



**FAWC Report on the Implications of
Castration and Tail Docking for the
Welfare of Lambs**

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CHAIRMAN'S FOREWORD

This Report considers the implications of castration and tail docking for the welfare of lambs. Both practices have been used for many years by shepherds in Great Britain and elsewhere. Their scale is substantial with considerable potential for suffering; several millions of lambs are castrated and many more are tail-docked each year in Britain. This concern was raised in our 1994 Report on the Welfare of Sheep, but there was insufficient scientific evidence available at the time to resolve the matter.

Over the last decade, the Government, with the support of the sheep industry, has funded research on the behavioural and physiological responses of lambs to castration and tail docking. This work – and similar studies in New Zealand – has provided evidence that lambs experience pain and distress during both procedures. FAWC believes that scientifically-based advice can now be given that will minimise the suffering arising from castration and tail docking.

Lambs are castrated mainly for management purposes. A considerable reduction in the number of lambs that are castrated routinely could be achieved by improvements in husbandry. Where castration is warranted, some methods cause more suffering than others and pain relief should be given once practical methods of delivering local anaesthetics and analgesics have been developed.

The justification for tail docking is to help minimise the risk of flystrike, a most debilitating condition that can be fatal. The pain and distress caused by tail docking is less severe than that following castration and the argument for routine pain management is not as clear. Nevertheless, it is a painful mutilation and farmers must justify the continued use of tail docking following an appraisal of the disease risks in consultation with their veterinary surgeon, and as part of the farm's health and welfare plan.



Professor C. M. Wathes
June 2008

PART I: INTRODUCTION

1. The Farm Animal Welfare Council (FAWC) was established in 1979. Its terms of reference are to keep under review the welfare of farm animals on agricultural land, at market, in transit and at the place of slaughter; and to advise Great Britain's Rural Affairs Ministers of any legislative or other changes that may be necessary. The Council has the freedom to consider any topic falling within this remit.

2. The aim of this Report is to provide practical advice to the Government on the implications of castration and tail docking for the welfare of lambs.

FAWC's philosophy of approach

3. Animals are kept for various purposes and in return their needs should be provided for. Farm animals are recognised as sentient beings in the Treaty of Amsterdam. We have a moral obligation to each individual animal that we use. This obligation includes never causing certain serious harms to animals and, when deciding on our actions, endeavouring to balance any other harms against benefits to humans and/or other animals.

4. The achievement of high standards of animal welfare requires awareness of animal needs and both caring and careful efforts on the part of all that are involved in the supervision of farmed animals. General guidelines as to what those who use animals should provide in order to avoid suffering and other harms and to promote good welfare are contained in the Five Freedoms:

Freedom from hunger and thirst, by ready access to fresh water and a diet to maintain full health and vigour;

Freedom from discomfort, by providing an appropriate environment including shelter and a comfortable resting area;

Freedom from pain, injury and disease, by prevention or rapid diagnosis and treatment;

Freedom to express normal behaviour, by providing sufficient space, proper facilities and company of the animal's own kind; and

Freedom from fear and distress, by ensuring conditions and treatment which avoid mental suffering.

5. When assessing any welfare problem, it is necessary to consider both the extent of poor welfare and its duration. Welfare assessment concerns individual animals. However, where there are indications of poor welfare, we consider that the more animals which are affected, the more serious is the problem.

6. In order to offer useful advice about the welfare of farm animals, FAWC takes account of scientific knowledge and the practical experience of those involved in the agricultural industry. A broad-ranging approach, taking into account all relevant views and attempting to balance human benefit with a concern to ensure that the animal's interest remains to the fore, is used in the formulation of FAWC recommendations.

7. Knowledge based on scientific studies of the welfare of animals is increasing rapidly. The term 'animal welfare' is employed frequently in scientific and legal documents and in public statements. In our view, welfare encompasses the animal's health and general physical condition, its psychological state, its biological fitness and its ability to cope with any adverse effects of the environment in which it is kept.

Remit and method

8. In 2004 FAWC established a Working Group to investigate castration and tail docking in lambs. The group carried out a public consultation in July 2004 and written evidence was received from a range of organisations. In addition, oral evidence was taken from invited experts from the livestock industry, academic and research institutions and animal protection organisations. We are grateful to all who participated in the study and gave their time and expertise.

PART II: BACKGROUND

9. In 1994, FAWC published a Report on the Welfare of Sheep in which we considered that tail docking and castration without anaesthesia or analgesia inflicted pain on the lamb. We stated that, *“it is difficult to give general approval to any system of husbandry that relies on painful mutilations to sustain the system but we see no alternative until the results of research provide further guidance”*.

10. In the years since the publication of this Report, much research has been conducted on the pain, stress and physical trauma associated with different methods of castration and tail docking. It is on the basis of the findings of this work that FAWC now feels able to revise, and in some cases restate, our previous recommendations.

11. Before considering the welfare implications of the various methods used to castrate and tail dock lambs, we should like to reiterate our previous comment that, *“...at the outset, we wish to state that all farmers should consider carefully the necessity for performing any mutilation on sheep and we hope that as many as possible will choose to avoid tail docking and castration”*. This comment is as valid today as it was in 1994.

12. This message is reflected in the Code of Recommendations for the Welfare of Livestock: Sheep. *“Farmers and shepherds should consider carefully whether castration is necessary within any particular flock. Castration is unlikely to be necessary where lambs will be finished and sent to slaughter before reaching sexual maturity. The procedure should only be carried out when lambs are likely to be retained after puberty and where it is necessary to avoid welfare problems associated with the management of entire males. Account should be taken not only of the pain and distress caused by castration but also the stress imposed by gathering and handling, and the potential risk of infection. For very young lambs gathered in large groups, there is a real risk of mis-mothering, which may lead ultimately to starvation and death.”*

13. On the subject of tail docking, the Welfare Code is equally clear. *“Farmers and shepherds should consider carefully whether tail docking within a particular flock is necessary. Tail docking may be carried out only if failure to do so would lead to subsequent welfare problems because of dirty tails and potential flystrike. If it is considered that both tail docking and castration are necessary, thought should be given to performing both operations at one time of handling, so as to minimise disruption and the potential for mis-mothering and distress.”*

14. Despite such clear recommendations within the Welfare Code to avoid both castration and tail docking where possible, it is apparent that these aspects of the Code are not having the desired impact in reducing the number of castrated or tail-docked lambs. Farm assurance schemes could be a very powerful mechanism to implement these parts of the Welfare Code but we found little evidence to indicate that they were effective in actively discouraging the practices. In particular, careful consideration of the need to castrate or tail dock should be an essential element of farm health and welfare planning.

15. We should like to emphasise the urgency of making progress in this important area of animal welfare. FAWC's philosophy of approach states that, "*where there are indications of poor welfare, we consider that the more animals which are affected, the more serious is the problem*". In the case of the UK sheep industry several millions of animals are castrated annually with many more tail docked. In the absence of any form of pain relief, there is evidence that these animals can experience pain.

16. In our 1994 Report, we stated that, "*there is no doubt that lambs feel pain and distress as a result of castration and tail docking but the type of distress and duration vary according to the method used*". We also stated that, "*the current legislation which limits the use of the rubber ring to the first week of life appears to be based on the erroneous impression that lambs of this age feel less pain than older lambs*".

17. We considered the available evidence for pain and distress associated with the different methods of castration (rubber ring, bloodless and surgical) and also for tail docking (rubber ring, bloodless, surgical removal and hot iron). On the assessment of pain associated with castration and tail docking, we commented:

"Available evidence suggests that all methods of castration and tailing cause pain and distress which may be detected by alterations in behaviour such as posture and activity, and by alterations in cortisol concentrations in the blood. However, lambs may show evidence of differing intensity and duration of pain even when the same technique is adopted. Particularly striking is the difference in behaviour of lambs castrated with a rubber ring or surgically, since those castrated with the ring exhibit abnormal postures or even rolling motions whilst those castrated with the knife appear to adopt a policy of sparing pain by a minimum of movement. It is not safe to assume that these behavioural differences indicate that the distress felt with one method relative to the other is any the less."

