



Opinion on Lameness in Sheep

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Farm Animal Welfare Council,
Area 8B, 9 Millbank,
c/o Nobel House, 17 Smith Square,
London, SW1P 3JR.

www.fawc.org.uk

FAWC Opinions

FAWC Opinions are short reports to Government¹ on contemporary topics relating to farm animal welfare. They are based on evidence and consultation with interested parties. They may highlight particular concerns and indicate issues for further consideration.

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¹ Department for Environment, Food and Rural Affairs in England, the Scottish Government's Rural Affairs and Environment Department, the Welsh Assembly Government's department for Rural Affairs and other responsible Government Departments and Agencies.

Opinion on Lameness in Sheep

Scope

1. This Opinion considers lameness in farmed sheep in Great Britain.
2. The objectives are:
 - i) to review the evidence for the welfare and economic issues linked to sheep lameness;
 - ii) to review the prevalence, causes and management of sheep lameness and whether these have changed since FAWC last considered this topic in 1994²;
 - iii) to review current advice and best practice for joint and foot conditions in sheep and to identify gaps in knowledge;
 - iv) to review current approaches to knowledge transfer; and
 - v) to recommend needs for further research and development.

Background

Extent and nature of the topic covered in the Opinion

3. In 1994, FAWC published its report on the Welfare of Sheep. It showed that lameness was a common problem in sheep in Britain and elsewhere and made recommendations to diminish this significant cause of poor welfare.
4. This Opinion builds on the previous Report and considers current scientific evidence and expert opinion. It answers six main questions:
 - i) Are there appropriate means of prevention, control and treatment of (the common types of) lameness in sheep?
 - ii) Are they used by farmers as soon as practically possible and, if not, what are the reasons?
 - iii) Are farmers able to assess the prevalence of lameness and to identify its various types, their causes and treatment?
 - iv) Is the prevalence of lame sheep in a flock an indicator of poor welfare, taking account of the time spent lame and treatment administered?
 - v) Have the activities since 1994 been effective in raising the British sheep farmer's awareness of the importance of managing lameness in sheep?
 - vi) Has research on the cause, progression and management (including treatment) of lameness in sheep been effective and is further research needed?

² Farm Animal Welfare Council. 1994. Report on the welfare of sheep.

Number of animals involved, duration and extent of welfare issues

5. In the UK in 2008, there were 15.6 million breeding ewes and 16.5 million lambs, with average flock size of 211 breeding ewes³. Nine percent of flocks had more than 500 ewes and ~ 50% of ewes were in flocks with more than 500 ewes. Compared with 1994, the number of ewes had declined by 4.2 million and the average flock size had decreased by 12.

6. Prior to 1994, there were no published estimates of the prevalence⁴ of lameness in sheep. In 1994, the farmer-estimated prevalence of lameness in English flocks was an average of 8.4%⁵ and was similar a decade later at 10% in 2004⁶. There are no more recent, independent estimates. Recent research⁷ suggests that farmers can recognise lame sheep and that their estimates of lameness are reasonably accurate.

7. These data suggest that at least 3 million sheep are lame in the UK at any one moment. There is no estimate of the incidence⁸ of lameness in sheep; it is possible that 6 to 9 million sheep become lame in the UK over the course of a year.

8. The causes of lameness in sheep and appropriate preventive measures and treatments are well documented^{9,10}. In 80% of flocks, footrot (interdigital dermatitis with or without under-running separation of hoof horn from the underlying sensitive tissue) is the most common cause, accounting for approximately 90% of foot lameness in the national flock.

9. In a well managed flock, the prevalence of lameness can be as low as 2%. There are notable exceptions that include epidemics of footrot, contagious ovine digital dermatitis (CODD), erysipelas and joint ill caused by *Streptococcus dysgalactiae* in lambs.

Legal context

10. Under the Animal Welfare Act 2006 in England and Wales, and similar legislation in Scotland, the owner is responsible for his/her animal's welfare.

