



*Castration of sheep* is one of a range of Animal Welfare Approved technical papers which provide practical advice and support to farmers. For more information visit [www.animalwelfareapproved.org](http://www.animalwelfareapproved.org)

**About this technical paper**

This technical paper provides farmers who are participating in the Animal Welfare Approved program with advice on the castration of sheep. Modern research shows that certain methods of castration, castration without anaesthetic, and castration beyond a certain age, can impact on animal welfare. This technical paper outlines best practice advice on castration to ensure the highest levels of welfare.

**KEYWORDS**

Welfare; castration; sheep; surgical castration; Burdizzo castration; rubber rings; anaesthetic; pain relief.



## **Animal Welfare Approved Technical Paper No. 10**

### **Castration of sheep**

Animal Welfare Approved has the most rigorous standards for farm animal welfare currently in use by any United States organization. Its standards have been developed in collaboration with scientists, veterinarians, researchers, and farmers across the globe to maximize practicable, high welfare farm management.

#### **Why castrate sheep?**

Castration is a very common procedure that is carried out on sheep. Castration involves the removal or destruction of the testes or testicles, and is carried out in order to stop the production of male hormones.

Ram lambs are normally castrated for management reasons. When male and female lambs are reared together there is a risk of unwanted breeding. There is also a perception that meat from rams is less acceptable to consumers than meat from wethers due to taint. Castration eliminates these problems.

#### **What do the Animal Welfare Approved standards require?**

The Animal Welfare Approved standards allow the castration of lambs when uncontrolled breeding cannot be prevented by any other management. Castration must be performed by someone who is competent to carry out the operation, either through training or experience. The standards also place restrictions on which methods of castration can be used, as well as the age of the animal to be castrated.

The reason for these restrictions is that castration is painful and potentially unnecessary. The testes and scrotum are richly supplied with nerves and any modification to them will cause immediate pain that can last for some time. All physical methods of castration will cause some degree of pain that can be exhibited both during and after castration.

#### **What are the different methods of castration?**

##### *Emasculator or burdizzo castration*

This method of castration uses a clamp which crushes the blood vessels around the testes, cutting off blood supply and causing them to die and drop off.

Animal Welfare Approved allows emasculator or burdizzo castration for lambs up to seven days of age.

##### *Rubber rings*

Ring or band castration involves fitting a tight rubber ring or band to the neck of the scrotum to cut off the blood supply to the testes, causing them to die and drop off.

A major problem with using rings on older lambs is the increasing size of the scrotum and associated structures which, when constricted by the ring, can give rise to chronic inflammation, sepsis and pain until the scrotum falls off and healing occurs. For this reason, lambs should ideally be castrated as soon as possible after they have formed a secure maternal bond but not before they are 24 hours old.

To minimize pain and discomfort Animal Welfare Approved requires farmers use rubber rings for lamb castration before seven days of age.

#### *Combined ring and burdizzo*

In the combined ring and burdizzo method, the ring is applied to the scrotum as normal and the burdizzo is then used just above the ring. The burdizzo crushes the nerves above the ring and reduces the pain response shown by the lamb.

Some studies in the UK (Kent *et al* 1993, Kent *et al* 1995, Molony *et al* 1997 and Kent *et al* 1998) support the use of the combined method as a way of reducing the pain associated with castration. The strongest evidence in support of the combined method comes from a number of studies of lambs less than seven days of age where the combination of the ring and clamp resulted in a significant reduction in behavioral and physiological indicators of pain. Studies have also shown that the combined method of castration with rings led to earlier shedding of the scrotum and quicker healing of wounds.

To minimize pain and discomfort, Animal Welfare Approved allows the combined use of rubber rings and burdizzo for lambs before seven days of age.

#### *Surgical castration*

The testicles may be surgically removed. With this method, a sharp knife or scalpel is used to remove the bottom one-third of the scrotal sac. The testicles are removed and the wound is allowed to drain and heal naturally. It is essential that good technique using appropriate tools that have been sterilized is used when applying the surgical method of castration.

According to research (Kent *et al* 1993 and Kent *et al* 1998) surgical castration is the most painful method of castration, as lambs that are surgically castrated have higher amounts of cortisol in their bloodstream compared to lambs castrated using other methods. Cortisol is released by the adrenal glands to help the body manage stress. If an animal (or human) is suffering pain or distress cortisol levels will increase in the blood and the saliva. A New Zealand study (Lester *et al* 1996) found that that the greatest pain response of all methods occurred with surgical castration. The severe distress responses of lambs also lasted for considerably longer, around eight hours, compared with 3.5 hours or less for other castration methods. Surgical castration also has the greatest potential for infection and fly infestation.