18. We also made the point that if effective pain relief could be provided, a major objection to these mutilations would be removed. We considered the available methods for pain relief and concluded that the use of local anaesthetic was the only viable option.

19. We made it clear that, as a matter of urgency, further scientific evidence was required on the assessment of pain associated with both castration and tail docking.

20. FAWC welcomes the fact that the Government acted promptly on our recommendations for further research and supported programmes at two UK veterinary departments. We have met both research groups and in developing the conclusions and recommendations for this report, have discussed the practical implications of the results of their work. We have also considered the results of a similar research programme in New Zealand, recent research findings from Switzerland, and held meetings with a wide range of interest groups. Research conducted since our 1994 Report reinforces the conclusions we made at the time, that current methods of both castration and tail docking cause pain and distress, though their severity is greater for castration than tail docking.

PART III: THE NEED FOR CASTRATION AND TAIL DOCKING

21. It has been suggested that a similar approach should be applied to these mutilations as that used for the control of scientific experiments on animals. ‘The Three Rs’ (reduction, refinement and replacement) are used as a framework for alleviating suffering in laboratory animals. In the case of castration and tail docking, a similar approach might be applied by reducing the number of lambs treated, replacement with alternative strategies, and refining the methods currently used to reduce pain, distress and other forms of suffering.

Castration

22. The reasons given for castration are associated with management and meat quality, namely prevention of indiscriminate breeding; avoidance of price reductions for undesirable characteristics; and avoidance of an increased risk of injury through fighting as dominance is established and maintained.

23. We have considered the evidence for the effects of castration on carcase characteristics, meat quality and lamb growth, and we have discussed these issues with producers, representatives of the meat industry and retailers. The meat industry’s view is influenced by the various changes in appearance of ram lambs that can start to develop after the age of 5-6 months. We have been told that these changes may include: heavier forequarters; thicker necks; looser muscle on the loin; darker flesh; coarser meat; and carcasses that are described as ‘wet’. This has, historically, resulted in some meat processors rejecting entire ram lambs sent for slaughter after sexual maturity. This was confirmed by some producers.

24. On the other hand, we were encouraged to find producers who had made a decision not to castrate and had found commercial benefits as a result. For example, one producer in the North of Scotland who bred and finished lambs of various breeds had experienced no difficulty in selling lambs for slaughter when between 6 and 12 months of age. The carcasses of the entire male lambs were up to 1kg heavier than those of the castrates of the same age and also had a lower fat content. However, not all husbandry systems lend themselves to management of entire male lambs since the lambs need better quality forage or other feed over winter in order to be finished, and a high level of management is essential, e.g. separation from the females after puberty and sound fences.

25. We discussed the problem of marketing entire male lambs with an agent who was procuring lambs from many parts of the North and West of Scotland to provide a regular supply for a processor. We were told that historically, there had been a price reduction for lambs with male characteristics, and that this had been partly the result of previous payment schemes. However, it was no longer seen as an issue of particular concern. But it was emphasised to us that if producers chose not to castrate, the lambs must be finished for sale as there was little interest in entire male lambs at store markets. It was also noted that there was an export market for ‘light lambs’ and that the carcasses of entire lambs were acceptable for this trade.

26. Other processors have told us that, particularly since the introduction of the 12 month slaughter rule associated with current regulations on Transmissible Spongiform Encephalopathies, the issues of declining eating quality and conformation are now of marginal significance to the industry and that carcasses from well managed entire males up to 12 months of age are fully acceptable. However, it is clear that some processors still regard ram characteristics as factors which must be considered when male lambs are marketed between 9 and 12 months of age. We were told that, in the past, some customer specifications required lambs with 'ram characteristics' to be excluded, but with the current 12 month age limit, lambs old enough to display such characteristics were rarely seen.

27. We have therefore found it difficult to quantify the extent of the problems associated with the sale of entire male lambs to processors, particularly for lambs between 6 and 12 months of age. There may also be regional differences in the attitude of processors to such lambs, since changes in carcass conformation may vary with breed and management system. An additional problem may arise where it is uncertain if lambs are to be sold live or dead weight, since discarded horn and testicle count against the animal's dead weight. There also remains the possibility that it may be financially convenient for some processors to downgrade entire males, irrespective of the absence of any detrimental effects on the value of the carcass. The fact remains therefore, that unless producers are finishing lambs and have an established relationship with a particular processor, there is considerable pressure on farmers to castrate those male lambs which are not finished until after 6 months of age.

28. Despite the possible small changes in appearance of the carcass, there is limited scientific evidence to indicate that meat quality is affected by castration. A number of studies have looked at the effects of castration and sex on meat quality and although some results have been conflicting, overall differences between ram lambs, ewe lambs and wethers up to 12 months of age are small though they may be commercially significant. There is some evidence for a marginally higher incidence of objectionable flavours developing in older male lambs.

29. Those major supermarkets that responded to our request for information on this matter confirmed that there were no significant adverse issues of meat quality associated with entire male lambs up to 12 months of age. The importance of post slaughter treatment was emphasised in ensuring meat of a consistently high quality. Two retailers did include castration as part of their lamb specification: one for lambs of 6 months of age or greater and the other for all lambs. However, they did not provide any objective information which supported their decisions.

30. Since 27% of sheep meat consumed in the UK is produced in New Zealand, it is interesting to note the situation there regarding lamb castration. About 40% of male lambs are not castrated, and a similar percentage are castrated by the 'short scrotum' technique, in which a rubber ring is placed on the scrotum distal to the testes that become retained within the abdominal cavity so that body heat inhibits the production of viable sperm without preventing the production of testosterone. We believe these practices are sustained because, in general, lambs are slaughtered at an earlier age, i.e. before maturity when the effects of testosterone on meat quality may become apparent.

31. Because of some uncertainties associated with the effect of genotype and management system on the carcass and meat quality of entire male lambs of 6 to 12 months of age relative to castrates, it might be considered desirable that relevant research is conducted. The outcome might be helpful in influencing producers to adapt to systems that reduce the need for castration and also by informing meat processors and some retailers about carcass and meat quality issues. It seems clear, however, that since some major supermarkets do not experience adverse effects on meat quality with entire male lambs up to 12 months of age, then the influence of castration on meat quality must be of marginal significance.

32. We therefore urge those retailers that include castration of lambs as part of their product specification to examine their reasons for such a requirement and where appropriate to change it. It is our view that such decisions, which may have important welfare consequences for lambs, should only be made on the basis of sound science and practical experience.

33. Two main management factors influence the decision to castrate: the need to segregate male and female animals after sexual maturity; and the complexity, and associated lack of predictability, of the UK sheep market. From our discussions with the sheep industry, segregation was thought to be a significant problem but less so than that of marketing entire male lambs. Because the UK sheep market is so complex regarding lambing time, breed and location, it was suggested to us that in many cases castration was performed either out of habit or as an insurance policy because it was difficult to predict the adequacy of grazing conditions in the summer and autumn for finishing lambs and because it was unclear what the destination of lambs might be. If it were known in advance which lambs would be sold as stores and which were destined to be slaughtered before sexual maturity, it would be very much easier for farmers to decide not to castrate.

34. In the hill farming areas of Wales, Scotland and Northern England, labour availability and cost, and the problems of gathering young lambs for castration and tail docking in time to comply with the present law appear to reduce the number of lambs castrated. As previously mentioned, early slaughter of light lambs for the export market, when available, as an alternative to the store market is an additional reason not to castrate. Although such lambs can be finished on the hill before the end of the summer grazing period, the market is relatively small and varies from year to year. The demand for such carcasses is mainly from Spain, Portugal, Italy and Greece.