11. Livestock farmers are required by law to ensure that all those attending livestock are familiar with, and have access to, the relevant codes. For sheep, this is the Code of

³ www.defra.gov.uk/evidence/statistics/foodfarm/general/auk/latest/excel/index.htm

⁴ Percentage of lame sheep at a particular moment.

⁵ Grogono-Thomas, R. and Johnston, A.M. 1997. A study of ovine lameness. MAFF Research Report.

⁶ Kaler, J. and Green, L.E. 2008. Naming and recognition of six foot lesions of sheep using written and pictorial information. A study of 809 English sheep farmers. Preventive Veterinary Medicine, 83: 52-64.

⁷ Kaler, J. and Green, L.E. 2008. Recognition of lameness and decisions to catch for inspection among sheep farmers and specialists BMC Veterinary Research, 4: 41-50.

⁸ Number of new cases of lameness per year per number of sheep at risk.

⁹ Winter, A. 2004. Lameness in sheep 1. Diagnosis. In Practice, 26: 58-63.

¹⁰ Winter, A. 2004. Lameness in sheep 2. Treatment and control. In Practice. 26: 130-139.

Recommendations for the Welfare of Livestock - Sheep (2002)¹¹ (and similar codes issued in Scotland and Wales). Guidance by the Government on best practice in relation to lameness was last issued in 2003¹².

12. British legislation relating to lameness is unambiguous. The Welfare of Farmed Animals Regulations (2007) require that farmed animals, including sheep, which are *“kept in husbandry systems in which their welfare depends on frequent human attention must be thoroughly inspected at least once a day to check that they are in a state of well-being”*; while those which are *“kept in husbandry systems in which their welfare does not depend on frequent human intervention must be inspected at intervals sufficient to avoid any suffering. Any animals which appear to be ill or injured must be cared for appropriately without delay; and where they do not respond to such care, veterinary advice must be obtained as soon as possible”*. Records *“must be maintained for a period of at least three years from the date on which the medical treatment was given, or the date of inspection, and must be made available to an inspector on request”*.

13. The Code of Recommendations for the Welfare of Livestock - Sheep states that *“If a chronically lame sheep does not respond to remedial treatment, it should be culled and not left to suffer”*.

14. European transport regulation EC/1/2005 prohibits the transport of unfit animals, and specifically includes those that are *“injured or present physiological weaknesses or pathological processes”* and, in particular, are *“unable to move independently without pain or to walk unassisted”*.

15. The UK is a signatory to the Council of Europe Convention on animals kept for farming purposes. Article 7.1 states that *“the condition and state of health and welfare of animals shall be thoroughly inspected at intervals sufficient to avoid unnecessary suffering and in the case of animals kept in intensive stock farming systems at least once a day”*.

16. In order to qualify for financial support under the Single Payment Scheme, farmers must meet minimum European standards. In England, these are Statutory Management Requirements (SMRs) and Good Agricultural and Environmental Conditions (GAECs), including those relating to animal welfare. In Scotland since 2010, the Animal Health Land Management Options (LMOs) include a requirement to keep records of the treatment of sheep lameness requiring treatment as one of the qualifying criteria for additional financial support. There are no additional funding opportunities relating to animal welfare in either England or Wales.

¹¹ <http://www.defra.gov.uk/foodfarm/farmanimal/welfare/onfarm/documents/sheep.pdf>; a more recent Code has been issued in Wales (2010)

¹² <http://www.defra.gov.uk/foodfarm/farmanimal/welfare/documents/sheeplameness.pdf>

National and international considerations

17. The UK is one of the largest producers of sheep meat in the world and produces approximately one third of sheep meat in the EU. Sheep farmers were supported directly for keeping sheep from the end of the Second World War until the Single Payment Scheme was introduced in 2005. A minimum of one percent of claimants are inspected annually. For sheep farms, non-compliance can be recorded for lack of action / intervention on lameness and can lead to strict financial penalties.

18. Lameness in sheep is a worldwide problem. Recently, *Dichelobacter nodosus* has been identified in lame sheep in Norway and Sweden, which were previously considered to be free from this pathogen. Warm winters have been associated with the development of disease. Norway, Sweden, Germany and Switzerland are attempting to eliminate footrot from individual flocks using clinical signs as the case definition; footrot is a notifiable disease in Norway.

