Opinion on the Implications of Castration and Tail Docking for the Welfare of Lambs

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Animal Welfare Committee
Nobel House
17 Smith Square
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Contents

Introduction

1. From 1979 to 2011, the Farm Animal Welfare Council (FAWC) provided detailed expert advice to Ministers in Defra and the Scottish and Welsh Governments on the welfare of farm animals on farm, at markets, during transport and at slaughter. FAWC is now the Animal Welfare Committee (AWC) with an expanded remit including companion animals and wild animals kept by people, as well as farm animals. This enables it to provide authoritative advice, which is based on scientific research, stakeholder consultation, site visits and experience, on a wider range of animal welfare issues.

Scope, methodology and definitions

2. AWC has been asked to consider the welfare issues in relation to the castration and tail docking of lambs as currently practised on farms.

3. FAWC previously considered these issues in its Report on the Welfare of Sheep in 1994 and again in its Report on the Implications of Castration and Tail Docking for the Welfare of Lambs, published in 2008. Anecdotal evidence suggests that, despite the recommendations of these Reports, there has been little change in practice. However, new prototype castration and tail docking devices are being developed with the aim of reducing the welfare harms resulting from these practices.

4. AWC has therefore been asked to:

- review the earlier reports, focussing on current methods of castration and tail docking of lambs in Great Britain (GB)
- consider if the recommendations from the 2008 Report are still relevant
- consider whether any further recommendations should be made in view of any more recent research, changes in industry practice, and possible availability of new methods

5. AWC established a working group to consider evidence and its implications. The group reviewed available literature, sent out a questionnaire to seek stakeholder views and held evidence sessions online and in-person.

6. Key terms are used as follows:

- lamb: a sheep less than one year old[1]
- wether: a castrated male

[1] The Codes of Practice give inconsistent definitions. The Codes for England and Scotland define a lamb as an ovine animal under 6 months of age whereas the Code for Wales defines a lamb as an ovine animal under 6–12 months of age.

- castration: the removal or destruction of the testes, or prevention by other means of their normal functioning, to render a ram lamb infertile[2]

- clamp: a device or instrument comprising two blunt edges that are applied to the neck of the scrotum to crush the spermatic cords

- tail docking: removal of part of a lamb or sheep's tail

- anaesthesia: induced temporary loss of the sensation of pain to allow surgery or other painful procedures to be performed. In this Opinion, the term is exclusively used to refer to local anaesthesia, i.e., loss of sensation in a small part of the body.

- analgesia: relief of pain

- surgical: see paragraphs 28–30

Climate change

7. Shifting weather patterns attributable to climate change are affecting all farmed species. Changes include higher temperatures, rapid and unpredictable temperature fluctuations, high and low rainfall, strong winds, and increased sunlight and humidity. Local microclimates may either reduce or intensify climate change impacts. These increases in temperature and humidity are also predicted to accelerate the growth, expansion of territory and number of invertebrate vector pests and livestock parasites in the UK. Future planning of grazing arrangements will need to take these into account. Increased contingency planning will also be required to safeguard welfare against extreme weather events such as drought or flooding.

8. These general welfare aspects of climate change, which apply to different species, inform the background to this Opinion. Climate issues that might have a direct impact on the need for castration and/or tail docking include the possibility of a shift in the size and seasonality of the *Calliphoridae* (blowfly) population, increased humidity near the skin or increases in the incidence of scouring (diarrhoea) caused by eating lush pastures and/or an increased parasite burden. These are addressed in the relevant sections of the Opinion.

Legal context

9. The Animal Welfare Act 2006, section 5 and the Animal Health and Welfare (Scotland) Act 2006, section 20 prohibit any procedures which involve interference with the sensitive tissues or bone structure of an animal (otherwise known as mutilations), except for medical treatment. These provisions also allow for exemptions to be made by means of regulation.

[2] This definition is updated from that given in the 2008 FAWC Report.

10. The following regulations set out exemptions for castration and tail docking, and the conditions under which these are permitted to be carried out in Scotland, England and Wales respectively:

- The Prohibited Procedures on Protected Animals (Exemptions) (Scotland) Regulations 2010 (PPR)[3]
- The Mutilations (Permitted Procedures) (England) Regulations 2007 (MR)[4]
- The Mutilations (Permitted Procedures) (Wales) Regulations 2007 (MR)[5]

11. The above regulations do not apply to immunocastration because this is not regarded as a physical procedure interfering with sensitive tissue.

12. These regulations should be read in conjunction with the following legislation, some sections of which continue to apply in some parts of GB:

- Protection of Animals (Anaesthetics) Act 1954 (PAA)[6]
- Veterinary Surgeons Act 1966 (VSA)[7]

13. The national Codes of Practice for the Welfare of Sheep (England 2000[8], Wales 2010[9], Scotland 2012[10]) are not legally binding but provide detailed advice on how to achieve the standards required by law. Compliance or non-compliance with a provision in a Code can be used as supporting evidence in legal proceedings. Stock keepers are legally required to be familiar with the relevant Code.

14. The regulations allowing the castration and tail docking of sheep in Scotland, England and Wales differ slightly. The paragraphs below summarise the law as it currently stands in each part of GB at the time of this Opinion. This is also set out in the table on the following pages, which also gives the legislative basis in each case. The legislation is complex and potentially confusing because of the way it has developed over time, with relevant requirements in different pieces of legislation and some different provisions in Scotland compared with England and Wales.

15. In all cases, the 2007 MR and 2010 PPR created a legal requirement that both procedures be carried out in hygienic conditions, in accordance with good practice, and in such a way as to minimise any pain and suffering they cause to the animal. This requirement to minimise pain and suffering means that, although anaesthesia is not always specified as legally required, there will be situations in which it must be used in order to meet this requirement.

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[3] https://www.legislation.gov.uk/ssi/2010/387/contents
[4] https://www.legislation.gov.uk/uksi/2007/1100/contents
[5] https://www.legislation.gov.uk/wsi/2007/1029/contents
[6] https://www.legislation.gov.uk/ukpga/Eliz2/2-3/46/contents
[7] https://www.legislation.gov.uk/ukpga/1966/36/contents
[8] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69365/pb5162-sheep-041028.pdf
[9] https://gov.wales/sites/default/files/publications/2018-01/sheep-welfare-code-of-practice_0.pdf
[10] https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2012/04/code-practice-welfare-sheep/documents/00391621-pdf/00391621-pdf/govscot%3Adocument/00391621.pdf

Castration

16. Across GB, ram lambs under 3 months old may be castrated by a stock keeper, such as a farmer or shepherd (but see 21). Ram lambs over 3 months old and adult rams must only be castrated by a veterinary surgeon.

17. Across GB, ram lambs may be castrated without anaesthesia, or any other form of pain control, up to 7 days old. A rubber ring or other device may be used to constrict the flow of blood to the scrotum, or a clamp (e.g., a Burdizzo) may be used to crush the spermatic cords individually without constricting the blood flow to the scrotum.

18. In Scotland, ram lambs up to 3 months may be castrated using a rubber ring or other device to constrict the flow of blood to the scrotum. If the lamb is over 7 days old, anaesthesia must be used.

19. Across GB, ram lambs up to 3 months old may be castrated using a clamp (e.g., a Burdizzo) that crushes the spermatic cords individually but does not constrict blood flow to the scrotum, without anaesthesia.

20. Across GB, the legal requirements relating to the rubber ring method also apply to the combined clamp and ring method (see 107).

21. In Scotland, castration with a knife or blade must only be performed by a veterinary surgeon. In England and Wales, ram lambs up to 3 months old may be castrated with a knife or blade by a stock keeper.

Tail docking

22. Across GB, tail docking must only be performed to the extent that sufficient tail is retained to cover the vulva of a female sheep and the anus of a male sheep.

23. Across GB, lambs may be tail docked without anaesthesia, or any other form of pain control, up to 7 days old. A rubber ring or other device (e.g., a Burdizzo) may be used to constrict the flow of blood to the tail.

24. In Scotland, lambs up to 3 months old may be tail docked using a rubber ring or other device to constrict the blood flow to the tail by a stock keeper. If the lamb is over 7 days old, anaesthesia must be used. Lambs up to 3 months old may be tail docked using a hot iron by a stock keeper without anaesthesia.

25. In England and Wales, lambs of any age may be tail docked using a knife or hot iron with anaesthesia.

26. In Scotland, lambs over 3 months old must only be tail docked by a veterinary surgeon, with anaesthesia. In England and Wales, legislation does not specify any age restriction on tail docking by stock keepers. However, the Welsh Government's Code of Practice for the Welfare of Sheep recommends that if lambs over 3 months old are tail docked, this should be done by a veterinary surgeon.

27. In Scotland, tail docking with a knife or blade must only be performed by a veterinary surgeon.

Note on the meaning of ‘surgical’

28. There is confusion over the use of the word ‘surgical’ in relation to castration and tail docking. A ‘surgical’ procedure is normally understood as a physical intervention carried out by a qualified person that involves cutting with a scalpel, crushing, tearing, stitching etc. However, all methods of physical castration and tail docking may be considered ‘acts of veterinary surgery’ in the general sense, with the Veterinary Surgeons Act 1966 and subsequent regulations permitting them to be carried out by stock persons only under certain conditions.

29. ‘Surgical castration’ and ‘surgical docking’ have come to mean specifically castrating or tail docking by cutting with a knife or blade, rather than by crushing with a rubber ring or other device or using a hot iron. Limiting the definition to cutting with a knife or blade was indeed how these expressions were used by FAWC in 2008. ‘Surgical castration’ and ‘surgical docking’ are also defined this way in the Scottish regulations which, following FAWC’s 2008 recommendations, require that these methods must be carried out by a veterinary surgeon. These definitions have no bearing on whether other forms of cutting are ‘acts of veterinary surgery’ or for the purposes of other legislation.

30. Other methods of castration and tail docking have historically been permitted to be carried out by stock keepers for ease and because they were considered less invasive. Referring to castration and tail docking with a knife as ‘surgical’ may suggest that other methods of performing these mutilations are less serious and less traumatic for the animal, which would pre-empt the purpose of this review. This Opinion therefore avoids use of the word ‘surgical’ except where castration or tail docking by a veterinary surgeon is being addressed.