35. Segregation of male and female lambs is possible for many producers although if castration is avoided, three segregated areas are required for ewes, ewe lambs and entire ram lambs, which requires greater management and sound fences. Aggressive interactions between males could become a problem as lambs matured, although some producers, who did not castrate their lambs, had not experienced particular problems in this regard when managing 6 to 12 month old entire male lambs. Under penned conditions of close confinement, the situation might be different. However, the adverse welfare consequences caused by any fighting must always be weighed against the suffering associated with castration, particularly when it is being routinely done to every male lamb in a flock.

36. We were told of concern within the abattoir industry about the slaughter of ewe lambs with previously unknown pregnancies, which arise when management of lambs fails to avoid contact between sexually active males and females. Although we were unable to find any national data to indicate the numbers of such lambs arriving at abattoirs, we are aware that there are some isolated incidents. Good management could prevent this problem in most situations.

37. There are also many hill farms where boundaries between farms are unfenced, and in the absence of close cooperation and trust between neighbouring farmers, leaving male lambs entire may not be an option because of unplanned breeding and subsequent early, calamitous lambing in winter conditions.

38. In conclusion, we understand the various pressures on producers that encourage castration but are of the view that castration is often used as the easy option, rather than considering if it really is necessary. We fully support the guidance given in the Welfare Code that stresses the importance of considering carefully if castration is necessary. Where producers have total control of the flock and the ability to finish their lambs, castration may be avoided if management standards are sufficiently high. Many producers have already taken this step and a significant proportion of male lambs slaughtered in the UK are entire. We also conclude that there are many situations where castration could be avoided without adverse effects on lamb growth, carcass and eating quality and in some situations there can be commercial benefits. Finally, we believe that decisions to castrate should be made in the context of the farm's health and welfare plan and according to the advice of the farm's veterinary surgeon.

Tail docking

39. Tail docking of lambs is a traditional and routine procedure on many British farms. It is widely considered to help reduce the level of faecal soiling and flystrike. Some breeds are also docked traditionally for appearance.

40. Flystrike remains a serious disease and welfare problem. It is sometimes difficult to detect the first signs of the disease and as a consequence some animals may become seriously affected, requiring radical treatment to effect a cure, with considerable pain and distress already likely to have been experienced by the animal. The risk of flystrike to individuals within any flock will depend on factors such as season, climate and location, and various studies in the UK and Australia have demonstrated that tail docking does appear to reduce the number of sheep affected.

41. Current legislation permits docking only if a sufficient length of tail is retained to cover the vulva of female sheep and the anus of males, but there are geographical differences in tail docking practices. Under lowland conditions, the greater part of the tail is removed but in hill areas it is often only the terminal third of the tail that is docked. A recent review of the effectiveness of different docking strategies in combating flystrike concluded that docking the tail to medium length was most effective.

42. One survey of flocks in England and Wales reported that 80% had at least one annual case of flystrike and 1.6% of sheep in flocks were reported to be affected. Another study reported that 71% of cases occurred on the breech or tail. Unfortunately, there have been relatively few controlled studies of flystrike in UK flocks and the reason why tail docking appears to help reduce flystrike remains uncertain. A recent detailed study of flystrike on 7 farms in S.W. England found a prevalence of 1.4% in docked and 6.9% in undocked lambs, almost a 5 fold difference. Lambs having high levels of faecal soiling were at considerably greater risk of flystrike compared with clean lambs. However, faecal soiling was only slightly higher in the undocked lambs, so the effect of soiling on flystrike was concluded to be an independent risk factor. It is interesting to note that around 35% of lambs were recorded as 'daggy', i.e. having moderate or high levels of faecal soiling around the breech and hind legs during the summer months, which may have been related to parasitic gastroenteritis. This implies that more effective methods of reducing faecal soiling including genetic selection could be particularly important in the prevention of flystrike. One such method is to shear the tail and area around the anus, a procedure sometimes referred to as crutching.

43. The researchers responsible for this work also raised the possibility that although lambs with undocked tails appeared to be at greater risk of strike, it is possible that the overall flock prevalence may be unaffected; female blowflies may select the best hosts within a flock on which to lay their eggs.

44. Since only a small proportion of lambs within a flock are likely to be struck, this raises the question of balancing the welfare costs of tail docking all animals in a flock, against the benefits to those individuals which gain additional protection from flystrike. It could be suggested that tail docking to prevent flystrike is only necessary because of the inadequate control of diarrhoea and/or the inadequate use of reliable alternative methods of blowfly strike control.

45. We believe that greater research effort should be directed towards the development of alternatives to tail docking for the prevention of flystrike. The following are all worthy areas for future research: methods of reducing scouring and faecal contamination; greater understanding of fly control strategies within an area; the genetics of susceptibility to flystrike; an understanding of why only certain animals seem to be targeted; and the precise sequence of events during a case.

46. An understanding of host selection seems to be particularly important and may be influenced by a variety of factors such as damp wool and urine or faecal contamination. Such factors may attract flies to individual sheep but further factors appear to stimulate the fly to lay eggs. It was suggested to us that a genetic component seems highly likely and may help explain why only certain individuals within a flock appear to be struck, sometimes more than once in a season. Anecdotal evidence suggests that certain breeds are more resistant to flystrike than others but this may be associated more with the environment in which they are kept. British breed societies may have valuable information on the relative susceptibility to flystrike of different breeds under various farming systems, and research comparing susceptibility would be valuable. There may also be the potential to improve welfare by breeding for resistance to ectoparasites.

47. There has also been little research on the sequence of events during a case of flystrike and there is some evidence that eggs are laid at the tail head, rather than around the breech, with the larvae migrating to the breech at a later stage of development. This may have implications for the effective prevention of flystrike, with treatment of the tail head with appropriate products being of critical importance.

48. Some producers who have avoided tail docking mentioned the problems of managing sheep with heavy dag formation. This, rather than problems of flystrike, seemed to be of greater concern. Effective control of scouring could help overcome such management difficulties as well as reducing the risk of flystrike.

49. Control of fly populations is another neglected area of research. Clearly, the presence of carcasses in fields will increase fly populations, but a deeper understanding of other factors influencing fly population dynamics is required for effective control. Blowfly pheromone traps have been developed, and although not 100% effective, they provide a valuable tool for the farmer on low ground farms by indicating the presence of flies and when sheep should be treated.

50. Reports from the UK and other sheep producing countries note that instructions for the correct application of chemical repellents are sometimes poorly adhered to with the result that they are sometimes far less effective than they should be. On-farm management and health planning should ensure that such methods of flystrike control are used to greatest effect by paying close attention to method and timing of application.

51. In conclusion, it is our view that tail docking is often performed out of tradition rather than necessity and, at best, may only be partially effective in reducing flystrike. Furthermore, it is a difficult ethical judgement as to whether to perform a painful procedure on large numbers of animals for the potential benefit of a small minority. Greater effort should be directed towards prevention of flystrike by methods other than tail docking. It is important to recognise that docking only reduces the incidence of tail and breech strike, so preventative measures such as chemical repellents, persistent insecticides and chemical dips remain important control measures. Additional measures to control fly populations may also have an important role in some locations.

PART IV: WELFARE IMPLICATIONS OF CURRENT METHODS OF CASTRATION AND TAIL DOCKING

52. Over the last 20 years many studies have attempted to quantify the pain and stress associated with different methods of castration and tail docking. Pain and stress have been assessed by observations of specific behavioural changes (e.g. foot stamping, kicking, and abnormal lying postures) and measurements of the concentration of plasma cortisol. One series of UK experiments concluded that behavioural measures provided the most sensitive indicator of the discomfort and pain associated with castration and used behaviour to rank different castration methods in terms of severity. Other smaller scale studies have explored the use of pain sensitivity measurement, subjective rating of behavioural responses, changes in blood pressure, and heart rate. Electroencephalograms (EEG) following castration have also been used on the basis that changes in human EEG spectra are strongly correlated with patients' reports of pain.