19. Lameness is also an important issue in Australia. Two Australian states have had an eradication programme for footrot for several decades. The transmission period (i.e., when footrot can spread) can be as short as six weeks under Australian conditions. At the start of the eradication programme, approximately 15% of Australian sheep flocks had footrot (in contrast to over 90% of UK flocks). Many flocks were cleared of footrot by examination of feet, treating or culling sheep with under-running footrot and foot-bathing the remainder. Culling doubled the rate of success of eradication. The eradication protocol was repeated twice or three times during the non-transmission phase. Fifty percent of attempts at eradication were successful, and the rate of success was higher when an independent advisor, rather than the farmer, carried out interim inspections. Some flocks were depopulated without compensation. This occurred against a background of a reduction in population from 170 to 70 million breeding ewes.

20. In New Zealand, anecdotal reports indicate that rigorous culling of lame sheep has resulted in many flocks with few lame sheep.

21. Footrot has been reported in Kashmir and in southern states in India.

Commercial interests and developments

22. FAWC welcomes initiatives by the levy bodies, agricultural institutes and universities and other organisations to transfer knowledge about lameness in sheep. The effectiveness of these programmes has not been evaluated.

23. There is only one licensed vaccine to assist in the control of footrot in sheep. The manufacturer's recommendations are that vaccination should be carried out approximately one month before footrot is at its peak in a flock and should be part of a flock lameness control programme using all methods for control and treatment. There can be large swellings at the vaccination site and the vaccine is contraindicated with

certain other vaccines and worm drenches. In Australia and Great Britain, researchers are testing novel approaches to vaccination and developing new vaccines.

Advice by FAWC and/or EFSA relating to the topic, especially within last 2/3 years

24. FAWC has recommended previously¹³ that “[farm assurance] scheme owners should work towards refining their standards and inspection procedures to achieve an increasing inclusion of welfare outcomes, so as to provide both a better reflection of the welfare of the animals within a production system and the level of stockmanship on the farm”. Suitable outcomes include evidence of pain, injury and disease, such as lameness. The Report recognised the vital role played by the stockman in maintaining and enhancing animal welfare and discussed how assurance schemes might seek to better assess stockmanship on farm.

25. In relation to the stockman, FAWC concluded¹⁴ “The stockman has a unique role within livestock farming in ensuring high standards of animal welfare. His knowledge must cover the principles and practices of animal husbandry, a basic knowledge of disease prevention and treatment, and the operation and maintenance of equipment”. This Report outlines the attributes of a good stockman, including an ability to recognise and manage lameness and other diseases.

26. Currently, there is no EFSA advice on the health and welfare of sheep other than the case of notifiable diseases and general farming guidance.

Evidence

Monitoring lameness and lesions

27. The level of lameness in sheep can be graded using a locomotion score. Whilst over 90% of sheep farmers can recognise even mildly lame sheep, they make a separate decision on whether to catch and treat them. Some treat the first mildly lame sheep in a group whilst others wait until several sheep are quite lame before catching and inspecting them. Some farmers never catch and treat individual lame sheep but wait until the flock is gathered: this is unacceptable.

28. It is also possible to score specific lesions on the feet of sheep. The prevalence of lesions is usually higher than the prevalence of lameness, with some flocks having up to 70% of sheep with foot lesions. This is because some sheep with footrot or other lesions may not be lame. The most common lesions observed in large-scale studies in the UK not causing lameness were white line disease and interdigital fibromas¹⁵. In addition, a high proportion of sheep had overgrown or misshapen hooves.

¹³ Farm Animal Welfare Council. 2005. Report on the welfare implications of farm assurance schemes.

¹⁴ Farm Animal Welfare Council. 2007. Report on stockmanship and farm animal welfare.

¹⁵ Conington, J., Speijers, M.H.M., Carson, A.F., Johnston, S. and Hanrahan, S. 2010. Foot health in sheep – prevalence of hoof lesions in UK and Irish sheep. Proceedings of the British Society of Animal Science, 12-14 April 2010, Belfast, N. Ireland.