Physical castration

	Birth to 7 days	8 days to under 3 months	3 months +
Scotland	Rubber ring or other device constricting blood flow to the scrotum permitted without anaesthesia. (PAA) Other methods (e.g., Burdizzo, combined) may be used by a stock keeper without anaesthesia. (VSA) Knife must only be used by a veterinary surgeon with anaesthesia. (PPR)	Rubber ring or other device constricting blood flow to the scrotum (including combined method) permitted with anaesthesia. (PAA) Clamp (e.g., Burdizzo) may be used by a stock keeper without anaesthesia providing the blood flow to the scrotum is not constricted. (VSA) Knife must only be used by a veterinary surgeon with anaesthesia. (PPR)	Rubber ring or other device constricting blood flow to the scrotum (including combined method) not permitted. Only a veterinary surgeon may perform permitted methods. (VSA) Anaesthesia must always be used. (PAA)
England and Wales	Rubber ring or other device constricting blood flow to the scrotum and other methods permitted without anaesthesia. (MR) A stock keeper may perform. (VSA)	Rubber ring or other device constricting blood flow to the scrotum (including combined method) not permitted. (MR) Other methods (including knife) may be used by a stock keeper. (VSA)	Rubber ring or other device constricting blood flow to the scrotum (including combined method) not permitted. (MR) A stock keeper may perform permitted methods. (VSA) Anaesthesia must always be used. (MR)

Tail docking

	Birth to 7 days	8 days to under 3 months	3 months +
Scotland	Rubber ring, other device restricting blood flow to the tail (including combined method) and hot iron may be used by a stock keeper. (VSA) Anaesthesia not required. Knife must only be used by a veterinary surgeon. (PPR)	Rubber ring, other device restricting blood flow to the tail (including combined method) and hot iron may be used by a stock keeper. (VSA) Anaesthesia must be used for methods restricting blood flow to the tail. (PAA) Knife must only be used by a veterinary surgeon. (PPR)	Rubber ring or other device constricting blood flow to the tail (e.g., Burdizzo) not permitted. Only a veterinary surgeon may perform permitted methods. (PPR) Anaesthesia must always be used. (PAA)
England and Wales	Rubber ring or other device to constrict blood flow to tail (e.g., Burdizzo) permitted without anaesthesia. (MR) For all other methods, anaesthetic must be used. (MR) A stock keeper may perform. (VSA)	Rubber ring or other device constricting blood flow to tail the (e.g., Burdizzo) not permitted. (MR) Anaesthesia must always be used. (MR) A stock keeper may perform. (VSA)	Rubber ring or other device constricting blood flow to the tail (e.g., Burdizzo) not permitted. (MR) Anaesthesia must always be used. (MR) A stock keeper may perform. (VSA) The Welsh Code of Practice recommends that only a veterinary surgeon performs.

Current practice

31. The British sheep farming sector is highly diverse. Local terrain, environmental conditions, habitat, economic considerations, farm business size and sheep breed, all play a role in determining how sheep are managed.

32. The majority of sheep are bred for meat, with over 12 million lambs being slaughtered in the UK each year.[11] There is a smaller but growing market for hogget (meat produced from animals 1–2 years of age) and mutton (meat from sheep over 2 years of age). In the UK, sheep are also bred for dairy, wool and environmental services (conservation grazing, and as an arable break) and kept as pets, although each of these accounts for only a tiny proportion of the total numbers kept. Individuals and flocks may be bred for use for more than one of these purposes.

33. Sheep are kept throughout the UK, from lowland farms with fertile productive soils to extensive upland or hill farms where they need to be able to thrive on poorer quality forage and in sometimes harsh conditions.

34. Holding size rages from large farm businesses keeping several thousand sheep down to smallholders and Scottish crofters with just a few animals. While many flocks are kept on owned or tenanted land with single-occupier grazing rights, other sheep farmers may also have grazing rights on common land. In these areas, animals from more than one farm may intermingle.

35. Lowland sheep farms and inbye fields on upland and hill farms often have smaller fenced fields, while upland, hill and arable land may have few physical boundaries to keep animals apart.

36. The stratified sheep system is unique to the UK.[12] It consists of a three-tier breeding system appropriate to the varied environmental conditions across the country. In the first tier, hardy hill breeds are kept in relatively harsh habitats. Surplus breeding stock and cast ewes from these are transferred down to the second tier, which comprises upland flocks, where they may be put to rams of specialised long-wool breeds to produce cross-bred breeding ewes such as mules or Welsh Halfbreds, depending on the ram breed used. These are then transferred down to the third tier, where they are generally crossed with terminal sire rams to produce slaughter lambs. Historically, each tier has been very dependent on the other two.

37. Although an increasing number of farmers are now running ‘closed’ flocks, the stratified system remains important and allows the whole UK sheep industry to be productive and efficient. Of those farms involved in the stratified system, there is considerable variation across different regions and an individual farm may be involved in one, two or even all three tiers.

[11] AHDB Sheep Manual 5: Growing and Finishing Lambs for Better Returns (2020).
[12] https://www.nationalsheep.org.uk/for-the-public/culture/uk-sheep-farming/

38. There are over 60 native sheep breeds in the UK.[13] Including non-native breeds and crossbreeds, there are well over 100.[14] Each breed has its own characteristics and suitability for the diverse habitats and farming systems across the UK, but they can be broadly divided into four groups: hill, upland, lowland and primitive.

39. Because females are only sexually active during the times of the year when day length is shorter, the majority of sheep breeds are short-day seasonal breeders. The UK breeding season usually runs from mid-autumn through to early spring.[15] However, the start date and duration of the natural season vary between different breeds as well as depending on the daylength in the region where they are kept.

40. This natural season may be further altered by controlling when males (entire or vasectomised) are introduced to a flock of females, or by means of hormonal treatments or artificial light regiments. Farmers may schedule the start and length of the mating period to suit their system. For example, those wishing to produce 'early season' lambs for slaughter will use breeds that finish quickly and put the rams in with the ewes early in the mating season. These farms will often lamb indoors and house the stock until the weather and ground conditions are suitable to put the ewes with lambs at foot out to graze. In order to finish lambs quickly, these lambs need high quality forage and may require significant amounts of additional feed. This approach is therefore not economically viable for all sheep farming systems. Low-input systems such as hill and upland, where lambing is outdoors, may wish to delay lambing until there is sufficient grass growth to support lactation and reduced probability of inclement weather. They may wait until late November or early December before introducing the rams to the ewes, with lambing following in late April through to early June. When these lambs need to be moved off the farm in autumn in preparation for the next season's breeding, some or many may not have reached the specified slaughter weight. These are sold as store lambs to other farms, where they will be fattened until the specified slaughter weight is reached.

41. Some slower-growing breeds, especially the primitive breeds that are often kept by smallholders and crofters, may not be ready for slaughter until they have reached their second year.

42. Other sheep farming enterprises, such as those selling into shorter supply chains or directly to the public, may wish to produce finished animals throughout the year and will therefore also keep lambs well beyond puberty.

43. The industry is therefore diverse in terms of farm type, management system, when lambs are born and the age they are ready for slaughter. This has implications for when castration and/or tail docking might be performed and whether either or both are in fact necessary.

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[13] https://www.gov.uk/government/statistics/uk-farm-animal-genetic-resources-fangr-breed-inventory-results

[14] https://www.nationalsheep.org.uk/for-the-public/culture/

[15] J Thimonier. Control of seasonal reproduction in sheep and goats by light and hormones. *Journal of Reproduction and Fertility Supplement* 30 (1981), 33–45.

Reasons given for castration

44. Farmers are currently motivated to castrate their ram lambs for the same reasons stated at the time of the previous FAWC reports on the issue: to avoid unwanted pregnancies and complications during post-slaughter processing, for stock management purposes, and to avoid lower market appeal and value for non-castrated males that are ill-suited to be used as breeding rams.

45. The age of onset of puberty for ram lambs is a function of both nutritional status and breed. Most tend to reach puberty between 20 and 28 weeks of age, although it can be as early as 16 weeks.[16] Because pubertal ram lambs have sexual drive and are physically capable of mating, they need to be segregated from females before this age to avoid unwanted pregnancies. This segregation is often done at weaning or shortly after. Segregating males and females also avoids the potential welfare harms to ewe lambs of being constantly harassed and mounted and prevents the males losing condition as a result of spending substantial time periods seeking mating opportunities rather than eating and growing. Although it requires additional infrastructure, physical segregation is feasible for many producers and, where effective, will eliminate the need for castration.

46. However, in some cases castration is being used as an alternative to effective sexual segregation, such as where the boundaries within a farm or with a neighbouring farm are absent or poorly maintained. Problems may be exacerbated if there is insufficient land or insufficient nutrition (e.g., poor grass or forage growth due to climatic conditions and a lack of supplementary feeding) for separated groups. This may occur on some smallholdings or crofts. Problems may also occur when grazing common ground, and indeed many commons prohibit entire males. Failure to separate entire ram lambs from females increases the probability of unplanned pregnancies and the health and welfare risks resulting from early outdoor lambing in winter conditions, and castration is used to prevent these.

47. Another reason given for castration is control of the behaviour of non-castrated ram lambs. For example, a few farmers state that non-castrated males are harder to manage, move around the farm and load onto trailers, as rams tend to be bolder and more confident than castrates. There are also reported incidents from conservation graziers of increased aggression between non-castrated males resulting in fight injuries and even death, particularly during the breeding season. However, it is unclear how widespread these problems may be within the industry. There is evidence that groups of rams, and of rams and castrates, may be kept together with no signs of overt aggression. If resources are limited, and animals are competing for food or space, it is possible that fighting will occur. However, castration should not be used as an alternative to the provision of sufficient resources. Although the welfare implications of injury and death in individual animals should be taken seriously, they need to be balanced against the pain and distress associated with castration and the numbers of animals that undergo this permitted mutilation.

[16] MG Maquivar MG, SM Smith and JR Busboom. Reproductive management of rams and ram lambs during the pre-breeding season in US sheep farms. *Animals* 11 (2021), 2503.

48. Producers who use management systems, feeding regimes and sheep breeds or crossbreeds that reach their target slaughter weight before the age of puberty should not need to castrate their ram lambs. In fact, there may be market benefits in not castrating these males because non-castrated males grow faster, are slightly larger and have leaner meat with less fat. Intact ram lambs will often reach their target slaughter weight at a younger age than ewe and wether lambs of the same breed on the same farm, and with higher carcase conformation scores.

49. However, those farmers whose business model is to sell finished lambs throughout the year, or those that are unable to finish some or all of their lambs on their own land because of lack of forage caused by a short grazing season or climatic conditions, may struggle to sell uncastrated rams as finished or store lambs.

50. Some producers and industry bodies have expressed concern that older, non-castrated ram lambs sold later in the year struggle to reach a fair market price because of 'retailer acceptability'. This is due to a continued perception that consumers may be put off buying lamb meat if they experience meat from an entire ram and it is noticeably different in taste, smell and/or texture and/or fat colour to the lamb meat they are used to. This is commonly referred to as 'ram taint'.

51. Industry reports based on market research suggest that if a consumer has an unpleasant experience with lamb, they tend to be put off buying that meat for at least one year and sometimes longer. This appears to be why retailers err on the side of caution rather than risk losing customers. As a result of assumptions about age and likely sexual maturity, at least one major retailer requires any ram lambs bought after December to have been castrated.

52. Research using taste tests and assessing biochemical profile and physical texture suggests that castration makes little difference to the quality of the meat from ram lambs up to 20 weeks of age. However, the results for older lambs are less consistent. Some studies have found no discernible difference in taste tests on meat from rams slaughtered up to 55 weeks of age if sexual segregation occurred by 20 weeks of age.[17] In contrast, other research has detected higher levels of free fatty acids, which are associated with a stronger odour, in the meat of ram lambs slaughtered at 30 weeks compared to similarly managed ewe and wether lambs of the same age.[18] Another study showed that although consumers detected a difference, they still 'liked' lamb from both castrates and entire rams.[19]

53. In addition to potential taste and texture differences, there is also increased disparity in carcass conformation between older ewe, wether and ram lambs. From an industry point of view, this can make it harder to produce a consistent product.

[17] Meat Promotion Wales, *Rearing Entire Males* (2004).
[18] MM Sutherland and JM Ames. Free fatty acid composition of the adipose tissue of intact and castrated lambs slaughtered at 12 and 30 weeks of age. *Journal of Agricultural and Food Chemistry* 44 (1996), 3113–16.
[19] RS Gravador et al. A consumer study of the effect of castration and slaughter age of lambs on the sensory quality of meat. *Small Ruminant Research* 169 (2018), 148–53.