53. The main body of research has been directed towards the pain level and duration associated with different methods; and the effects of the lamb's age on pain responses. One weakness of most studies is that they have concentrated on pain and distress in the hours immediately following the procedure with relatively little studies of longer term effects. The very few published studies of chronic pain indicate that it may be present for several days and possibly weeks after the procedure.

54. There have been considerable advances in scientific understanding of pain mechanisms since the present legislation covering castration and tail docking was formulated. For example, the current legal age limit of one week for rubber ring castration appears to be based on research carried out in the 1950s and was probably influenced by the widely held belief at that time that neonates (including human infants) were less susceptible to pain.

55. There is now solid evidence, which demonstrates that newborn lambs, and even those born prematurely, have the basic neuronal circuitry needed for processing nociceptive information and are capable of showing behavioural and physiological responses to noxious stimulation. Although it is a moot question what this evidence tells us about the experience of pain in young animals, it is now generally accepted that newborn of all vertebrate species are capable of experiencing pain and that its prevention and management are important.

56. It has also been shown that unrelieved pain in mammals leads to a decreased pain threshold at the site of injury, and that the affected field of sensitivity spreads to adjacent areas (hyperalgesia). Moreover, normally non-painful stimuli become painful (allodynia). This has been given the term 'wind-up' as nerve cells in the spinal cord sensitise neighbouring nerves. In addition, it seems that in humans the provision of local anaesthesia in addition to a general anaesthetic can help prevent 'phantom limb' pain, something that potentially could occur after tail docking and even castration.

57. New techniques that are being harnessed to look at some of these phenomena include quantitative sensory and noxious stimulation testing to assess hyperalgesia and allodynia. For example, amputation of the tail tip in mice causes chronic (up to 6 weeks) sensitisation in the stump as measured by responses to thermal and mechanical stimulation.

58. Cutting or compression of the neck of the scrotum (with a knife or rubber ring, or by clamping) will stimulate nociceptors causing pain. Pain relief can be provided by either a general or local anaesthetic to prevent the central nervous system receiving this nociceptive stimulation. The same principles apply to tail docking.

59. In conclusion, the assessment of pain, in animal as well as human studies, is difficult and there will always be an argument for further research. Nevertheless, there is widespread acceptance that, without effective analgesia, all methods commonly used for both castration and tail docking of lambs cause pain and distress.

Castration by elastration (the rubber ring method)

60. Elastration is probably the most widely used method of lamb castration and has been used by shepherds in the UK for more than 40 years. One, or occasionally two, thick rubber rings, approximately 15 mm external diameter and 5 mm internal diameter are placed around the neck of the scrotum using an instrument called an elastrator. The ring obstructs blood supply, causing atrophy of the scrotum, normally within 4 to 6 weeks, although this can take longer in lambs with a large scrotum. The process of atrophy is accompanied by the development of a lesion on the proximal side of the ring which may also be a source of long-term discomfort or pain. Current legislation restricts the use of the rubber ring method to the first week of life.

61. This age limit presents a particular problem for hill flocks lambing outdoors, because the normal practice is to handle the lambs as little as possible during the first weeks of life to avoid mis-mothering, mis-adventure and injury. Lambs are normally gathered, castrated and tail docked at an average of six weeks of age when lambs may vary in age between 3 and 10 weeks, giving a spread of some 7 weeks between the first and last born lambs. Because of its ease of application and effectiveness, many hill farmers prefer to castrate using rubber rings but are currently unable to use them legally because of the age limit. FAWC is aware that the age limit may frequently be ignored.

62. Rubber rings have some advantages over other methods, particularly for small lambs, which are important considerations for use under field conditions. They are relatively quick and easy to apply; can be used by a single operator for both tail docking and castration; are a highly effective method of achieving the desired outcome; and are cheap and robust. These potential advantages may not apply to older, heavier lambs.

63. Rings can occasionally be applied incorrectly, trapping the rudimentary teats, and there are also reports of incorrectly applied rings, which have trapped the urethra causing retention of urine and renal failure. However, the major disadvantage is that, in the absence of effective pain relief, lambs experience considerable pain in the period following application of the ring.

64. Research on lambs of various breeds and up to 8 weeks of age, using both behavioural and physiological (e.g. plasma cortisol) indicators, confirms that application of the ring leads to considerable pain and distress, certainly for 1.5 to 2 hours following application. It is also reported that, particularly in lambs less than 24 hours old, acute pain may so preoccupy and

debilitate, that the lambs fail to ingest protective amounts of colostrum and therefore become predisposed to a variety of diseases.

65. Fewer studies have looked at the chronic effects of ring castration but the available evidence indicates that pain and stress persist considerably longer than the immediate post application period. One study concluded that lambs of both 1 week and 4 to 6 weeks of age show behavioural signs of prolonged pain during the three days following ring castration. Another study of ring-castrated 6 week-old lambs found that the peak incidence of painful behaviour coincided with the end-phase of the atrophy process and the point of maximum lesion size and severity, which was between 14 and 28 days following castration. There is currently much research interest in the wider effects of early noxious experiences and research is underway to examine whether castration in lambs is associated with both heightened pain and stress responses in later life.

66. A major problem with using rings on older lambs is the increasing size of the scrotum and associated structures which, when constricted by the ring, can give rise to chronic inflammation, sepsis and pain until the scrotum falls off and healing occurs. For this reason, lambs should ideally be castrated as soon as possible after they have formed a secure maternal bond but not before they are 24 hours old. Chronic inflammatory lesions with associated pain have been seen in 6-week old lambs castrated with rubber rings. Although the relationship between intensity or duration of pain and pathology and the appearance of wounds and other lesions may not be straightforward, animals with chronic inflammatory lesions must be given the benefit of any doubt and assumed to be experiencing pain. Consideration of the severity of lesions produced by ring castration and other effects must therefore limit the upper age or size of lambs on which rubber rings should be placed.

67. The severity and duration of the lesions following ring castration depends upon a number of factors including: the quality of the seal produced by the ring, i.e. the extent of any gap within the inner ring diameter that would allow pathogens access to unhealed tissue on the proximal side of the ring; the pathogenicity of micro-organisms that gain access to living tissue through damaged skin and the ability of the lamb to mount a defence against them; and the lamb's ability to repair the damaged tissue. The design of the ring is therefore of critical importance in producing an effective seal between the dying scrotum and the intact proximal tissues of the lamb.

68. Greater attention to design specifications of rubber rings, to achieve a better seal against infection, should be made, with a system of approval introduced. In particular we should like to see standardised rings designed to produce an optimal seal when used for castration and designed to break if stretched above a certain diameter. Other ways of using and applying rings to achieve the aims of castration and to reduce any ill-effects and mis-use should be researched.

69. Nearly all relevant studies have used age, rather than weight, as a variable when comparing pain responses to rubber ring castration. The exception is work done on lesions after rubber ring castration. But because of the considerable variation in size between lambs of different breeds and in different environments, it might be more appropriate to implement

an upper weight limit, rather than an upper age limit on the use of the ring. This approach would also have practical relevance for hill farmers since it might allow a greater degree of flexibility as to the upper age at which the smaller hill lambs could legally be castrated. Use of an upper weight limit rather than age limit is not justifiable at present but warrants further research.