29. Most sheep farmers and shepherds recognise the causes of lameness but do not always use the correct terminology when referring to lesions. The common mistake is to describe all lesions where the horn is damaged as footrot. If there is misdiagnosis, then mistreatment can result.

30. The many causes of lameness in sheep are either infectious or non-infectious. Infectious and contagious causes are transmitted between sheep in a flock and can be transmitted to other flocks via infected sheep. In the UK, the two important infectious and contagious diseases¹⁶ that cause foot disease are footrot and contagious ovine digital dermatitis.

Footrot, including interdigital dermatitis, also called strip, stripe or scald

31. Footrot is responsible for over 90% of all lameness in British sheep and is present in over 97% of flocks. The integrated nature of the sheep industry in the UK, with frequent movement of infected sheep between livestock markets and farms may explain why this contagious disease is so widespread.

32. The UK's temperate climate provides an ideal environment for transmission of the bacterium that causes footrot. Sheep farmers in south west England report that footrot occurs virtually all year round. It can spread rapidly in housed sheep.

33. Footrot, presenting as interdigital dermatitis or progressing to hoof horn separation from the corium, is caused by *D. nodosus*; consequently both presentations of disease should be managed together^{17,18}. Sheep can have footrot without being lame and management programmes that include inspection of feet will reduce the time taken to see the rewards from a flock health programme on control of footrot.

34. Sheep farmers and shepherds should discuss treatment protocols with their veterinarian, including those in the flock health plan.

35. The best treatment for individual sheep with footrot is an injection of long acting antibiotic (10 mg/kg of oxytetracycline) together with removal of all debris from the interdigital space and application of an antibacterial spray¹⁹. *D. nodosus* is sensitive to antibiotics commonly prescribed by veterinarians and treatment protocols should be developed and managed in conjunction with veterinary advice. Most sheep treated in

¹⁶ Foot-and-Mouth Disease and Bluetongue are other important infectious causes of lameness.

¹⁷ Moore L.J. 2005. The detection and characterisation of *Dicholobacter nodosus* from cases of ovine footrot in England and Wales. *Veterinary Microbiology* 108: 57-67.

¹⁸ Wassink, G.J., King, E.M., Grogono-Thomas, R., Brown, J.C., Moore, L.J. and Green, L.E. 2010. A within farm clinical trial to compare two treatments parental antibacterials and hoof trimming for sheep lame with footrot. *Preventive Veterinary Medicine* 96: 93-103.

¹⁹ Kaler, J., Daniels, S.L.S, Wright, J.L. and Green, L.E. 2010. Randomised clinical trial of long acting oxytetracycline, foot trimming and flunixin meglumine on time to recovery in sheep with footrot *Journal of Veterinary Internal Medicine*, 24: 420-425.

this way recover from footrot within a few days; a few take up to 10 days: lameness and lesions heal in this period although foot shape might take 4 – 6 months to improve²⁰.

36. When lame sheep are treated promptly, so that no sheep is lame for more than 3 days before treatment, then the prevalence of lameness is between 1 and 2%. The benefits are that few sheep are in pain from lameness, a ewe's fertility is improved and she will produce and rear more lambs that grow rapidly. Treatment of sheep with footrot within 3 days minimises spread of the disease to other sheep. Some farmers report that where there are fewer ewes with footrot, then epidemics of interdigital dermatitis in spring lambs are less likely.

37. Trimming the foot delays healing and should be avoided because the corium, a sensitive tissue, is inflamed and trimming leads to further damage.

38. Whilst no sheep with footrot should be left untreated, such sheep are found on some farms. These sheep are intermittently or continuously lame and often have overgrown feet with poor foot conformation. Antibiotic treatment (injection and spray) is necessary for up to 10 days and it is not known if trimming the horn to open the lesion is beneficial.

39. Segregating those sheep with footrot from sound sheep at the earliest opportunity helps to reduce the spread of footrot²¹; this should be done at every gathering and especially at housing and at turnout. Lame sheep and sheep with foot lesions should not be turned away to remote pastures until treated and recovered. A low stocking density reduces the risk of transmission amongst sheep at pasture.