54. Farmers who buy store animals to finish may not wish to buy uncastrated ram lambs because they do not want to incur the additional labour and financial costs required to maintain these as a separate flock.

55. Castration is also a processing issue. The industry reported that abattoirs often prefer ram lambs to be castrated, because entire rams take longer to process. Moreover, the limited market for testicles means that there is an additional cost for disposing of these. Yet despite this preference, abattoirs stated that they still receive and process entire males during normal operation, although some will only accept males over 6 months if they are castrated. Nevertheless, the working group heard that there is a significant market for entire ram lambs, hoggets and mature sheep for the Eid-al-Adha festival.[20]

56. Many farm assurance schemes require that the need for castration and tail docking is reviewed on a case-by-case basis. While all schemes require that current Government guidelines are followed, only some 'higher welfare' schemes (e.g., RSPCA Assured) also require that analgesia and anaesthesia are always used. However, the number of sheep currently managed under 'higher welfare' schemes account for only a tiny percentage of the total GB population.

Reasons given for tail docking

57. Traditionally, tail docking is performed to decrease the risk of flystrike (also known as myiasis). If flystrike is not prevented, or not identified and treated at an early stage, then pain, distress, ill-health and even death will result. Flystrike is therefore a significant welfare issue and all three GB Codes of Practice currently state that tail docking may be carried out to decrease the risk of this condition.

58. The two main factors affecting the onset of flystrike are the prevalence of flies and the susceptibility of sheep.[21]

59. The blowfly population is closely linked to climate, with higher numbers being associated with high humidity and higher ambient temperatures. As the average GB temperature and humidity continue to rise as a result of climate change, the peak incidence of flystrike will probably increase and also last for a longer period of the year. Regional forecasts based on climate models that predict flystrike risk are available to farmers.[22] However local conditions also need to be taken into account, as flies tend to be less prevalent on an open, breezy hillside but present in higher numbers in a humid lowland field and/or near a stagnant body of water.

60. Sheep have increased susceptibility to flystrike if there are factors that attract flies to lay their eggs on the animal, combined with factors that increase the humidity near the skin and thus promote development of the blowfly larvae. Soiled or injured animals are more likely to attract flies. Animals with faecal contamination on their wool either caused by grazing lush pastures or by gastrointestinal parasites are at higher

[20] https://www.fwi.co.uk/livestock/livestock-marketing/advice-on-marketing-lambs-for-the-muslim-festival

[21] A Fenton, R Wall and N French. The incidence of sheep strike by *Lucilia sericata* on sheep farms in Britain: a simulation model. *Veterinary Parasitology* 76 (1998), 211–28.

[22] https://alerts.nadis.org.uk/

risk, as are those suffering from foot rot or open wounds.[23] Good stock management to reduce the incidence of these will also decrease the risk of flystrike. Indeed, the main reason given for tail docking in research and stakeholder evidence was to prevent this faecal contamination of the tail and rump.

61. Several studies have assessed the effectiveness of tail docking. A controlled field study found that tail docking consistently reduced flystrike risk and is often cited in favour of the practice.[24] However, the wider evidence is somewhat mixed. In Brazil, tail docking was found to have no impact on faecal soiling.[25] Reviews of the scientific evidence on the rationale for tail docking note that the results of the various studies are conflicting and limited.[26]

62. Other reasons for tail docking were also identified during evidence collection. One was the increased shearing time for sheep with tails.[27] Shearing is a stressful procedure for sheep and therefore a welfare concern. Another reason given was the increased likelihood of carcass contamination from lambs with long tails, which might be a food safety risk. Tail docking of ram lambs may also be used to distinguish male and female sheep. Other respondents cited routine, tradition or appearance as reasons for tail docking.

63. However, tail docking is not practised in all flocks. It is less common among hill flocks, where longer tails are considered to offer protection against harsh environmental conditions. Other breeds, for example, the Northern short-tailed group from north-western Europe (e.g., Soay, Shetland and Hebridean), have naturally shorter tails.

64. The attitude of sheep breed societies may also affect tail docking practices. Some breed societies, for example the Herdwick and Hebridean sheep societies, state that pedigree animals should not be tail docked. However, other societies only recommend that members follow current Government welfare Codes with respect to tail docking. In these latter cases, some breeders (especially those with lowland breeds) believe that they will achieve a better market value for their pedigree breeding animals if their tails are docked and so continue to do this.

Current methods

65. The evidence presented by the industry indicates that castration is usually carried out using the rubber ring method without anaesthesia or analgesia. Other options for castration include short scrotum castration, clamp castration and the combined method, although the evidence suggests that these are less widely used

[23] R Wall and F Lovatt. Blowfly strike: biology, epidemiology and control. *In Practice* 37 (2015), 181–8.
[24] NP French, R. Wall and KL Morgan. Lamb tail docking: a controlled field study of the effects of tail amputation on health and productivity. *Veterinary Record* 134 (1994), 463.
[25] VS Soriano et al. To dock or not to dock? Faecal soiling measurement in sheep. *Animal Welfare* 29 (2020), 81–7.
[26] E.g., E Gascoigne, C Mouland and F Lovatt. (2021). Considering the 3Rs for castration and tail docking in sheep. *In Practice* 43 (2021), 152–62; MA Sutherland and CB Tucker. The long and short of it: a review of tail docking in farm animals. *Applied Animal Behaviour Science* 135 (2011), 179–91.
[27] DR Scobie, AR Bray and D O'Connell. A breeding goal to improve the welfare of sheep. *Animal Welfare* 8 (1999), 391–406.

than rubber rings. Tail docking may also be carried out using the rubber ring method, or with a sharp knife, using a hot iron that cauterises the wound, or with a clamp (e.g., Burdizzo), generally combined with a rubber ring. As with castration, the most common method is the rubber ring on young lambs without anaesthesia or analgesia.

66. Rubber rings are cheap, simple and popular as a method of castration and tail docking for lambs. Currently they can be legally applied to lambs under 7 days of age without anaesthesia or analgesia across GB, and to lambs up to 3 months old with anaesthesia in Scotland. This age restriction means that farmers will often castrate all their ram lambs, regardless of whether or not they will be slaughtered before reaching puberty, since decisions taken about the future of individuals are not made until well beyond the legal age limit for rubber ring castration.

67. In its 2008 Report (paragraph 61), FAWC noted in relation to castration:

> This [7 day] 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.

AWC has no reason to believe that this situation has changed. The legislation in Scotland allows for castration by rubber ring up to 3 months as long as anaesthesia is used after 7 days. However, there is considerable doubt about how widely anaesthesia is used in practice.

68. It should also be noted that the testes of some primitive breeds of sheep do not fully descend into the scrotal sac by 7 days of age. Owners of these breeds will therefore often castrate when the ram lambs are over 7 days old using a clamp (e.g., a Burdizzo) with pain control. However, comments posted on breed society discussion fora indicate that some breeders may also use rubber ring castration on older lambs.

Pain relief

69. In 2008, FAWC recommended that pain relief (anaesthetics and analgesics) should be used for both castration and tail docking whenever possible, and that research should be directed towards the development of practical methods for delivering pain relief under farming conditions and for different ages of lambs.

70. Industry evidence suggests that pain relief is rarely used for either castration or tail docking. There are several likely reasons for this. There is no legal requirement to use anaesthetics on lambs that are castrated or tail docked using a rubber ring within their first 7 days of life. However, as noted above, anecdotal evidence suggests that these practices are often carried out after the 7-day legal limit for using rubber rings (or, in Scotland, for using rubber rings without anaesthetic). A more probable

explanation is that use of anaesthetics would be an additional stage in the process, thus adding stress for the lamb, and extra time and cost for the farmer during the very busy lambing period. Farmers may not identify signs of pain or discomfort or may choose to overlook these and may well lack the skills required to administer a local anaesthetic by injection in a consistently hygienic and effective way.

71. There is an issue with the availability of anaesthetics and analgesics for lambs. The only local anaesthetic currently licensed for use in lambs in GB is Procamidor Duo[28], which is a combination of procaine and adrenaline. However, the Cascade, which is a legislative provision in the Veterinary Medicines Regulations, allows veterinary medicines licensed for different species to be used to avoid causing unacceptable suffering in cases where there are no suitable products authorised for the species in question. Procaine without adrenaline may therefore also be used for anaesthesia in lambs.

72. Non-steroidal anti-inflammatory drugs (NSAIDs) also provide analgesia and are known, experimentally, to reduce the impact of chronic pain from castration and tail docking. There are currently no NSAIDs licensed in GB for use on lambs. Products such as meloxicam or flunixin can be used under the Cascade. NSAIDs are generally not recommended for lambs under 14 days old although are sometimes used experimentally. Meloxicam is licensed in Australia, New Zealand and Canada for use on sheep over 14 days old.

Public perception

73. Although studies show that animal welfare is generally an important issue for consumers, retailers reported that consumers raise fewer concerns about the welfare of lambs than about the welfare of any other farm animal. This may be because consumers see sheep grazing freely in fields and on hills across the countryside and so have the impression that sheep farming is more 'natural' and less intensive than the farming of other animals, and that lamb meat is therefore a relatively 'natural' product. This perception is promoted by the industry, which refers to lamb as being 'reared in harmony with nature'.[29] Retailers reported that consumers are far more likely to be concerned about a negative eating experience, which was likely to put them off eating lamb for the rest of the season.

74. There is little evidence to suggest that the general public is aware of mutilations being carried out on lambs, whilst public attitudes might change if awareness spread. The British Veterinary Association cites the example of mulesing, the removal of wool-bearing skin from around the tail head of a sheep to reduce the risk of flystrike in skin folds, which is banned in GB and New Zealand but permitted in Australia. The Australian public became increasingly concerned about the practice, to the extent that a number of clothing retailers in Australia banned the sale of products made from the wool from flocks in which mulesing was practised.

[28] Produced by Richter Pharma AG.
[29] https://www.nationalsheep.org.uk/for-the-public/eat-wear-enjoy/buyers-guide-to-lamb/

International context

75. Practices relating to castration and tail docking vary significantly between countries and regions. These differences can be due to different environments, production systems and regulations.

76. This Opinion focusses on practices in England, Wales and Scotland. In Northern Ireland, both castration and tail docking are permitted without pain relief up to 3 months old, with rubber ring use restricted to the first 7 days.

77. The UK currently imports around one third of the sheep meat that it consumes, over 70% of which comes from New Zealand. Australia provides around 15% of sheep meat imports and is the second largest supplier to the UK. It is therefore interesting to note the different methods permitted and practised on sheep sold for the same market. Castration and tail docking are permitted on older lambs than in the UK, and pain relief, although not required on lambs under 6 months, is nevertheless encouraged. Lidocaine, the anaesthetic which is generally used for lambs in Australia and New Zealand, is not permitted for use on sheep in the UK.

78. In New Zealand, only hot iron and rubber ring methods are permitted for tail docking lambs under 6 months old, with recommended best practice guidance suggesting that tails should be docked at less than 6 weeks of age. Pain relief is not required in animals under 6 months of age. Animals over 6 months of age must not be tail docked unless by a veterinary surgeon with pain relief.[30] Although castration is generally performed using rubber rings (across the scrotal neck and short scrotum castration), surgical castration and clamping are also permitted. Animals under 6 months of age may be castrated without pain relief, while those over 6 months must only be castrated if, throughout the procedure, they are under the influence of pain relief.[31] However, recommended best practice as detailed in the Painful Husbandry Code of Welfare states that pain relief should be provided at any age to animals undergoing castration (including short scrotum). In New Zealand, lambs are generally tail docked and castrated within the first 6–8 weeks of life, with the Ministry of Primary Industries NZ stating that the rationales for the 6-month period are the practicalities and the New Zealand farming context.