70. There is a substantial body of scientific evidence, using a range of pain indicators, on which FAWC can now base its recommendations. We have therefore reached the following conclusions on castration of lambs using elastration:

- i. Castration using a rubber ring is painful at all ages that have been studied.
- ii. Castration using a rubber ring should be carried out as early as possible after a secure maternal bond has been established, but not before lambs are 24 hours old in order to reduce the development of painful lesions in older lambs and to ensure a strong bond between the ewe and her lamb.
- iii. Lambs up to 8 weeks of age can be castrated by the application of a tight rubber ring by a suitably trained person, **provided it is accompanied by the induction of effective pain relief.**

Short scrotum castration

71. In this method, the testes are pushed into the abdominal cavity using an elastrator band around the scrotum. The testes are subject to a higher temperature than in the scrotum and male lambs should be rendered infertile as a result. There are few studies of the short scrotum method; it is legal in the UK but is little used. We have applied the precautionary principle to this method by recommending effective pain relief since a rubber ring is used. Pain relief with this method is as important as with other techniques.

Immunocastration

72. Immunocastration involves the administration of a vaccine that produces antibodies preventing the release of gonadotrophin releasing hormone (GnRH), which is involved in sending signals from the brain to stimulate the growth and functions of the testicles. This leads to a depression of testicular activity with ensuing effects on behaviour and male physical characteristics. Its potential benefits include improvement in feed efficiency relative to animals surgically castrated at a young age, a reduction in male aggressive behaviour and avoidance of objectionable flavours.

73. Immunocastration has been in commercial use for pigs for some years in Australia. The vaccine is administered in two doses 4 weeks apart with the second dose about 4 weeks before slaughter. This results in suppression of testicular functions with consequent reduction in aggressive and sexual behaviour.

74. Studies in Switzerland have shown that the commercial vaccine for pigs appears to be effective in rams. After the second injection, testosterone levels remained at low levels for at least 12 weeks and then slowly started to rise after 3 to 7 months. No vaccine against GnRH is currently licensed for use for sheep in GB.

75. This method has the potential for achieving the effects of castration in ram lambs without the pain associated with other methods but has the significant disadvantage of an extra gathering of lambs and the need to apply two injections. Suitable protocols would need to be developed for its use in the field in a wide variety of husbandry systems, especially under extensive conditions. These may be straightforward for lambs which are home produced but may be more complex for store lambs moving through markets.

76. There also may be consumer concerns because the vaccine is a modified hormone. Effective communication with consumers to gain acceptability of the meat from vaccinated animals would therefore be needed. Vaccines are widely accepted by consumers when used for the benefit of preventing or treating disease in animals and humans. There is a potential ethical issue of the acceptability of using a vaccine to modify the normal functions of an animal for production rather than health reasons. Given that the approval process for veterinary medicines ensures adequate safeguards to protect human and animal health, FAWC does not see immunocastration using a licensed medicine as fundamentally different to traditional methods using a ring or surgical method. FAWC suggests that immunocastration has the potential to be a suitable alternative method of castration and warrants further research.

Surgical castration

77. Surgical castration was widely practiced before elastration became available and involves either a single incision across the bottom of the scrotum or separate incisions into each side of the scrotum to expose the testes. The testes are then removed by drawing them out without cutting the spermatic cords, or after scraping and cutting, clamping or cauterising the spermatic cords.

78. The disadvantages of this method are those associated with any surgical interference, i.e. pain, inflammation, infection, the risk of haemorrhage and also the time needed for healing. The pain produced is associated with both the incision and the pulling of the spermatic cord and this will be followed by the pain caused by inflammation from the trauma and any subsequent bacterial infection. The Welfare Code strongly discourages shepherds from carrying out surgical castration, stating, *“Shepherds should only carry out surgical castration after first having considered and ruled out alternative methods, in discussion with their veterinary surgeon”*.

79. In our 1994 Report, we concluded that surgical castration caused significantly more distress than other methods. Our position on this remains unchanged. In fact, the evidence against surgical castration has been reinforced by research published since 1994, including a detailed comparison of the cortisol responses to a wide range of different castration methods at various ages, carried out in New Zealand. This concluded that the greatest pain response of all methods occurred with surgical castration. The severe distress responses of lambs also lasted for considerably longer, around 8 hours, compared with 3.5 hours or less for other castration methods.

80. We conclude that because of the pain associated with surgical castration, and also the other serious complications which may follow any surgical procedure, surgical castration should be prohibited except on therapeutic grounds and then only when carried out by a veterinary surgeon using pain relief.

Clamp (bloodless) castration

81. Clamp castrators are surgical instruments comprising two blunt jaws which are applied across the neck of the scrotum so that the spermatic cords are crushed through the neck of the scrotum. There are several designs available, the most widely known being the Burdizzo, which is available in several sizes. Modified designs include models that are powered and sometimes incorporate timing devices to ensure the clamp is applied for the correct time. When properly applied, the blood supply to the testes should be occluded and innervation of tissues beyond the crush destroyed. The clamp may be applied either on its own or in conjunction with the rubber ring (known as the combined castration method – see below).

82. When used in isolation, the common method is to apply the device to each cord, once or twice, the second application distal to the first, while ensuring that the medial scrotal tissues are uncrushed. Swelling and inflammation of the testes normally disappears within 10 to 14 days and the restriction in blood supply to the testes causes them to atrophy often earlier than with elastration.

83. No specific mention of clamp castration is made in current legislation but since it is designed to crush the spermatic cords rather than simply to restrict the flow of blood to the scrotum, it may legally be applied up to three months of age.

84. Behavioural observations supported by cortisol responses suggest that when applied, clamp castrators produce a burst of intense pain from a barrage of nerve impulses in pain pathways as the injury is inflicted. However, the clamp also crushes nerves within the tissue to which it is applied. Therefore, once the impulse barrage accompanying each application has subsided, in principle, pain from the testes and parts of the scrotum may be prevented or reduced compared with that associated with rubber ring castration. Pain input via nerves in the uncrushed medial parts of the neck of the scrotum may continue.

85. The intention of the clamp is to block nerve conduction and reduce the pain of castration and reduce behavioural and cortisol responses. Clamp castrators also have the advantage over surgical methods that (except possibly in the case of very young lambs) the skin remains intact with less risk of infection. There are risks of rupture of crushed blood vessels leading to haematomas, and failure to apply the instrument correctly may not subject the spermatic cord to sufficient force to ensure atrophy of the testicular tissue. Additional problems of using the clamp alone are associated with the level of skill required to operate it effectively. Clamping each cord separately twice, proximal to the testes, can be difficult because of the small size of the cord and scrotum in relation to the clamp. In practice, the operator must locate the spermatic cord and hold it firmly against the skin while the other hand positions the jaws of the device across the cord and then holds them shut for 10 seconds. The second crush on each cord must be made a short distance distally from the first. The difficulty of adhering to operating instructions was demonstrated in one study which showed only 12% success although other field trials have found performance to be more consistent.

86. Another important factor to take into account is the operator's perception of the obvious pain response of the lamb as the clamp is applied. This response is far more pronounced than when a rubber ring is applied. However, this human perception should be set against research that indicates that despite the initial response, clamping can act to reduce overall the pain experienced as a result of castration.

87. In view of the practical and technical difficulties in using the clamp method successfully, we conclude that this method should only be used after training and a test of competence. FAWC also considers that the combined method may provide a more reliable method of pain relief than the clamp on its own.

Combined castration method, i.e. the rubber ring plus clamp

88. As the clamp crushes and destroys nerves within the tissue to which it is applied, there has been considerable interest in the possibility of using it as a pain reduction method in conjunction with the rubber ring. Trials have been conducted in which the clamp has been applied once to each spermatic cord, leaving some scrotal tissue intact. An alternative approach has been to apply the clamp across the entire neck of the scrotum, either immediately before or after application of the rubber ring. Experimental and field work suggests that this is a more straightforward method of applying the clamp and reduces the difficulties the operator experiences when using the clamp on its own.