40. Culling repeatedly lame sheep with footrot reduces the incidence of footrot in a flock because such sheep are a source of infection.

Whole flock management for footrot

41. Given a suitable hard standing, foot-bathing sheep before housing and after gathering can kill bacteria on the surface of the foot. Foot-bathing is most successful in preventing footrot and will also treat interdigital dermatitis. There is no evidence that any one type of bath treatment formulation is more effective than another. Foot-bathing is not an appropriate treatment for sheep with footrot although, if used correctly, it may limit the spread of the disease. Such sheep will not recover or will recover slowly, by which time production losses will have occurred and their welfare will have been compromised.

²⁰ Kaler, J., Medley, G.F., Grogono-Thomas, R., Wellington, E.M.H., Calvo-Bado, L.A., Wassink, G.J., King, E.M., Moore, L.J., Russell, C. and Green, L.E. 2010. Factors associated with changes of state of foot confirmation and lameness in a flock of sheep. *Preventative Veterinary Medicine*, 97: 237-244.

²¹ Wassink, G.J., Gorgono-Thomas, R., Moore, L.J. and Green, L.E. 2003. Risk factors associated with the prevalence of footrot in sheep from 1999 to 2000. *The Veterinary Record* 152: 351-358.

42. There is little evidence that Australian eradication programmes for footrot would be successful in the UK because of our climate, the structure of sheep breeding and the lack of co-ordination between farmers. The UK's climate predisposes to the spread of footrot for 8 - 10 months of the year and, even indoors, footrot can spread via bedding. Whilst footrot can be eradicated in individual flocks, its ubiquitous nature makes any footrot-free flock very vulnerable to re-infection. The risks of re-introduction should be considered before a farmer opts for eradication of footrot.

43. A flock must be closed and sheep kept on well-fenced land if footrot is to be eradicated. New sheep must be quarantined for several weeks before introduction to the flock.

44. Breeding sheep that are more resistant to footrot is desirable and possible²². This can be achieved through selectively breeding from families of animals with greater resistance to footrot. Identification of the cause of lameness is essential before embarking on genetic selection and selection is best undertaken collectively, e.g., via Sire Reference Schemes. Other management strategies and treatment of footrot will still be necessary in the short term. In the future, it might be possible to select sheep resistant to footrot using validated single nucleotide polymorphism (SNP) techniques.

45. Recently, whole group/flock injection with an unlicensed long-acting antibiotic preparation when a small percentage of sheep are lame (metaphylaxis), has been practised. However, flocks treated this way are likely to break down with footrot unless the flock is closed. There is no information on the long term impact of such an approach and one risk is that repeated usage creates antibiotic resistance to footrot that will reduce the ability to treat affected sheep in future.

Contagious ovine digital dermatitis (CODD)

46. Contagious ovine digital dermatitis is an infectious disease. Its prevention and treatment are less well understood than footrot. It is probably introduced through the purchase of sheep, sometimes with no clinical signs of disease. The disease affects ewes and lambs; typically the horn separates at the coronary band. The whole horn capsule can separate from the underlying tissue. Sheep are extremely lame and may have more than one foot affected. In the first year of the disease, up to 50% of the flock may be affected but the prevalence is usually lower in subsequent years.

47. CODD is probably caused by a bacterium, possibly a spirochaete. Although some treatment plans have been proposed, there is no single recognised management protocol for CODD. Antibiotic injections and footbaths containing antibiotics have been

²² Raadsma, H.W. and Conington, J. 2010. Genetic aspects of resistance to ovine footrot. In: Breeding for disease resistance in farm animals. 251-276, 3rd Edition, Eds Bishop, S.C., Axford, R.F.E., Nicholas, F.W. and Owen, J.B. ISBN 978-1-84593-555-9.

advocated, however, there is no licensed antibiotic footbath currently available for sheep and the farm's veterinarian should be consulted.