79. In Australia, the Numnuts device and NumOcaine, a licensed brand of anaesthetic containing lidocaine, have both been on the market since 2019. In New Zealand, their use has been permitted since 2021.

80. In Australia, animal welfare regulations are the responsibility of individual states and territories. However, the Australian Animal Welfare Standards and Guidelines for

[30] Animal Welfare (Care and Procedures) Regulation 2018 (LI 2018/50) https://www.legislation.govt.nz/regulation/public/2018/0050/latest/whole.html#LMS493017

[31] Code of Welfare: Painful Husbandry Procedures 2018, https://www.mpi.govt.nz/dmsdocument/46045-Code-of-Welfare-Painful-husbandry-procedures

Sheep[32] have been regulated into law by most state and territorial governments.[33] In these, sheep must not be tail docked or castrated over 6 months of age without appropriate pain relief and haemorrhage control, and the recommended methods are a hot knife or rubber ring. However, the guidelines suggest that castration should be performed as young as possible and before 12 weeks of age. The guidelines recommend that castration and tail docking be performed after ewe–lamb (maternal) bonding has been established and after ram lambs are 24 hours old, and that pain relief should be given when practical and cost-effective methods become available. In addition, the guidelines, suggest that lambs should not be castrated if they are destined for slaughter before 12 weeks of age, or before the onset of puberty.

81. Legislation and practice differ across Europe. In the Republic of Ireland, castration without pain relief may be performed with clamping prior to 3 months of age or by rubber ring before 8 days of age. Tail docking with a rubber ring may be performed before 8 days old without pain relief.[34] In France, castration is not permitted without local anaesthetic, and rubber ring castration is banned in Germany. Both procedures are prohibited in Italy and the Netherlands, and in Belgium each may be carried out only by a veterinary surgeon with castration requiring sedation. There are currently no EU-wide regulations relating to permitted mutilations of sheep. The Council of Europe (CoE) published recommendations concerning sheep in 1992, but domestic legislation takes precedence. The CoE recommended that both procedures should be avoided, particularly if using rubber rings. However, if either procedure needs to be carried out, it recommended that only surgical methods preceded by anaesthesia or haemostatic tongs should be used.

82. In Canada, the code of practice for the care and handling of sheep[35] has recently been reviewed. In the code, rubber ring, clamping and surgical castration are permitted, while short scrotum castration is not. Rubber ring use is allowed between 24 hours and 10 days of age in housed and semi-housed systems and between 24 hours and 6 weeks of age in pastorally based systems. Clamping ram lambs is permitted between 1 to 6 weeks of age without pain relief. Surgical castration without pain relief is permitted before 4 weeks of age. Pain relief is required for lambs older than 4 weeks of age for surgical castration and 6 weeks of age for clamping. The code recommends that castration be performed between 24 hours and 7 days of age and that pain relief should be provided whenever possible. Tail docking using a rubber ring must not be performed beyond 6 weeks of age except by a licensed veterinarian with anaesthesia and analgesia. Surgical tail docking must only be performed by a licensed veterinarian with pain relief. The code recommends that tail docking also be performed between 24 hours and 7 days of age and that pain relief be provided whenever possible.

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[32] Australian Animal Welfare Standards and Guidelines for Sheep 2016, https://www.animalwelfarestandards.net.au/files/2011/01/Sheep-Standards-and-Guidelines-for-Endorsed-Jan-2016-061017.pdf

[33] Australian Animal Welfare Standards and Guidelines, progress report, https://www.animalwelfarestandards.net.au/sheep/

[34] S.I. No. 123/2014 – Animal Health and Welfare (Operations and Procedures) Regulations 2014, https://www.irishstatutebook.ie/eli/2014/si/123/made/en/print

[35] National Farm Animal Care Council. Code of Practice for the care and handling of sheep, 2013, at https://www.nfacc.ca/pdfs/codes/sheep_code_of_practice.pdf

Welfare implications of current practice

Pain

83. There is extensive scientific evidence that the standard methods of castration all cause acute pain. The most common methods involve applying a constricting rubber ring or physically crushing the spermatic cord. Although a rubber ring appears to cause less immediate discomfort at the time of castration, studies have found signs of pain shortly afterwards and sometimes for several weeks following the ring application.

84. Research studies using a variety of methods (measuring active pain behaviours, restlessness, abnormal postures, plasma cortisol, electro-encephalography (EEG), Qualitative Behavioural Assessment (QBA) and facial expression) all suggest that rubber ring castration is associated with significant acute pain that increases over the first 15–20 minutes after application and takes up to 2 hours to subside. The pain intensity increases over time, as the rubber ring contracts slowly to its original size and tissues are increasingly ischaemic, and the initial pain response of the lamb on application may appear mild. Lambs may also experience discomfort or pain for the next 28–35 days due to inflammation and infection around the site of the ring until the necrotic tissue is shed and the wounds heal. In some studies, rubber ring castration is associated with slower growth rates immediately after application and increased mortality.

85. Tail docking is generally perceived to be less painful than castration, and comparative studies confirm this.[36] However, it is not a pain-free procedure, and use of rubber rings has been shown to be associated with behavioural indicators of pain (tail wagging, foot stamping, restlessness, vocalisations) and physiological indicators (elevated cortisol). Tail docking has also been shown to be associated with facial expressions or 'grimaces' indicative of pain and altered EEG expression compared to control (handled only) lambs.[37] In addition, tail docking is often performed on ram lambs at the same time as castration, and there is evidence that, when combined with castration, tail docking induces greater pain than castration alone. As with castration, the peak acute pain response associated with tail docking occurs around 15 minutes after application, but there is evidence that the response is more variable as some lambs do not appear to show as extreme a pain response as others. It has been suggested that the pain response may be a function of the placement of the ring on or between vertebrae, which can affect the speed at which the ring crushes the nerves.

86. The rubber ring site during tail docking is also associated with the development of lesions until the necrotic tissue is shed. Due to its location, the site can be susceptible to infection and is likely to be a source of chronic pain. The length of the docked tail may also have longer-term consequences for the lamb. A very short tail, which does not cover the anus or vulva, has been shown to be a risk factor for skin

[36] V Molony, JE Kent and IJ McKendrick. Validation of a method for assessment of an acute pain in lambs. *Applied Animal Behaviour Science* 76 (2002), 215–38.
[37] MJ Guesgen et al. Coding and quantification of a facial expression for pain in lambs. *Behavioural Processes* 132 (2016), 49–56; EC Jongman et al. EEG changes in 4-week-old lambs in response to castration, tail docking and mulesing. *Australian Veterinary Journal* 78 (2000), 339–43.

damage by sunlight, frost or abrasion, prolapse, and increases the risk of carcinoma formation and bacterial arthritis.[38]

87. Longer-term consequences of tail docking have also been reported in sheep, including behaviour, hyperalgesia, the formation of traumatic neuromas, chronic pain and changes at parturition.[39] Tail docking may have a long-term impact on the behaviour of ewes at mating and parturition.

Age

88. The law in England and Wales restricts the use of rubber rings for castration or tail docking to lambs up to 7 days old, and while in Scotland the rubber ring method may be used beyond 7 days as long as an anaesthetic is used, it was reported that farmers rarely use anaesthetics as part of the procedure. However, AWC is aware that castration and tail docking using rubber rings is frequently carried out on lambs older than 7 days. This is especially true for hill flocks that lamb outdoors (see 67).

89. The current restriction on the use of rubber rings on lambs more than 7 days old dates back to the Protection of Animals (Anaesthetics) Act 1964, when it was generally believed that neonates of various species felt less pain than their older counterparts. However, more recent evidence suggests that neonate ram lambs are more sensitive to pain than older rams, because their pain suppressing mechanisms are less well developed than the pain sensing paths, and that neonate ewe lambs are equally sensitive to pain as older ewes.[40] Indeed, it is believed that very young animals may be experiencing even more pain than they are exhibiting, but they simply do not have the behavioural repertoire to demonstrate this high level of pain.

90. There is now little evidence to conclude that castration is less painful during the first week of life than at an older age. The current legislation therefore appears to be having the unintended consequence that lambs are being castrated and tail docked at an age when it will be most painful for them.

91. The seven-day age restriction for rubber ring castration without anaesthetic also motivates farmers to castrate lambs before they have decided whether they will be kept beyond puberty. A further unintended consequence of the current legislation is therefore that many ram lambs (those that will in fact be slaughtered before puberty) are unnecessarily castrated.

Stress

92. Being prey animals, sheep find close contact with humans, capture, restraint, inversion and immobilisation stressful, particularly if they have previously experienced

[38] J Lloyd et al. Docked tail length is a risk factor for bacterial arthritis in lambs. *Small Ruminant Research* 144 (2016), 17–22.
[39] C Larrondo, H Bustamante, E Paredes and C Gallo. Long-term hyperalgesia and traumatic neuroma formation in tail-docked lambs. *Animal Welfare* 28 (2019), 443–54; C Clark et al. Long-term and trans-generational effects of neonatal experience on sheep behaviour. *Biology Letters* 10 (2014), 20140273.
[40] MJ Guesgen et al. The effects of age and sex on pain sensitivity in young lambs. *Applied Animal Behaviour Science* 135 (2011), 51–6.

very infrequent contact with humans. Ewes with lambs at foot will tolerate much closer contact with humans when their lambs are handled than when not lactating, but this can still cause significant stress, as shown by high pitch and frequent vocalisations, elevated heart and respiration rates and behaviour. Lambs will also find handling stressful, which may be expressed by struggling or immobility (a freezing response) and a high rate of vocalisation. These may be partly due to the separation from the ewe that usually accompanies handling. Capture and handling in very young animals, before a strong maternal bond has developed, can compromise the formation of this bond. If this occurs during the first few hours following birth, it may compromise colostrum intake. In the medium term it may lead to ewe and lamb separation and mismothering, which might imperil longer-term lamb survival. Where lambs have a strong maternal bond, the mother ewe is likely to remain nearby during any handling associated with castration or tail docking if done in the field. If groups of ewes and lambs are brought into a handling or restraint system, there is potential for ewe-lamb separation for several hours. Stress may be further exacerbated while the sheep are moved and are in close contact with humans and working sheepdogs. There is also the risk of injury or bruising if animals collide with handling equipment or one another during any attempted flight or escape.

93. There is good evidence in some species, such as rats and humans, that the presence of, and contact with, the mother can help to reduce pain and stress levels in young animals. In sheep, studies have shown an increase in maternal attentiveness to lambs in pain, although whether this helps to reduce the level of pain experienced by the lamb is not known. This does, however, suggest that the separation of lambs from their mothers when groups of lambs are gathered, will be an additional source of stress, which may in turn exacerbate the painful experience of castration and tail docking.[41]

Ethical analysis

94. If properly carried out, castration impedes normal behaviour by eliminating the possibility of sexual reproduction. Castration avoids unplanned pregnancies, which are likely to lead to an increased incidence of dystocia and lamb death, . Individual ram lambs are therefore castrated for the sake of flock management and future lambs. However, the objective of eliminating sexual reproduction may potentially be achieved by physical segregation, with the ram's bodily integrity and functioning preserved and no pain caused to it.