89. Several studies have investigated behavioural and physiological responses following this combined method of castration in lambs ranging from 2 days of age up to 8 weeks, including comparisons with rubber ring castration, and the use of local anaesthetic. Variables investigated in these studies include: age; breed; site, duration and method of clamp application; timing of clamp application relative to application of ring; as well as various methods of administering local anaesthetic including the use of needleless injectors.

90. Because of the wide range of approaches taken by different researchers and the lack of consistency with regard to the application techniques, it is not always straightforward to make direct comparisons between various studies. On a practical level, there is experimental evidence that shepherds can use the combined method applying the clamp across the entire neck of the scrotum without the problems experienced when using the clamp alone as there is less need for anatomical accuracy. Therefore, the following discussion relates to the combined method in which the clamp is applied in this way following application of the rubber ring in the conventional way.

91. In general, studies in Great Britain have supported the use of the combined method as one means of reducing the pain resulting from castration. The strongest evidence in support of the combined method comes from a number of studies of lambs less than 7 days of age where the combination of the ring and clamp resulted in a significant reduction in behavioural and physiological indicators of pain.

92. There have been fewer studies on older lambs and the results are less clearly in favour of the combined method. A comparison of acute pain and stress responses of lambs of different ages to various castration techniques and pain reduction methods, based on cortisol responses, only supported the use of the combined method for lambs of less than 1 week of age. However, whilst plasma cortisol concentration can be useful for discrimination of differences in pain and distress of moderate severity, it is less reliable as an indicator of high severity pain and stress such as occurs in castration.

93. Using the clamp across the full width of the scrotum in combination with the ring does, therefore, have potential welfare benefits, certainly for young lambs and possibly also for older animals when used by very experienced operators not working under field conditions. In terms of chronic effects, an investigation of the lesions associated with both the ring and combined methods in 2-day old lambs found that the maximum severity of the scrotal lesion was similar for both groups. However, the time for the lesions to reach maximum severity was halved in those lambs castrated using the combined method.

94. As a result of the immediate destruction of the nerve supply to the testicles, the combined method has advantages over the use of the rubber ring alone in reducing the acute pain response in the 3 hours following castration in young lambs. It should be recognised that, in achieving these benefits in long term pain reduction, the combined method most probably gives rise to a brief intense burst of pain. There is some evidence that the combined method may increase the rate of healing, if not the maximum severity, of the lesions resulting from the application of the rubber ring. However, the practical and technical difficulties of using the combined method successfully are a disadvantage.

95. An additional concern with the application of the clamp across the full width of the scrotum is the potential risk associated with haematomas and sepsis and applying the clamp in such a way is contrary to established veterinary practice. As has been previously explained, the ring when applied in combination with the clamp should produce an effective seal between the dying scrotum and the living proximal tissues of the lamb, thus overcoming such concerns, and in field trials and research adverse effects have not been reported. However, it is important to recognise that if the combined ring plus clamp approach entered commercial farming practice, it might sometimes be performed with poorly designed or maintained clamps, with rings that might be of sub-optimum design and by shepherds working under difficult conditions. These risks might therefore be considerably greater than those found in carefully monitored field trials. We believe that because of these drawbacks the use of the combined method should be prohibited once effective pain relief from anaesthetics is widely available.

Conclusions about methods of castration

96. All methods of castration have advantages and disadvantages for animal welfare and issues of practicality including possible misuse under field conditions also have to be taken into account. Based on the discussion above and pending the development of practical means of effective pain relief (see later), FAWC concludes that the following methods should continue to be permitted.

- Elastration using a rubber ring
- Short scrotum castration using a rubber ring
- Clamp castration, e.g. Burdizzo
- Combined method of castration, i.e. a rubber ring and clamp

97. Surgical castration should be banned except when performed by a veterinary surgeon using effective pain relief.

98. Immunocastration has the potential to reduce welfare problems and its use should be investigated further.

Recommendations relating to castration

99. *All parties concerned should work towards the ideal situation where all male lambs are either not castrated or, when this is necessary, castrated using pain relief.*

100. *When lambs are to be castrated, this decision should be agreed with the farm's veterinary surgeon as part of the farm's health and welfare plan.*

101. *When castration is necessary, lambs should be castrated as early as practically possible after a secure maternal bond has been established, but not usually before they are 24 hours old.*

102. *Castration of lambs above the age of 3 months should only be undertaken by a veterinary surgeon using pain relief.*

103. *Surgical castration should be prohibited except when performed by a veterinary surgeon using pain relief.*

104. *Pain relief reduces the impact of castration on welfare and should be used when and wherever possible. Any decisions about pain management and its relief should be made in discussion with a veterinary surgeon.*

105. *When practical methods of administering pain relief have been devised and demonstrated under farm conditions, the law concerning castration should be changed to require the use of these. Until then, existing castration methods – with the exception of surgical castration – should continue to be permitted.*

106. *Research should be urgently directed towards the development of practical methods for delivering pain relief during castration under farming conditions and for different ages of lambs.*

107. *Methods of castration should be re-assessed once practical methods of delivering effective pain relief have been developed, and in any case within five years time.*

108. *Rubber rings for castration, and the equipment to apply them, should be designed and manufactured to specifications which result in an effective seal when fitted and prevent them from being applied to animals above defined age limits. Approved standards should be introduced for these specifications.*

109. *The potential of very tight rings or equivalent for pain relief through nerve destruction should be investigated.*

110. *There should be further studies of the practical application of immunocastration and of consumer concerns about this method.*

Tail docking

111. When tail docking is carried out, it is usually done at the same time as castration; in the first week of life for lowland or housed sheep, and at the first gathering for hill sheep. However, there are also geographical differences that influence the nature of the mutilation. In hill areas, it is often the case that only a few centimetres at the tip of the tail are removed, whereas under lowland conditions shepherds generally remove the greater part of the tail. It is a legal requirement that sufficient tail is retained to cover the vulva of female sheep and the anus of male sheep. Four main methods are currently used within the UK: elastration (rubber ring); surgical removal; hot docking iron; and surgical removal plus clamp, in which part of the tail is cut off after applying a clamp to the tail.

112. Although research on tail docking has attracted less attention compared with castration, studies have investigated the pain and stress associated with tail docking and some have also looked at the influence of local anaesthesia on pain responses. Pain and stress have been assessed using similar techniques to those outlined above for castration, with the majority using cortisol and/or behaviour. It is therefore possible, not only to compare the pain responses associated with the various methods of tail docking, but also to make comparisons of the relative pain and stress of tail docking and castration. The pain associated with castration will include a pain component from visceral organs, i.e. the testes, in addition to the pain from skin and other tissues. Therefore the pain of tail docking will be both quantitatively and qualitatively different from that of castration. Any decisions to tail dock should be made in the context of the farm's written health and welfare plan, taking account of advice from the farm's veterinary surgeon.

Tail docking using the rubber ring method

113. Elastration is probably the most widely used method of tail docking. The ring prevents blood flow to the distal tissues, which atrophy and drop off after 4 to 6 weeks. The method is quick, easy, and reliably effective, but has been shown to cause acute pain and stress in lambs at all ages investigated including lambs of less than one week of age, for which its use without anaesthesia is restricted by law in the UK.

114. Although there have been fewer studies of tail docking compared with those of castration, particularly with regard to age effects, there is no evidence to indicate that the pain response in lambs docked below one week is less than that for animals docked at older ages. By comparison with castration using rubber rings, however, cortisol responses indicate that the pain and stress are less severe when rings are applied to the tail. Nevertheless, the pain may still be considerable and, as with castration, it has been noted that in very young lambs the level of acute pain may be severe enough to prevent the animals from ingesting protective amounts of colostrum.