Non-infectious causes of foot lameness

48. Non-infectious causes of foot lameness do not spread between sheep or flocks. They include white line disease (shelly hoof), granulomas, foot abscesses, inter-digital fibromas, and foreign bodies such as thorns, wire or soil balls. If the cause of lameness cannot be found, then clearing the interdigital space and minimal paring may be required to identify the cause of lameness.

49. Sheep with a foot abscess require that the pus is drained from the foot and the sheep is treated with an antibiotic injection.

50. To treat white line disease, the hoof horn needs to be pared to remove the horn that has separated from the foot.

51. Interdigital fibromas and shelly hoof are heritable²³. Farmers should avoid selling or buying rams with these lesions.

52. Both interdigital granulomas and granulomas that form when hoof horn is damaged require surgical treatment and a veterinarian should be consulted.

Causes of limb lameness

53. Lameness originating from limb lesions can also be caused by infectious and non-infectious diseases.

54. There are no surveys of prevalence, but most sheep farmers will have some lambs with infectious polyarthritis (joint ill) each year. The incidence can be minimised by ensuring that ewes are lambed in a clean, dry environment and that lambs take in adequate amounts of protective colostrum within six hours of birth. Dipping navels and providing clean lambing pens or dry lambing fields also help to protect lambs.

55. Administering penicillin for at least five consecutive days in the early stages of lameness is a good cure for polyarthritis. The prognosis is very poor for lambs that remain lame after at least five consecutive days' therapy with penicillin. Further antibiotic therapy will not affect the joint pathology that is associated with such chronic infections and affected sheep should be euthanised promptly.

²³ Conington, J., Nicoll, L., Mitchell, S. and Buenger, L. 2010. Characterisation of white line degeneration in sheep and evidence for genetic influences on its occurrence.. *Veterinary Research Communications*, 34: 481-489.

56. Erysipelas is caused by a bacterium present in soil. It is an uncommon condition in sheep but can cause outbreaks of lameness in lambs; if left untreated, lambs become severely debilitated and should be euthanised promptly.

57. Non-infectious diseases in the upper part of the limb include trauma (e.g., fractures and ligament and tendon injuries) in young lambs and older sheep and mineral and vitamin deficiencies, although these are rare.

Foot trimming

58. The hoof horn protects the foot. The outer horn is not sensitive but it is attached to the sensitive corium. The wall horn is long when sheep are on wet pasture or bedding and is worn down and harder on dry pastures or hard floors.

59. Traditionally, sheep feet were trimmed routinely once or twice a year. Indeed, this practice was recommended in advisory literature. There is, however, no scientific evidence that routine foot trimming is beneficial to sheep and veterinary advice now is that the feet of all sheep should not be trimmed routinely.

60. Trimming horn should only be used to reshape the foot, e.g., reshaping excessively overgrown feet. Trimming that leads to the foot bleeding is painful and unacceptable; it increases the risk of footrot and foot granulomas.

Critical issues

61. Lameness in sheep is painful. If a sheep remains untreated then the pain or suffering endured is unnecessary, which is illegal in Great Britain.

62. Whilst some shepherds treat all lame sheep promptly, others do not treat lame individuals.

63. For most causes of foot lameness, there are effective treatments that, if applied promptly, can reduce the prevalence of lameness in a flock to less than 2%. The current prevalence of lameness in Britain suggests that much more should be done by shepherds to minimise this cause of poor welfare in sheep.

Ethical analysis

64. In considering what provisions should be made by sheep farmers to avoid unnecessary suffering and promote good welfare, FAWC is guided by the Five Freedoms and also asks the question, does a lame sheep that has not responded to treatment have a life worth living? Can a sheep that has recovered from lameness have the potential for a good life?

65. The public, and consumers, perceive sheep farming in general and extensive sheep rearing in particular as 'welfare-friendly'. This is because most sheep are given

more freedom throughout the year to roam extensively on pasture, express many normal behaviours, and the rearing system appears more 'natural'. However, the provision of this Freedom should not excuse the stock keeper from both legal and moral responsibilities to ensure the animals under his care are provided with the other four Freedoms, including Freedom from pain, injury and disease. This means that lameness control programmes within extensive systems are particularly important, and should provide suitable facilities, sufficient labour, and veterinary/technical advice to maintain low levels of flock lameness with the minimum of interventions, whilst being able to target even mildly lame individuals in order to minimise individual pain and suffering.