95. The standard rubber ring castration method is typically used with inadequate pain management. It causes pain shortly after application of the ring and also often gives rise to longer-term pain. In order to be ethically acceptable, either the pain and infection management accompanying and following rubber ring castration need to be significantly improved such that ram lambs experience little or no pain at any point.

96. Castration cannot be justified solely on lamb meat taste grounds. There is limited evidence of a significant objectively identifiable taste or texture difference between the cooked meat of castrates and entire rams.

[41] A Futro, K Masłowska, and CM Dwyer. Ewes direct most maternal attention towards lambs that show the greatest pain-related behavioural responses. *PLoS One* 10 (2015), e0134024.

97. Tail docking is motivated by a range of factors. Some of these, including tradition and easy identification (e.g., tail docking of rams), are ethically unacceptable because the pain and loss of bodily function are not compensated by any welfare gain. Tails shield the anus and external sexual organs from wet, cold and direct sunlight, and, in the case of ewes, protect the udders. Most lambs wag their tails, especially when nosing and while sucking or otherwise in the company of the dam, and so tail use is part of the normal behavioural repertoire.

98. When undertaken as part of a health and welfare plan designed to reduce the incidence of flystrike and the pain and distress associated with it, tail docking may be ethically justified if there is no alternative. However, removing part of the tail is painful and represents a loss of bodily integrity. This should therefore only be done if alternative methods to reduce flystrike have been found to be ineffective. These may include altering feed/grazing, biannual shearing, worm control and insecticide application.

Castration: possible future alternatives

99. Given the welfare and ethical implications of current practice, set out above, it is useful to consider possible alternatives to both castration and tail docking.

No castration

100. Ram lambs could remain intact, be reared with their mothers until weaning then sold for slaughter before puberty or retained for breeding. This has the advantage of not causing pain and reducing the need for early handling so minimising impacts on ewe-lamb bonding, separation and mismothering. Lamb growth and development would be normal and the potential increased risk of lamb mortality due to an early painful experience would be removed. Entire ram lambs grow more quickly than castrates and reach market weight more quickly. Entire males slaughtered before puberty also have a significantly improved carcase grading score compared to castrates. Because ram lambs typically attain puberty earlier than ewes, those that are born early in the year and are from fast growing breeds or genetic lines can reach slaughter weight before females become fertile. These ram lambs would not need to be castrated and this approach would bring welfare gains.

101. One of the disadvantages of this approach is that many ram lambs do not grow fast enough to reach slaughter weight before puberty. The proportion in this category will vary with breed and system but is likely to include the majority of mountain and hill ram lambs. They would need to be kept apart from females (ewes and lambs). Their carcases would become less valuable, because retailers are reported to be reluctant to take ram lambs, other than for the halal market, due to fears of ram taint and the concern that poor flavour and/or texture might affect future consumer purchasing behaviour. Selling ram lambs underweight (light lambs) might be possible but would be at a financial penalty. For slower growing breeds, especially where unfenced pastures do not allow the separation of males and females, this may not be realistic.

102. There is a risk that requiring ram lambs to be slaughtered prior to puberty will further encourage breeders to produce rapidly growing sheep. Genetic selection for this trait, especially if not managed extremely carefully, could result in unintended welfare consequences including increased dystocia, decreased fertility and health issues similar to those observed in other species.[42]

Immunocastration

103. In 2008, FAWC recommended that further studies should be conducted into the practical application of immunocastration and consumer concerns about this method. Since then, immunocastration has been approved for use in the pig industry.

104. Immunocastration achieves ram lamb infertility by vaccinating the lamb against hormones of the Hypothalamic-Pituitary-Gonadal (HPG) axis cascade (e.g., anti-gonadotrophin-releasing hormone). This is not licensed for use in sheep in the UK, although a sheep immunocastration vaccine has been developed and vaccines for use in cattle and pigs are available. Immunocastration requires two injections (a primary dose and a booster) before puberty. Primary vaccinations can be given at weaning, with the second a few weeks later. These prevent testes development, resulting in immature testes (as seen with histological assessments) and a small scrotal circumference, low circulating testosterone, and ram lambs that are indifferent to the presence of oestrus ewes.[43] The effect is not permanent but may require further boosters if ram lambs are to be retained for prolonged periods.

105. Immunocastration is the only method that can claim to be genuinely pain free, even if the act of injecting is likely to cause some discomfort. This is particularly likely if multi-use needles are used, resulting in blunting, as well as bringing the risk of infection. It is likely to be a more expensive option than rubber rings but its targeted use on ram lambs that are unlikely to be finished before puberty may lead to savings.

Clamp castration and combined method

106. The Burdizzo is a clamp that is used to crush and destroy the blood vessels and spermatic cord in the neck of the scrotum. The device is normally used to crush each spermatic cord individually, leaving the blood supply to the scrotum intact, but can also be used to crush across the entire neck of the scrotum so that the tissues distal to the crush die, become necrotic and are shed within about 4–5 weeks of application.[44] Use of a Burdizzo may significantly reduce the pain experienced compared with rubber ring castration. Nerves are crushed when the instrument is applied, and lambs display an initial and immediate acute pain response (vocalisation, kicking). However, during the 60 minutes after application they show a 70% lower active pain and restlessness response compared to rubber rings, and QBA analysis

[42] LO Fiems. Double muscling in cattle: genes, husbandry, carcasses and meat. *Animals* 2 (2012), 472–506; RJ Julian. Production and growth-related disorders and other metabolic diseases of poultry – a review. *The Veterinary Journal* 169 (2005), 350–69.
[43] K Masłowska, Study of an anti-GnRF vaccine as a more welfare friendly method of castration for ram lambs. University of Edinburgh Ph.D. thesis, 2017; T Needham, H Lambrechts and LC Hoffman. Application of immunocastration in a commercial Dohne Merino ram flock before weaning. *South African Journal of Animal Science* 48 (2018), 1115–20.
[44] SRUC Technical Note TN679, at https://www.sruc.ac.uk/media/urenl4or/tn679.pdf.

has also indicated less painful responses following Burdizzo castration than following the use of other common methods.[45] The levels of plasma cortisol released with clamp castration do not, however, differ from those due to castration with rubber rings.[46] The lesions caused by the crush are less likely to become infected than if a rubber ring is used, although ram lambs castrated using a Burdizzo show a similar response to scrotal palpation after castration as those castrated using a rubber ring.[47]

107. Clamp castration requires considerable skill as the spermatic cords need to be accurately located to ensure an effective crush and there is a risk that ram lambs may not be completely infertile if this is not achieved. If a clamp is inappropriately used, or used by an untrained person, there is also a risk that the urethra may be caught and crushed, causing pain and potentially death if a lamb is no longer able to pass urine. In addition, the necrotic tissue distal to the crush injury is not separated from the living tissue and so there is an infection risk. For these reasons a combined method, which uses a rubber ring immediately followed by a crush applied proximal to the ring, has been commended by some studies. This provides the benefits of a rubber ring (an effective seal between the necrotic and living tissues and reliable castration) with the pain-relieving action of the clamp and so probably alleviates pain more effectively than any other non-anaesthetic method.[48] It has been shown to reduce pain effectively, with the scrotum being shed earlier than with the rubber ring alone and lesions no greater than those associated with a rubber ring. However, the method can be cumbersome, and it is time-consuming to carry out two procedures on each lamb.

Short-scrotum castration

108. In this method a rubber ring is placed around the neck of the scrotum but with the testes pushed up close to or in the inguinal canal. The process is simple and quick, and the lamb is rendered infertile as a result of the increased temperature of the testes from being in close contact with the abdomen. The pain behaviours shown by lambs are somewhat lower than with full bilateral castration of the testes, and QBA data suggest that short-scrotum castration is more positively perceived by observers than rubber ring castration.[49] The testes fail to develop normally, and histological evidence suggests that no sperm are present. No research evidence has been presented to suggest that the presence of the testes in or close to the inguinal canal discomforts lambs, and cryptorchidism can occur naturally. The lesions and inflammatory response associated with rubber ring placement are lower than with standard castration using a rubber ring and the necrotic tissue is shed a few days earlier.

109. Although this method is not pain-free, it is viable for ram lambs and widely used in some countries, such as New Zealand (where about 40% of ram lambs are castrated

[45] K Masłowska, F Mizzoni, CM Dwyer and F Wemelsfelder. Qualitative behavioural assessment of pain in castrated lambs. *Applied Animal Behaviour Science* 233 (2020), 105143.
[46] SC Mellema et al. Influence of local anaesthesia on pain and distress induced by bloodless castration methods in young lambs. *Schweizer Archiv für Tierheilkunde* 149 (2007), 213–25.
[47] S Melches, SC Mellema, MG Doherr, B Wechsler and A Steiner. Castration of lambs: a welfare comparison of different castration techniques in lambs over 10 weeks of age. *The Veterinary Journal* 173 (2007), 554–63.
[48] JE Kent, V Molony, IS Robertson. Changes in plasma cortisol concentration in lambs of three ages after three methods of castration and tail docking. *Research in Veterinary Science* 55 (1993), 246–51.
[49] Masłowska et al. Qualitative behavioural assessment.

in this way) and causes less pain than standard rubber ring castration. Care needs to be taken to ensure that the ring is placed close to the abdominal wall to avoid the testes partially descending, which may make the lamb partially fertile, but this is unlikely to occur any more frequently than with full castration if both testes are not descended when castration occurs.

Castration using local anaesthesia and NSAIDs

110. Currently, rubber ring castration may be accompanied by local anaesthesia, although this is not legally required.

111. *The anaesthesia should ideally be administered 10–15 minutes before the rubber ring is placed.* Experimentally, local anaesthesia (given 5 minutes before rings are applied) causes approximately a tenfold reduction in pain-related behaviours and time spent in abnormal postures, and reductions in circulating cortisol. Use of local anaesthesia does not affect the response of ram lambs to palpation of the scrotum in the weeks after castration, and the response in lambs castrated with the use of local anaesthesia is greater than seen in control lambs that are handled but not castrated.[50] However, the necrotic tissue is shed a few days earlier than when the rubber ring is applied without local anaesthesia.

112. Giving local anaesthesia by injection is challenging for farmers, and it is unlikely that many will be prepared to wait sufficient time for the anaesthesia to eliminate all pain. If anaesthesia could be delivered more efficiently, this method might mitigate at least some of the acute pain associated with castration.

113. Using a single needle multiple times may make the process quicker and more cost-efficient for farmers but increase the risk of introducing bacteria into the site. Blunting of a needle as a result of use multiple times can cause increased pain at the injection site. Developments in needle-free injection technology allow anaesthesia to be administered through the skin using a variety of techniques such as shock waves or high-pressure gas propulsion. A needleless injection of local anaesthesia has been used in ram lambs, either immediately at the site of ring application, or directly into the testes, resulting in a reduction in pain behaviours and plasma cortisol compared to no use of local anaesthesia.[51] This method has been tested in the field and judged to be preferred by farmers over the use of a crushing device to achieve insensitivity to pain. However, needleless devices are expensive because they require precision engineering and regular maintenance. Use of rubber rings coated in lidocaine has also been trialled and found to provide some reduction in pain responses, although not to the level that can be achieved by effective administration of local anaesthesia by injection.[52]

114. The anaesthetics currently available for use on ram lambs in the UK are limited (see 71). Procamidor Duo, which is a combination of procaine and adrenaline, is the

[50] Mellema et al. Influence.
[51] JE Kent, V Molony and MJ Graham. Comparison of methods for the reduction of acute pain produced by rubber ring castration or tail docking of week-old lambs. *The Veterinary Journal* 155 (1998), 39–51.
[52] M Stewart et al. Do rubber rings coated with lignocaine reduce the pain associated with ring castration of lambs? *Applied Animal Behaviour Science* 160 (2014), 56–63.

only anaesthetic currently licensed for use on sheep, while procaine itself may be used for sheep under the Cascade. However, the working group heard evidence that procaine in either form does not always effectively block pain, is effective for an unpredictable duration, needs to be very accurately administered due to limited spread through body tissue and is required in a large volume.

