep Footrot Out - check boundary fences shared with the quarantined property. If necessary, remove susceptible stock from paddocks at risk from straying of potentially infected animals.
3. Maintain Surveillance - Carefully and continuously monitor your stock for any sign of lameness. Check your stock again during a suitable footrot challenge period (i.e. when it is warm and moist weather), which is the first time that footrot may become apparent. Notify your RLP District Veterinarian of any sign of lameness.
4. Footrot is a notifiable disease under the Stock Diseases Act 1923 in New South Wales. If footrot is found at an inspection that is not initiated by you, regulatory action including the possibility of prosecution may result. If footrot is detected and you have not reported a problem, this advice to check your stock and report any foot abnormalities or lameness would be taken into consideration when recommending any appropriate penalty.
5. Based on an assessment of the risk the adjoining property presents to your flock, the Rural Lands Protection Board may contact you in the near future to inspect your sheep for footrot.
6. Please do not throw any stray sheep back over the fence to your neighbour. Please notify the owner if you have higher sheep so he/she can come and pick them up.

For further information or assistance, please do not hesitate to contact your local Rural Lands Protection Board.

(NSW Agriculture, 2005)
Appendix 6

Schedule of Operations - Inspect and Cull Program

Approved Footrot Eradication Program of ____________________________
(Owner/Occupier Name & Property Name)

Total Flock Numbers: Sheep: ________ Goats: ________
Breed(s):

1. Is the total flock to be inspected? Yes/No (Please complete attached mob list)
   Note: Inspection means looking at every foot of every animal.
   What mobs will you NOT be inspecting?
   List such Mobs as per Mob List numbers: __________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

2. Proposed Summer Inspection Schedule:
   Please complete all dates and insert the name (under the title) of the person who will inspect the stock.

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<th>Turn</th>
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<th>Stock Diseases Inspector</th>
<th>Footrot Contractor</th>
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3. Mustering
   The entire paddock will be mustered each time a mob is moved to the yards for inspection. Any animals
   incapable of travelling with the mob should be immediately transported to the yards.

4. Branding
   All stock will be branded during each inspection - see attached notes All CULLED/INFECTED stock will be
   marked on the headwag with a red brand.

5. Footbathing Out of Yard
   Clean Yes/No Infected/Culled Yes/No
   Date of last footbath (prior to commencement of inspection program): / / 
   Chemical: Zinc Sulphate / Radicate

6. Segregation
   All CULLED/INFECTED stock will be permanently segregated from non-infected stock until disposal.
Stock of a known disease status/risk (not infected, 1st clean turn, 2nd clean turn, etc) will be segregated from those of a different status.

7. Disposal of Infected Stock
   Destroy and/or sell for slaughter only, during week commencing:

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8. Remuneration
   Owner of stock agrees to pay normal contract inspection fees directly to the Footrot Contractor if engaged.

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Any sheep or goats introduced to the property must have prior approval of the District Veterinarian/Footrot Advisory Officer.

All newly-formed mobs and their progeny must be inspected as part of the ongoing eradication program and will be subject the terms of this agreement.

I, ____________________________, being owner/occupier of ____________________________, agree to carry out this Approved Footrot Eradication Program according to this Schedule of Operations and as required by my Undertaking in lieu of Quarantine:

______________________________  __________________________
Signature of Owner/Occupier       Date

Inspector - Stock Diseases Act
Approved on behalf of District Vet, ...

(NSW Agriculture, 2005)
References