66. Farmers have a duty of care for their sheep to prevent as well as to treat disease. This means that they must ensure that they are able to recognise the various causes of lameness and to effect the correct treatment in a timely manner. If they do not have these skills, then they should seek advice from those that do, e.g., their veterinarian and other sources such as the levy bodies (EBLEX, Meat Promotion Wales and Quality Meat Scotland).

67. Treating lameness can cause distress in the short term because affected animals have to be caught and restrained for diagnosis and treatment.

Conclusions

68. Sheep that remain lame despite treatment and a period for recovery do not have a life worth living.

69. Sheep that are lame for one week or longer lose body condition and, as a result of lameness, they are debilitated and less productive. Lame lambs do not thrive and can lose body condition.

70. It is a legal requirement that all lame sheep must be treated appropriately as soon as possible. Therefore, sheep that are found lame must be treated promptly and appropriately.

71. There is good evidence for effective treatment of the most common causes of foot lameness, the exception being contagious ovine digital dermatitis. However, there is limited evidence for the effective prevention of foot lameness.

72. Pain relief (in the form of non-steroidal anti-inflammatory drugs, NSAIDs) should also be administered in all cases where the condition is considered painful. It is recognised that, with no species-specific approved pain-relieving medicine for sheep, the use of a product off-licence affects meat withdrawal time for those animals going for slaughter; however, the welfare of the individual animal should be the critical concern in such cases. FAWC acknowledges that practical methods of administering pain relief on-farm have yet to be developed.

73. Sheep that fail to respond rapidly to treatment ought to be euthanized promptly on-farm for welfare reasons.

74. If only 20% of farms are culling lame sheep promptly, there is unacceptable delay in the management of chronic lameness on many farms.

75. Farmers can estimate lameness in their flock but might not identify the causes nor use the correct terminology. Farmers and veterinarians should work together to be sure that the correct diagnosis is made on the causes of lameness in order to ensure appropriate treatment.

76. Regular and accurate maintenance of records on the prevalence of lameness, the causes identified or suspected, together with evidence of treatments, can be used to help the farmer and veterinarian understand the severity and extent of lameness in the flock. This should ensure appropriate courses of preventive action or treatment where appropriate.

77. There is an increased awareness of lameness in sheep but the level of farmers' awareness of current evidence and recommended lameness management strategies is patchy.

Recommendations

77. Farmers should aspire to keep sheep that are free of lameness. This is currently possible and achievable through a thorough understanding of the various causes of lameness within a flock and maintaining an effective control plan, which includes prompt treatment when lameness does occur.

78. Shepherds should use a veterinary-approved health plan for minimising lameness in their flock to ensure the responsible use of antibiotics (and other pharmaceutical compounds) and effective treatment of lame sheep.

79. Lame sheep that are unresponsive to treatment ought to be euthanised rapidly and humanely.

80. The Code of Recommendations and other publications on lameness in sheep should be updated to take account of current knowledge about the causes, prevention, control and treatment of lameness.

81. Government should enforce the law relating to the welfare of farmed sheep using various penalties, e.g., withholding payments under the Single Farm Payment scheme.

82. Government should work with industry to develop a national strategy to reduce lameness in sheep.

83. Surveillance of lameness in sheep should be undertaken by Government, in conjunction with farm assurance schemes, to determine trends in lameness over time.

84. The prevalence of lameness in flocks farmed in Great Britain should be reduced to 5% or less within five years of the publication of this Opinion as an interim target and to 2% or less (which is already possible with best practice) within ten years.

85. Further research into lameness in sheep is required. It should be paid for by public funds and the sheep industry, according to its immediacy and relevance. Priorities include: the causes and management of CODD, prevention of footrot including genetic selection for resistance, the development of a vaccine, pain-free footbath formulations for the prevention and treatment of interdigital dermatitis, risks of antimicrobial resistance in *D. nodosus* and Streptococcal polyarthritis in lambs.

APPENDIX

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