115. Evidence presented to the working group indicated that a better product for sheep castration and tail docking would be lidocaine. This is easier to use, requires a much less accurate injection and is more effective and reliable as an anaesthesia. However, lidocaine was banned from use in food-producing animals following a review by the Committee for Veterinary Medicinal Products (CVMP) at the European Agency for the Evaluation of Medicinal Products (EMEA) in 1999. The issue of concern was a metabolite of lidocaine, 2,6-xylidine, which was shown to have genotoxic characteristics. The CVMP concluded that maximum residue limits (MRLs) could not be established for lidocaine in food producing species (other than horses) because data on the occurrence of this metabolite in these species was not available.

116. The European Medicines Agency has now established MRLs for lidocaine in bovine species, valid throughout the European Union, and, in GB, MRLs have now also been established, which increases the likelihood that a product will soon be authorised for use in cattle.[53] It is often the case that when MRLs are established for one species, they can be extrapolated to other species to allow the product to be used more widely. However, in this case, because lidocaine is metabolised to a carcinogenic metabolite, the EMA considered that additional data would be required to confirm that the levels produced in other species did not differ significantly from those seen in cattle, and so did not recommend extrapolating to other species at this stage, and indeed noted that any extrapolation would be to ruminants other than sheep.

117. The Norwegian Scientific Committee for Food Safety (2005) is of the opinion that there is no suitable alternative to lidocaine as a local anaesthetic in food producing animals.[54] It reached this viewpoint because, compared with lidocaine, procaine has a lower potency, slower onset, shorter duration and causes more side effects. It also noted that the studies performed on the lidocaine metabolite 2,6-xylidine to demonstrate the potential carcinogenic risk to humans are old and were carried out using non-GLP (good laboratory practice) principles. Furthermore, these experiments were performed on rats and used a repeated oral dose that far exceeds the concentration ever used for local anaesthesia. The Norwegian Food Safety Authority therefore now allows lidocaine to be used in food producing species, with a zero-day withdrawal period for milk and a 24-hour withdrawal period for slaughter.

118. Lidocaine is also used on sheep in Australia and New Zealand, which together provide 85% of the UK's imported sheep meat.

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[53] Veterinary Medicines Directorate, Maximum Residue Limits in Great Britain, at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1100404/MB_2__2097921-v1-MRLs_in_GB_editable_version.pdf.

[54] The Opinion of the Scientific Committee of the Norwegian Scientific Committee for Food Safely. Risk assessment of lidocaine residues in food products from cattle, swine, sheep and goats: withdrawal periods for meat and milk (2005).

119. MRLs have also now been established for the cutaneous and/or epilesional use of lidocaine in piglets up to 7 days of age for local anaesthesia during and after castration, and Tri-Solfen, which contains lidocaine and bupivacaine, has now been authorised for this purpose in the UK. It is intended that this be applied topically to the spermatic cords of piglets as part of surgical castration. Bupivacaine acts for longer than lidocaine although it is only effective for 3–4 hours.[55]

120. Tri-Solfen was originally developed in Australia for pain mitigation in mulesed lambs but has also been tested in ram lambs undergoing castration. An Australian study suggested that lambs castrated using a knife exhibited greater cortisol and behavioural pain responses compared to lambs castrated with rubber rings, and that this was moderately reduced by the use of Tri-Solfen.[56] A second study suggested that knife castration using Tri-Solfen was more effective at reducing pain (based on behavioural assessment) compared to rubber ring castration.[57] Tri-Solfen has poor skin penetration and is only really effective as an anaesthetic agent on open wounds, such as those resulting from knife castration or hot iron tail docking, neither of which is commonly used in the UK.

121. Local anaesthesia can have some impact on the acute pain response of lambs, but there is less evidence that it can mitigate chronic pain. Use of long-acting analgesics, such as NSAIDs (e.g., meloxicam), may be more useful in reducing longer-lasting painful stimuli. Meloxicam can be injected, but an oral application is also now available. The efficacy of buccal delivery of meloxicam for pain relief has been tested in sheep castrated with a knife and tail docked with hot irons.[58] However, these are not directly comparable to methods used in the UK. In this study, treatment with meloxicam reduced the time lambs spent standing hunched or stretched or showing abnormal behaviours during the 8 hours following castration and tail docking compared with lambs treated with placebo, and lambs treated with meloxicam were more likely to be lying during the 24 hours after treatment. However, another study using local anaesthesia and meloxicam injection, alone or in combination, with rubber ring castration in ram lambs aged 4–6 weeks old, suggested that neither approach eliminated all pain, but that there was some benefit in using both products in the first 5 hours after castration that was not seen with meloxicam alone.[59] Meloxicam is not recommended for use on lambs under 14 days of age.

Castration using new methods

Numnuts

[55] A Small, AD Fisher, C Lee, I Colditz. Analgesia for sheep in commercial production: where to next? *Animals* 11 (2021), 1127.
[56] DR Paull, C Lee, IG Colditz and AD Fisher. Effects of a topical anaesthetic formulation and systemic carprofen, given singly or in combination, on the cortisol and behavioural responses of Merino lambs to castration. *Australian Veterinary Journal* 87 (2009), 230–7.
[57] S Lomax, M Sheil and PA Windsor. Use of local anaesthesia for pain management during husbandry procedures in Australian sheep flocks. *Small Ruminant Research* 86 (2009), 56–8.
[58] AH Small, S Belson, M Holm and IG Colditz. Efficacy of a buccal meloxicam formulation for pain relief in Merino lambs undergoing knife castration and tail docking in a randomised field trial. *Australian Veterinary Journal* 92 (2014), 381–8.
[59] NJ Kells et al. Effect of analgesic strategies on pain behaviour associated with combined ring castration and hot iron tail docking in Merino lambs. *Applied Animal Behaviour Science* 222 (2020), 104914.

122. Numnuts is a hand-held device combining a ring applicator and injector. It attaches a rubber ring to the scrotum of the ram lamb and delivers local anaesthesia proximal to the ring immediately after its application as part of the same process. The device uses NumOcaine, its own brand lidocaine, which has been licensed for use in Australia since 2019 and New Zealand since 2021. It is not currently licensed in the UK.

123. In Australia, NumOcaine (lidocaine) is reported to work within 1–5 minutes of injection but may only have a short duration of action. Use of the Numnuts device for castration combined with tail docking reduced acute pain behaviours in ram lambs of 4–10 weeks of age at 5 and 20 minutes after castration but not from 35 minutes onwards.[60] In addition, although painful behaviours were fewer, they were still significantly greater than among the control animals throughout. The number of abnormal postures shown by lambs castrated and tail docked with Numnuts did not differ from lambs castrated and tail docked with a rubber ring. However, ram lambs mothered up following the procedure as quickly as sham-treated controls and there was no negative effect on weight or average daily gain. Recent unpublished evidence suggests that the use of Numnuts with lidocaine for castration alone caused a reduction in some pain behaviours in the first 10 minutes after ring application but not thereafter.

124. Research by Scotland's Rural College (SRUC) awaiting publication has shown that, overall, the use of Numnuts with procaine for castration and tail docking has some benefits in reducing the early expression of painful behaviours during the first 20 minutes after application, but not thereafter. However, for castration without tail docking, the use of Numnuts did not appear to alleviate pain any more than the use of rubber rings. There are no data on the effects on palpation, lesion scores or time to shed the necrotic tissue when using this device. In Australia, Numnuts with lidocaine is usually used on lambs secured in a cradle because two hands are required to apply the ring and local anaesthetic. How effectively these could be done in a UK hill situation, by one person without a cradle, is unknown.

125. Meat from ram lambs that have been castrated using a Numnuts device with Numocaine (lidocaine) is currently permitted to be imported into the UK for consumption. However, Numnuts could only be used in the UK in conjunction with an anaesthetic licensed for use in the UK on lambs. Only Procamidor Duo (containing procaine) is currently licensed for this purpose. In England and Wales, the device could only be used on ram lambs under 7 days old, because the current legislation prohibits ring castration on lambs older than 7 days of age. However, in Scotland the law allows ring castration (with anaesthesia) up to 3 months of age. In Australia, it is generally used on lambs more than 7 days old.

ClipFitter

[60] AH Small, EC Jongman, D Niemeyer, C Lee and IG Colditz. Efficacy of precisely injected single local bolus of lignocaine for alleviation of behavioural responses to pain during tail docking and castration of lambs with rubber rings. *Research in Veterinary Science* 133 (2020), 210–18.

126. This is a device developed in the UK that aims to replicate the mechanism of the combined castration method with a single mechanical action that attaches a disposable clip to the lamb's scrotum.[61] The clip remains in place until the dead tissue is shed, so replicates the role of a rubber ring but with the aim of providing the reduction in active pain behaviour seen with use of the Burdizzo clamp. ClipFitter is designed to achieve castration by crushing the spermatic cords or tissue, including the nerve supply, and causes immediate desensitisation of the tissues distal to the clamp. The subsequent necrosis and loss of the desensitised tissues due to cessation of blood flow caused by the clamp remaining in place is secondary to this.

127. In a recent SRUC study commissioned by Defra, which is awaiting publication, the use of ClipFitter mitigated the pain associated with castration in lambs under 7 days old to a level indistinguishable from that experienced by uncastrated lambs, and to low levels in lambs aged 4–6 weeks.[62] The necrotic tissues were shed more quickly than by other methods and the lesion scores were smaller than those associated with rubber rings. The older lambs were considered to be close to the upper weight (approximately 20 kg liveweight) at which the clamp could be easily and effectively closed to ensure rapid tissue desensitization.

128. ClipFitter is regarded as a novel device with a mode of action not foreseen when the legislation restricting the use of rubber rings or other devices to constrict the flow of blood was being developed. In Scotland, because of its mode of action, it is considered to be a method of castration or docking that can legally be used on lambs up to 3 months old without anaesthesia.

129. In England and Wales, the current position is that, because the device causes restriction of blood flow to the scrotum or tail, it should be considered in the same way as a rubber ring and not be permitted for use on lambs over 7 days old.

130. Smaller clips are now being developed for younger lambs. Biodegradable clips are available containing an additive that accelerates degradation.

Tail docking: possible future alternatives

131. As has been noted, there are significant welfare and ethical problems with the current practice of tail docking. However, the issues are somewhat different from those relating to castration because tail docking is used to prevent flystrike. This causes significant pain and distress and, without treatment, can lead to death. Because of this direct benefit to the animal, tail docking may appear more defensible than castration. While sheep that have not been castrated will continue to thrive, albeit with some unwanted pregnancies, sheep that have not been treated for flystrike are potentially at serious risk.