115. A complicating factor is the site of application of the ring. Behavioural observations of lambs following rubber ring application to the tail indicate that some individuals (around 16 %) show a less marked response than others. The reason is unclear but may be attributable to the site of application; for example, application on an intervertebral space may partially block nerve conduction.

Surgical tail docking

116. Surgical tailing simply involves the removal of part of the tail with a sharp knife. Although quick and effective, the risks of infection and haemorrhage are considerable. In our 1994 Report, we commented that, *“there appears to be some evidence that the use of the knife alone causes more distress than other methods”* but we felt unable to recommend any particular method(s) due to a lack of comparative studies. Recent studies of behavioural and cortisol responses show considerably greater pain and distress for surgical docking compared with other methods. We now feel confident in recommending that surgical tail docking by a shepherd should be prohibited.

Tail docking using a hot docking iron

117. This method involves severing the tail by cautery using a heated, chiselled metal device designed for the purpose. A number of studies have looked at the pain response of this method of docking and compared it with the rubber ring. The cortisol response is similar to that produced by ring tailing for lambs of similar ages. However, as the tail is removed at the time of the operation, it is our view that it would be a preferable method to the ring for docking tails in older and heavier lambs with larger tails.

Tail docking by clamp with or without surgical removal of the tail

118. A number of studies, including field trials, have investigated tail docking using various designs of clamps. Clamping has been combined with application of rubber rings and also with surgical removal following application of the clamp. Although there is some evidence that using the ring in combination with a clamp may reduce the cortisol response compared with the ring alone, there are some practical objections to this method. Field trials demonstrate that some operators are reluctant to apply the clamp effectively due to the flinching of lambs and the noise when the tail is crushed. If correctly applied however, application of the clamp combined with surgical tail removal could be used as an alternative to the heated docking iron for tail removal in older lambs.

Conclusions about tail docking

119. Cortisol responses indicate that the pain and distress associated with tail docking by rubber ring, clamp and heated docking iron are generally less severe compared with those associated with most methods of castration. Nevertheless, both castration and tail docking are painful mutilations that should be avoided whenever possible. Furthermore, in male lambs, docking will frequently be carried out at the same time as castration, thereby increasing the overall levels of pain and distress experienced.

120. In our 1994 Report, we commented that injection of local anaesthetic for tail docking may not be effective. However, we are now satisfied from research and field trials, that injection of local anaesthetic into the tail can reduce the pain associated with all methods of docking and can be rapidly effective. It could be delivered with multi-shot syringes or with needleless injectors.

121. It is difficult to define precisely the age above which the ring should not be used and also when tail docking should be designated as a procedure suitable only for a veterinary surgeon. There is evidence to indicate that healing takes longer when larger tails are removed, and also when tails are docked to shorter lengths. Tail size increases with age in early life, although it also varies considerably between breeds. After careful consideration of these factors, we conclude that tail docking should be done as early in life as possible, after the first 24 hours of life, and research is needed on the effects of tail docking on older lambs at 9 to 12 weeks of age.

122. There is a lack of information about the chronic pain and stress responses of tail docking in lambs and it is important that possible chronic effects are not discounted. Although plasma cortisol concentrations appear to remain relatively low for at least 4 days after tail docking, this may not be a sufficiently sensitive index of low grade pain and it has been suggested that behavioural observations may be more useful. Hyperalgesia and phantom pain are well documented in humans but less so in other animals. Neuromas on severed nerves are also a source of continuing impulses in pain pathways and may also give rise to persistent pain.

123. On the basis of research and field experience, we conclude that:

- i. tail docking in lambs up to 7 days old is best done with a rubber ring;
- ii. for older lambs up to 8 weeks, the tail should be removed either by a hot docking iron or a clamp; and
- iii. the acute pain of tail docking can be alleviated using local anaesthesia.

Recommendations relating to tail docking

124. *When the tails of lambs are to be docked, this decision should be agreed with the farm's veterinary surgeon as part of the farm's health and welfare plan.*

125. *When tail docking is necessary, lambs should be docked as early as practically possible after a secure maternal bond has been established, but not usually before they are 24 hours old.*

126. *Tail docking of lambs above the age of 3 months should only be undertaken by a veterinary surgeon using pain relief.*

127. *Pain relief reduces the impact of tail docking on welfare and should be used when and wherever possible. Any decisions about pain management and its relief should be made in discussion with a veterinary surgeon.*

128. *Tail docking for cosmetic reasons cannot be justified: breed society standards which encourage tail docking for appearance or cosmetic reasons should be re-examined in the light of animal welfare considerations.*

129. *Further research should be directed towards gaining a greater understanding of the aetiology of flystrike in sheep; assessment of the long term effects of tail docking on welfare; and development of practical approaches to reduce the pain of tail docking.*

130. *Where chemical products are used for the control and prevention of flystrike, on-farm management and health planning should pay particular attention to the correct timing and application methods of such products in order for them to be most effective.*

131. *Surgical tail docking should be prohibited except when performed by a veterinary surgeon using pain relief.*

Pain relief during and following castration and tail docking using local anaesthesia and analgesia

132. There has now been much research on the use of local anaesthetics to reduce pain in lambs during and following castration and tail docking by the common methods. The application of local anaesthetics to the testes, scrotal neck, spermatic cords has been studied along with various methods of delivery, e.g. by hypodermic syringe and needle, high-pressure needleless injector, and oral, intra-nasal and topical sprays. The effects of analgesic, non-steroidal anti-inflammatory drugs given either intramuscularly or intravenously have also been investigated.

133. It is clear from this work that some local anaesthetics can be effective in reducing substantially, or in some cases, virtually eliminating the acute pain response to both castration and tail docking. Most work in sheep has used lignocaine hydrochloride, which is highly effective in blocking pain resulting from castration and tail docking. However, it should not necessarily be expected that all local anaesthetics will have similar benefits. Evidence for the efficacy of local anaesthetic comes from studies of young lambs (< 7 days), where a local anaesthetic has been found consistently to be as effective as the combined method of castration in reducing pain. Most anaesthetics that are used commonly are only effective for a relatively short time, covering the period of 2 to 3 hours when the acute pain is greatest but may provide some relief for up to 12 hours. The choice of anaesthetic, its timing and method of delivery and site of application should be discussed with, and approved, by a veterinary surgeon.

134. Currently, there are no local anaesthetics licensed for use in sheep. Procaine hydrochloride is licensed for use in cattle for minor surgical procedures. Lignocaine hydrochloride is licensed for use in horses, dogs and cats, but not for use in food-producing animals, and is available from agricultural merchants. Under the principle of the veterinary 'cascade', procaine hydrochloride can be used in sheep but there must be a withdrawal period of 28 days before the meat is permitted to be used for human consumption.

135. Field trials with local anaesthetics have shown that the most suitable delivery method is by high pressure needleless injector. Whilst this technology was developed for research use, and is being increasingly used in other areas of livestock production, such as the poultry industry, suitable instruments for field work in sheep farming are not yet available commercially. Prototypes developed for field trials of castration and tail docking have worked well but need to be refined and developed further before commercial use.

136. When reviewing video evidence of the application of local anaesthetic, we observed that some lambs showed a response to the use of the needleless injector. In addition to the obvious benefits of local anaesthetic in terms of pain relief, there is also the possibility of some degree of discomfort or pain following the anaesthetic's injection, even when a needleless injector is used.

137. There is also some evidence of the potential long-term benefits of local anaesthetic. As with the combined method of castration, application of local anaesthetic reduces the maximum severity of lesions resulting from the application of the ring. In addition, two studies have provided evidence that use of local anaesthetic may reduce the effect of chronic pain resulting from application of rubber rings. This period of chronic pain requires further research and findings should be implemented as they become available.