[61] https://eadiebros.wordpress.com/blog/

[62] Quantitative assessment of pain associated behaviours of male lambs (less than 1 week and 6-8 weeks old) in response to castration or tail docking with a new method (*Clampeasy*/also known as *ClipFitter*) compared with a 'best welfare practice' method which includes local anaesthesia and analgesia. Cathy Dwyer, AW0303, 2022.

132. There are alternative options for avoiding flystrike. If farmers are transitioning away from tail docking, this will require an evaluation of the timing and method of the new procedures to ensure they meet the farm's particular needs, depending, for example, on sheep breed, time of year, weather conditions, hill or lowland location, incidence of flystrike and the methods used to minimise the animal's parasite burden and maintain its cleanliness.

133. Tail docking for other purposes, such as of males to differentiate them from females, for cosmetic reasons, or because breeders believe that docked animals kept for breeding will achieve a higher market price, is unacceptable.

No tail docking

134. Early lambing flocks, where lambs are raised for the spring trade or are expected to be slaughtered before the blowfly season, could remain undocked. There is no justification for docking the tails of these lambs as they should not be at risk of flystrike. Similarly, the evidence that lambs of naturally short-tailed breeds require tail docking to avoid flystrike is extremely limited and these should also remain undocked.

135. If other lambs are to remain undocked, farmers will need to consider alternative strategies to reduce the risk of flystrike. Every farm is different and there will be no single solution that works for all. Instead, each individual sheep-keeper will need to develop a justifiable strategy that works for their own circumstances. This may involve both management decisions and appropriate genetic selection.

136. For example, a farmer may be able to take advantage of the local microclimate. Flies tend to be less prevalent on an open, breezy hillside but present in higher numbers in areas of high humidity or near stagnant water. Other blowfly attractants such as livestock and wildlife carcases, should be rapidly removed. Similarly, it may be possible to introduce rotational grazing systems that regularly move sheep away from their dung piles that may soil wool and attract insects.

137. Scour (diarrhoea) in sheep increases the risk of faecal soiling of the wool (dags) around the breech of the animal, which increases the risk of flystrike. During flystrike season, sheep should be carefully monitored and, if necessary, gathered at regular intervals to shear (crutch) the wool around the breach and tail areas. In addition, any animal with faecal soiling should be immediately caught, its dags removed and, if necessary, treated with an appropriate anthelmintic. However, catching a single sheep on an open hillside is both challenging and time-consuming, often requiring an experienced shepherd and good working sheepdog(s), and is stressful to the sheep. Reducing the incidence of scour in the flock is therefore of paramount importance.

138. Whether an animal develops scour depends on several different interacting factors, including genetics, nutritional status, stress levels, diet, a range of different infectious agents and gastrointestinal parasites.

139. Dietary factors that increase scour risk include a rapid change in diet, fast introduction to lush spring pastures and micro-nutrient deficiencies. Ensuring animals

are slowly introduced to new foodstuffs, providing access to sufficient fibre (e.g., hay) when they are first put out on fresh grass and providing appropriate mineral blocks can all decrease the risk of scour.

140. To reduce the incidence of gastrointestinal parasites, sheep farmers should follow the Sustainable Control of Parasites in Sheep guidelines[63] for appropriate use of anthelmintics and introduce grazing management that reduces the likelihood of susceptible animals ingesting parasites and/or allows the sheep to graze mixed swards (including tree and shrub browse). This is because ingestion of plants containing high concentrations of condensed tannins has been associated with reduced gastrointestinal worm counts. In addition, future breeding stock may be selected from ewes that scour less and/or have lower gastrointestinal parasite burdens.

141. Because the incidence of flystrike rises as humidity near the skin increases, shearing earlier in the season or even twice a year may be advisable. However, when deciding the best time to shear, other welfare aspects also need to be considered. For example, ewes within their first 8–12 weeks of lambing may have enlarged milk veins. These can make shearing more difficult and therefore increase the duration and stress caused to the animal. Shearing requires separation of the ewe and lamb(s), at least temporarily, which is likely to cause significant distress in both. Similarly, shearing late in the season may be inappropriate if the animal would then have insufficient protection from inclement weather.

142. It is also possible to select sheep that have a lower risk of attracting blowflies and therefore a lower risk of developing flystrike. For example, some breeds naturally shed their winter fleece, whilst hair breed sheep do not grow wool at all, but instead have a rugged hair coat. These animals often use trees or a robust fenceline for scratching to help shed their winter coat. Newer commercial types of sheep continue to be derived from these original founder populations, which need to be continually monitored and selected to ensure that the gene mutations associated with shedding remain within the population.

143. Humidity near the skin tends to be higher in lowland sheep breeds with close-knit wool or wrinkly skin. Recent breeding programmes in Australia that select against these traits have had some success in increasing the resistance to breech strike from blowflies. It is hoped that this approach will form part of a long-term strategy to improve flystrike prevention and therefore reduce the need for mulesing.[64]

144. It is also possible to select for short-tailed sheep, and some breeds naturally have shorter tails, such as the Northern European short-tailed sheep breeds. These often have fewer vertebrae (8–10 compared to 16–18 in longer tailed breeds). However, these tend to be primitive breeds, which are generally considered less commercially acceptable. The current high prevalence of tail docking has meant that until now there has been little incentive for the sheep industry to invest effort in

[63] https://www.scops.org.uk

[64] F Brien and P James. Breech flystrike prevention genetic R&D review. Independent review of Australia Wool Innovation's Breach flystrike prevention genetic research, development and extension program, at https://www.wool.com/sheep/welfare/breech-flystrike/progress/.

identifying short-tailed individuals and breeding from them. It would, however, be possible to start genetic selection for short tails in 'commercial' breeds and flocks. However, there are risks in crossing with the known short-tailed breeds as this may dilute some of the growth traits that are currently sought by commercial breeders. Moreover, breeding programmes that screen and select for short tail mutations may bring unintended consequences. In the future, however, if the genetic basis for a short tail in the Northern European group were better understood, this could potentially be introduced into more commercial breeds without the unwanted traits.

145. While these different breeding options are important strategies for the majority of commercial flock within the UK, some rare breed societies may be less willing to adopt them as they may further reduce the genetic diversity within a small population and/or produce unacceptable changes to breed characteristics.

Use of insecticides and insect growth regulators

146. Long-acting topical insecticides or insect growth regulators can be used on sheep. These work best when applied prophylactically before or near the start of the flystrike season. If required a second spray treatment later in the season may also be applied. However, all these treatments pose risks to environmental invertebrates and can also contaminate waterways. The topical insecticides are also toxic to humans. These treatments should therefore be used with care. Alternative non-toxic treatments are sometimes used, especially by organic farmers. However, these tend to last only a few days and wash off in the rain. They therefore need to be frequently reapplied and are probably unfeasible for use on large flocks.

Tail docking using local anaesthesia and NSAIDs

147. The principles of pain management are the same for tail docking and castration, in that ideally both an anaesthetic and an NSAID are used in advance. However, it is more difficult to anaesthetise a tail, as it is necessary to block four nerves, which is challenging with a single injection. One possible method is to attach two rubber rings with a space between them and give an injection into the space while applying pressure. Administration of a local anaesthetic to the left and right dorso-lateral tissues of the tail, either 1–2 minutes before the ring application or immediately after, by either conventional needle and syringe or needleless injector, reduces the cortisol and behavioural responses of lambs to tail docking.[65] Attempts to alleviate pain via the oral or intramuscular administration of NSAIDs, or by using analgesic sprays (which can be effective on pain caused by knife castration) or epidermal application of a local anaesthetic, are not as effective in reducing pain compared to a targeted local anaesthetic injection.[66]

148. However, the same issues apply to tail docking as to castration in relation to the poor availability of licensed anaesthetics and NSAIDs. The increased precision in

[65] MJ Graham, JE Kent and V Molony. Effects of four analgesic treatments on the behavioural and cortisol responses of 3-week-old lambs to tail docking. *The Veterinary Journal* 153 (1997), 87–97; Kent et al. Comparison of methods.
[66] JC Pollard, V Roos and RP Littlejohn. Effects of an oral dose of acetyl salicylate at tail docking on the behaviour of lambs aged three to six weeks. *Applied Animal Behaviour Science* 71 (2001), 29–42.

the injection site, and the need to apply more than one injection to achieve effective anaesthesia for tail docking, makes this is a more challenging procedure for farmers. Inaccurate injection may result in temporary hind limb paralysis. Also, as described above, use of the same needle to inject multiple animals increases the risk of spreading bacterial infection and needle blunting may lead to increased pain in some lambs.

Tail docking using new methods

149. Research on the tail docking of ewe lambs has found no difference between lambs that are tail docked using Numnuts with lidocaine and sham handled lambs, although the Numnuts lambs then spent less time attempting to suckle.[67] This suggests that Numnuts with lidocaine may greatly reduce the pain associated with tail docking but leave some residual discomfort. Unpublished research suggests that using Numnuts with procaine for tail docking fails to provide that same level of observed pain reduction. This confirms the findings of previous studies.[68] The variability of response may be due to the precise location of the injection relative to the tail bone and nerves and the balance of visceral and somatic pain.

150. In the recent SRUC study commissioned by Defra previously referred to (see 126), the use of ClipFitter mitigated the pain associated with tail docking in two groups of lambs (one group aged under 7 days and another group aged 4–6 weeks) to the very low level observed when local anaesthesia and analgesia were provided.[69] The necrotic tissues were shed more quickly than by other methods, and the lesion scores were smaller than seen with rubber rings.

Conclusions

151. FAWC's 1994 Report on the Welfare of Sheep stated 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'. The 2008 Report on the Implications of Castration and Tail Docking for the Welfare of Lambs reiterated this position. However, castration and tail docking continue to be routinely carried out on many farms. The evidence gathered throughout this review confirms that, despite these Reports, there has been very little change in practice.

152. The welfare and ethical analyses set out above endorse our view that castration and tail docking, as currently practised, cause a welfare harm that includes immediate and ongoing pain. Even when conducted with pain control, castration and tail docking result in losses of bodily integrity and the capacity to express normal behavioural repertoire.

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[67] A Small, D Marini and I Colditz. Local anesthetic delivered with a dual action ring and injection applicator reduces the acute pain response of lambs during tail docking. *Animals* 11 (2021), 2242.
[68] A Small, M Fetiveau, R Smith and I Colditz. Three studies evaluating the potential for lidocaine, bupivacaine or procaine to reduce pain-related behaviors following ring castration and/or tail docking in lambs. *Animals* 11 (2021), 3583.
[69] Quantitative assessment. Dwyer, AW0303, 2022.

153. Across GB, the law on castration and tail docking is complex, difficult to understand and based on outdated scientific evidence. Moreover, some legal requirements are rarely enforced. Hill farmers who lamb outdoors are only able to gather their ewes and lambs once the lambs are old enough to be fully mobile and the risk of mis-mothering is low. Many such farmers therefore perform these procedures on their lambs using rubber rings beyond the legal age limit of 7 days. Furthermore, the legal restriction of the use of rubber rings to the first week of the lamb's life (or, in Scotland, beyond that with anaesthesia) has no scientific basis and may well be encouraging farmers to castrate and tail dock early in cases where it is unnecessary.

154. The Codes of Practice still require updating and thorough revision. They state that castration and tail docking should only be carried out if a welfare harm might otherwise occur, but this allows both to be justified in large numbers of cases. Farmers may be following the letter of the Codes but there has been little incentive for them to follow the principle that these mutilations should generally be avoided. Indeed, while castration is generally practised as a management tool, some lambs appear to be tail docked to meet breed standards and improve market price rather than for welfare reasons.

155. Just as there has been no legal or regulatory requirement for farmers to change their practices, there has been no incentive for them to seek alternatives. Apart from some funding briefly available as part of the Scottish Government Animal Welfare Management Programme, which was discontinued several years ago, no support has been given to farmers to encourage them to reduce or eliminate their use of castration and tail docking.

156. Despite the recommendation in the 2008 FAWC Report that retailers and others in the food supply chain should reward famers for adopting a welfare-focused policy on castration and tail docking, some retailers continue to require castration and indeed pay a premium for what they consider to be a higher quality product. A widespread belief continues that meat from uncastrated ram lambs is of lower quality than that from castrates, meaning that such meat often attracts a lower price. However, there is little objective evidence that this meat possesses an inferior flavour. The public perception that sheep farming is 'natural' means there is little push from consumers or retailers to improve welfare standards.

157. In 2008, FAWC recommended that pain relief be used when carrying out these practices and that more practical methods of delivering it should be developed. Yet there continues to be a lack of licensed anaesthetics and analgesics that are effective, affordable and easy to administer. Although immunocastration products for sheep have been developed by some pharmaceutical companies, because rubber rings are still permitted and are extremely cheap, there has been little incentive to license them in the UK.

158. In 2008, FAWC recommended that Government should work with industry to support the development and authorisation of pain relief products and suitable methods of delivery, but this has largely been left to the market, which has ultimately failed to produce what is needed. Because castration and tail docking are still generally permitted without pain relief, there has been no incentive for pharmaceutical companies to develop and commercialize effective and easy to administer

anaesthetics and analgesics for these purposes. There is little financial incentive to apply for licences specifically for sheep when products that are already available and licensed for other animals are being prescribed and used under the Cascade. This potentially routine usage is not in keeping with the exception requirement for use under the Cascade.

159. Similarly, because castration and tail docking are generally permitted using the rubber ring method, there has been little commercial incentive for new, more humane products to be developed, especially given the absence of direct Government support. Nevertheless, the development of two new prototype products in recent years shows that alternatives might be possible and has stimulated further discussion of possibilities. Published scientific studies using Numnuts suggest that it reduces pain responses to tail docking, although with residual discomfort remaining, and reduces pain responses where tail-docking and castration are combined. A recent and currently unpublished scientific study of ClipFitter suggests that it is a practical and feasible alternative to the use of rubber rings that results in greatly reduced pain responses to castration and tail docking carried out separately. Further research is needed to determine the maximum size of lamb on which this device, or a similar device, might be used.

160. Although this review has focussed on castration and tail docking, these are not the only mutilations that are routinely performed on sheep. Ear notching and tagging can cause physical damage and may require review in the light of new techniques.

161. Current castration and tail docking practices can no longer be justified. They should no longer be permitted except where there is truly no alternative, and in these cases should only be carried out with effective pain relief or in ways that cause negligible pain. However, AWC does not believe that the solution is a simple change in law or change in practice. This is a multifaceted, systemic problem, which will require systemic change.

Recommendations

162. The legislation relating to castration and tail docking in each administration should be amended to bring it into line with current scientific knowledge and to take account of current farming practices for lambs at different ages. Given the movement of sheep across GB as part of the normal farming cycle, legislation should be consistent across administrations.

163. Amended legislation should come into force by 2028 at the latest. During the intervening period, arrangements should be put in place to incentivize and support new farming practices, and suitable castration and tail docking methods should be made available. AWC considers 5 years to be sufficient for the infrastructure to be put in place and the legislative changes should not be delayed any longer than necessary.

164. The current legislation should be simplified as far as possible, ideally so that all relevant provisions concerning how, when and by whom the procedures are permitted are clearly stated and included in a single piece of legislation in each administration.

165. The Codes of Practice for the Welfare of Sheep should be updated to reflect these changes.

166. In the short-term, across GB, legislation should be amended to allow new devices that have been shown to be less harmful to welfare to be used to castrate and tail dock lambs (e.g., ClipFitter, Numnuts).

167. In the short-term, lidocaine should be licensed in GB for use on sheep.

168. Arrangements should be made to monitor castration and tail docking practices, to verify that any new guidelines are being followed and to assess if there are any unintended environmental impacts (e.g., chemical or plastics residues).

Castration

169. Where the physical separation of rams from ewes is not possible (e.g., common land, extensive grazing systems), castration should only be permitted on ram lambs not intended for slaughter before puberty.

170. Castration should only be permitted with the written agreement of a veterinary surgeon as part of an annual welfare management review.

171. Anaesthesia and analgesia should be routinely provided for any method of castration where significant pain is likely to be caused.

172. Anaesthesia and analgesia should be routinely required for castration performed at any age (including during the first 7 days of life) whenever significant pain is likely to be caused.

173. Physical castration by a stock keeper should be legally permitted only for ram lambs of a size, weight or age appropriate to the method used. AWC considers that there is currently insufficient evidence for it to specify an upper age limit.

174. The current legal requirement that the castration of lambs over 12 weeks old must only be carried out only by a veterinary surgeon should continue.

175. The current legal requirement in Scotland that castration using a knife or blade must only be carried out by a veterinary surgeon should be introduced in other administrations.

Tail docking

Legislative changes

176. Tail docking should only be permitted where there is a high risk of flystrike and on lambs that are not intended for slaughter before the blowfly season and which are not of a self-shedding breed.

177. Tail docking should only be permitted with the written agreement of a veterinary surgeon as part of an annual welfare management review.

178. Anaesthesia and analgesia should be routinely provided for any method of tail docking whenever significant pain is likely to be caused.

179. Anaesthesia and analgesia should be routinely required for tail docking performed at any age (including during the first 7 days of life) whenever significant pain is likely to be caused.

180. Tail docking by a stock keeper should be legally permitted only for lambs of a size, weight or age appropriate to the method used. AWC considers that there is currently insufficient evidence to recommend a particular age.

181. In England and Wales, it should be a legal requirement that the tail docking of lambs over 12 weeks old must only be carried out by a veterinary surgeon. In Scotland, this legal requirement should continue.

System and infrastructure changes

182. By 2028, castration and tail docking methods that meet the new legislative requirements listed above should be available to farmers, including suitable licensed anaesthetic and analgesic products.

183. To this end, Government should undertake a review of anaesthetics and analgesics for lambs. This should include, but not be limited to, consideration of all anaesthetics and analgesics known to be effective in lambs, and whether each might be permitted for use in GB. It should strike an appropriate balance between avoiding pain to the animal and protecting consumer health. Particular consideration should be given to products such as lidocaine currently licensed for use on lambs in countries from which GB imports lamb meat, but which are not licensed for use on lambs in GB.

184. The Government review should also include consideration of the longevity of anaesthesia and analgesia on lambs. If no suitable products are currently available, Government should work with industry to support their development and commercialization.

185. By 2028, Government payment schemes should be available to support the new farm management practices required for keeping ram lambs intact, such as segregating ram and ewe lambs.

186. By 2028, all assurance and retailer schemes should be aligned with the new legislation.

187. Tail docking should not be a requirement of any breed standard and animals that are docked should not attract a market premium.

188. Training should be provided for stock keepers on appropriate shearing and crutching practices to prevent flystrike.

189. Government should support the development of chemical treatments to prevent flystrike that are not environmentally harmful.

190. In view of climate change, research should be encouraged to monitor the incidence of flystrike and to understand its aetiology and the risks associated with it.

Other mutilations performed on sheep

191. AWC recommends that a further review be conducted of the welfare implications of ear tagging and ear notching.

Glossary

Anaesthesia – Induced temporary loss of the sensation of pain to allow surgery or other painful procedures to be performed. In this Opinion, the term is exclusively used to refer to local anaesthesia, i.e., the loss of sensation in a small part of the body.

Anaesthetic – A pharmaceutical product that induces loss of the sensation of pain.

Analgesia – Relief of pain.

Analgesic – A pharmaceutical product that relieves pain.

Anthelmintic – A pharmaceutical product used to treat parasitic worm infections.

Buccal – Relating to the cheek pouch.

Burdizzo – A brand of clamp castrator with two blunt jaws that crush the spermatic cord and stop the blood supply to the testes.

Cascade – A legislative provision in the Veterinary Medicines Regulations that allows a veterinary surgeon to prescribe a veterinary medicine licensed for one species for use on another in order to avoid causing unacceptable suffering in cases where there are no suitable products authorised for the species in question, but only where a 28-day withdrawal period is observed before slaughter.

Cast ewe – An older ewe that would struggle in harsh terrain but may thrive in a different environment.

Castration – The removal or destruction of the testes, or prevention by other means of their normal functioning, to render a ram lamb infertile.

Clamp castration – Castration by applying an instrument comprising two blunt jaws across the neck of the scrotum to crush the spermatic cords.

ClipFitter – A brand of lever plier, formerly known as ClampEasy, that clamps a disposable clip to the tail of a lamb, or to the scrotum of a ram lamb, that remains in place until the dead tissue is shed.

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 a 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.

Cryptorchidism – The absence of at least one testicle form the scrotum.

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

Ewe – A female sheep.

Ewe lamb – A female lamb.

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

Hogget – A sheep 1–2 years of age or meat from such a sheep.

Hyperalgesia – Excessive sensitivity to pain.

Immunocastration – The administration of a vaccine that 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.

Lamb – A sheep less than 1 year of age.

Lidocaine – A local anaesthetic previously known as lignocaine.

Mule – A cross between a Bluefaced Leicester ram and a purebred hill or mountain ewe.

Mulesing – The removal of wool-bearing skin from around the tail head of a sheep to reduce the risk of flystrike in skin folds.

Mutton – Meat from a sheep slaughtered at 2 years of age or older.

Neuroma – A growth of nerve tissue that may cause pain.

Numnuts – A brand of hand-held device combining a ring applicator and injector that attaches a rubber ring to the tail of a lamb, or to the scrotum of a ram lamb, and delivers a local anaesthetic proximal to the ring immediately after its application.

Oral – Relating to the mouth.

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

Primitive – An unimproved breed with physical and behavioural characteristics similar to those of wild sheep.

Prophylactic – A treatment used to prevent disease occurring.

Ram – A male sheep.

Ram lamb – A male lamb.

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

Short scrotum castration – A castration technique that leaves the testes above a rubber ring. The testes are pushed up close to or into the inguinal canal and subject to a higher temperature than in the scrotum, thus rendering the ram lamb infertile.

Stock keeper – A person of 18 years or older with charge of animals, or a 17-year-old undergoing instruction in animal husbandry subject to the conditions specified in Schedule 3 of the Veterinary Surgeons Act 1966.

Store lamb – A lamb sold from one farm to another for fattening and slaughter.

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

Wether – A castrated male.

Appendix 1: AWC membership

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Martin Barker
Dr Andy Butterworth
Richard Cooper
Dr Jane Downes
*Dr Troy Gibson
*Dr David Grumett
Dr Maria Carmen Hubbard
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Dr Dorothy McKeegan
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*Dr Pen Rashbass
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Halal Monitoring Committee
Hybu Cig Cymru – Meat Promotion Wales
Institute of Auctioneers and Appraisers in Scotland
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National Farmers' Union Scotland
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