138. When a local anaesthetic is administered to lambs, then practical means will also have to be devised for their efficient handling while minimising any additional stress.

General conclusions about castration and tail docking

139. For both castration and tail docking, protection of lamb welfare requires that:

- i. acute discomfort, pain and stress resulting from the initial procedure are minimised;
- ii. chronic pain or other adverse effects following castration or tail docking are minimised; and
- iii. practical means are devised to provide pain relief.

140. We reiterate our strong belief that castration and tail docking of lambs are mutilations which should not be undertaken without strong justification.

141. Furthermore, we encourage sheep farmers and shepherds to use the principle of incremental improvement when making decisions about castration and tail docking. For those who cannot meet the highest standards of welfare immediately, small changes for the better can be recognised as a good start, encouraging further improvements in the future. This is particularly important as consumers, farm assurance schemes and retailers are now more aware of, and increasingly demanding, higher welfare standards and are thus able to influence the shepherd's decisions about castration and tail docking.

142. Over time, we expect the sheep industry to adopt those methods of castration and tail docking that cause least harm to the animals and to justify their reasons for their decisions to undertake these mutilations, when used. It would also be helpful for surveys of the number of lambs that are castrated and tail docked by the various methods to be undertaken, to demonstrate that improvements are being made.

143. In changing industry practices on castration especially, there are a number of practical considerations and potential problems to overcome. We accept that a period of adaptation involving training and practical demonstrations will be necessary in order to implement change on a national basis. Producers will need a period to modify current practice in order to adjust to the greater amount of time, and possibly additional labour, which may be required when castrating and tail docking using new techniques. We would encourage retailers to recognise and reward producers bearing those additional costs that improve lamb welfare. We expect the sheep industry, with the help of the Government, to adopt a pro-active approach to identify and develop solutions to any practical problems and objections arising from the implementation of our recommendations.

144. The recommendations on castration and tail docking methods in this Report are aimed at reducing levels of acute pain at the time of these procedures and in the immediate hours thereafter. Less research has been directed towards the assessment of chronic pain and stress. Healing from castration and tail docking operations may take 4 weeks and where lesions are present it is not unreasonable to assume that some pain is involved. On the basis of giving the animals the benefit of the doubt, therefore, we can only conclude that it is probable that following castration and tail docking, lambs experience some level of pain long after any local anaesthetic has ceased to be effective.

General recommendations relating to both castration and tail docking

145. *Castration and tail docking should only be undertaken after a formal analysis of the risks to the lamb's health and welfare, in conjunction with the farm's veterinary surgeon and as part of the farm's health and welfare plan.*

146. *The Government should introduce a system to monitor the number of lambs that are castrated and tail docked by the various methods, to demonstrate that improvements are being made.*

147. *Sheep farmers, the meat industry, operators of farm assurance schemes and retailers should implement the Welfare Code, which requires careful consideration of the need for castration and tail docking, and should introduce measures to avoid these mutilations where possible.*

148. *Retailers and others in the food supply chain should not require castration of lambs and should reward farmers for adoption of a welfare-oriented policy on castration and tail docking, avoiding these mutilations where possible.*

149. *Further research should be directed towards the assessment and reduction of chronic pain following castration and tail docking.*

150. *The Government, together with industry, should support the development of methods of delivering local anaesthetic appropriate for use by the sheep industry under field conditions.*

151. *The Government, together with industry, should implement as quickly as possible the authorisation of an approved local anaesthetic for sheep.*

APPENDIX I: GLOSSARY OF TERMS

Allodynia – Condition in which ordinarily non-painful stimuli evoke pain.

Anaesthesia – Induced loss of the sensation of pain to permit the performance of surgery or other painful procedures.

Analgesia – Relief of pain. An analgesic is a drug that relieves pain.

Burdizzo – A type of clamp castrator.

Cascade – Where no drug is licensed for an animal, one intended for a similar species can be used but only where a 28 day withdrawal period is observed before slaughtering.

Castration – The removal or destruction of the testes.

Castrate – 1) To remove the testes. 2) A lamb that has been castrated.

Clamp castration – A process where a surgical instrument comprising two blunt jaws is applied across the neck of the scrotum so that the spermatic cords are crushed.

Colostrum – The first milk secreted by an animal coming into lactation. May be especially rich in maternal lymphocytes and immunoglobins and thus transfer immunity passively.

Combined castration – Castration technique using both the clamp and rubber ring.

Cortisol – A hormone often released in response to apparently stressful situations.

Crutching – The shearing of a sheep's tail and the area around the anus.

Elastration – Castration technique using a rubber ring placed around the neck of the scrotum.

Elastrator – Instrument used to apply rubber rings for castration.

Ectoparasite - A parasite that lives on the outside of its host rather than within the host's body.

Electroencephalogram (EEG) - a diagnostic test which measures the electrical activity of the brain (brain waves) using highly sensitive recording equipment attached to the subject by fine electrodes.

Flystrike – Infestation of the flesh of living sheep by blowfly maggots.

Genotype - The genetic constitution of an organism or cell.

Hyperalgesia – Excessive sensitivity to pain.

Immunocastration – The administration of a vaccine which produces antibodies that prevent the release of gonadotrophin releasing hormone (GnRH), which is involved in sending signals from the brain to stimulate the growth and functions of the testes.

Light lambs – Lambs under 25kg liveweight usually sold to the mainland European market.

Neuronal – Relating to a neuron or neurons (the conducting cells of the nervous system).

Nociceptor - A peripheral nerve organ or mechanism for the reception and transmission of painful or injurious stimuli.

Pain – An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage¹.

Rubber ring – Used in the castration of lambs and applied by an elastrator, usually 5 mm internal diameter and 15 mm external diameter.

Short scrotum castration – Castration technique which leaves the testes above a rubber ring. The testes are pushed into the abdominal cavity and subject to a higher temperature than in the scrotum, thus rendering the lamb infertile.

Tail docking – Partial removal of a sheep's tail.

Transmissible Spongiform Encephalopathies (TSEs) - A group of diseases characterised by a long incubation and fatal progressive course with characteristic spongiform degeneration of grey matter of the cortex.

Wether – A castrated ram.

¹ International Association for the Study of Pain, 1979.

APPENDIX II: THOSE WHO GAVE EVIDENCE AND ASSISTANCE

Compassion in World Farming

Dunbia

FAI Farms

Farmers Union of Wales

Home Office

Hybu Cig Cymru - Meat Promotion Wales

Iceland

Marks and Spencer

Meat and Livestock Commission

Moredun Research Institute

National Farmers' Union

National Farmers' Union Scotland

National Sheep Association

New Zealand Ministry of Agriculture and Forestry

Quality Meat Scotland

Royal College of Veterinary Surgeons

Royal (Dick) School of Veterinary Medicine

Royal Society for the Prevention of Cruelty to Animals

Sainsburys

Scottish Agricultural College

Soil Association

Tesco

Veterinary Laboratories Agency

Universities Federation for Animal Welfare

Waitrose

APPENDIX III: MEMBERSHIP OF THE FARM ANIMAL WELFARE COUNCIL (JUNE 2008)

Professor Christopher Wathes – Chairman

Dr Michael Appleby

Professor Richard Bennett

Professor Henry Buller

Dr Joanne Conington

Mr Huw Davies

Professor Sandra Edwards

Mr David Henderson

Mr George Hogarth

Mr Gwyn Jones

Mrs Ruth Layton

Mr Stephen Lister

Dr David Main

Professor David Morton

Mr Andrew Nicholson

Reverend Professor Michael Reiss

Mr Stuart Shearlaw

Mr Steven Tait

Ms Alison Ward

Mrs Meryl Ward

Mr Ed Varley, MRCVS – veterinary advisor

APPENDIX IV: CONTACT DETAILS

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