Animal Welfare Approved prohibits the surgical castration of lambs at any age.

#### **It's common practice to castrate ram lambs older than one week of age. Why doesn't Animal Welfare Approved allow this?**

A number of procedures that are 'common practice' in farming are not permitted in the Animal Welfare Approved standards. While Animal Welfare Approved obviously wants to

ensure that approved farms are commercially viable we have to balance production with animal welfare.

We know that castration will cause pain, regardless of which castration method is used or the age out of the animal. Scientists have spent a lot of time looking at the best options for castration. The research conducted to date looks at varying ages and types of castration with varying results in terms of what is considered to be the most painful method or age. The overall conclusion is that the older the animal is, the greater the pain it will experience. Various studies also show that lambs castrated at older ages will experience greater welfare problems than lambs castrated at younger ages, such as larger and more severe lesions (Kent *et al* 1999, Mellema *et al* 2006).

In light of the scientific evidence above, the ideal situation for an Animal Welfare Approved farm would be to avoid the need for castration altogether by managing lambs in a way that prevents the problem of unwanted breeding in the first place. However, we have to accept that this is not possible on all farms, so the aim must therefore be to carry out castration in such a way which minimizes pain and suffering. A number of the scientific studies referenced in this paper show that the use of an anesthetic and analgesic is very effective in improving the welfare of lambs at castration. However, as we are not aware of any anesthetics or analgesics that are licensed for use in sheep in the U.S. (see below), we must work on the best welfare outcome without the use of pain relief. This would be castration at an early age – hence our standard.

### **Isn't meat quality affected?**

There is a perception that meat from entire ram lambs is of lower quality than that from castrates. However, a number of trials have shown that separated entire male lambs can be safely reared to around one year of age, when the broad teeth start to erupt, with no detriment to lamb meat quality or flavor. In trials (Hybu Cig Cymru 2004) no taint was discovered in taste panel assessments on lambs kept up to 388 days of age fed on hay and concentrates or grass. In addition, the carcasses of the entire male lambs were up to 1kg heavier than those of the castrates of the same age and also had a lower fat content.

### **What about growth rates?**

Some sheep producers say that castration before 6 weeks 'stunts growth'. The reality is that, in all species, entire males produce hormones that mean their growth rate is faster than that of a castrated male or a female. The theory behind castrating at six weeks of age is that you get some of the benefit of this increased male hormone growth effect before you castrate the animal. However, it is not always as straightforward as that.

First, there is a breed effect in sheep. The research by Arnold and Meyer (1998) shows that while some breeds did exhibit some changes in growth rate relating to castration age, other breeds did not. Work by J P Hanrahan (1999) shows improvement in lamb growth rate when comparing entire males with males castrated around time of birth. Overall this gives the entire males an advantage of reaching slaughter around seven days before the castrates.

Hanrahan's study looked at differences between twins where one twin was castrated and the other was not. The results of this study show that entire males were almost 2kg heavier at weaning, and are ready for slaughter about two weeks earlier than castrates when they yield carcasses of the same weight. The carcasses of entire males had significantly lower fat scores and could have poorer conformation. However, the entire males could be taken to a

heavier carcass weight so that the fat scores were the same for castrates and non-castrates, which would mean slaughter to yield a carcass weight of 18.6 kg compared with 18.2 for castrates. In this case, the difference in date of slaughter between entire rams and castrates would be reduced to less than seven days, but would still favor the entire males.

On this basis, Animal Welfare Approved would not agree that early castration 'stunts' the growth of lambs. From a purely commercial point of view it is true that entire lambs grow faster than castrates and late castration (around weaning) can show some improvement in growth rate over early castration in some sheep breeds.

### **Management options**

As noted above, on the basis that castration is painful the ideal welfare outcome is not to carry this operation out at all.

The justification for castration of cattle is probably easier than castration of lambs. Entire bulls tend to be more aggressive to both stock people and other cattle, and can cause problems with unwanted breeding. They also generally produce lower quality meat with abattoirs often stipulating that they must be slaughtered by 16–18 months of age, which is difficult on a high forage ration. Castration clearly eliminates all these problems.

However, when we look at castration of lambs the picture isn't quite so clear. A number of studies have shown that there is no loss of meat quality from entire rams up to around a year of age. If sheep producers can manage their flocks to split out ram lambs from ewe lambs to prevent unwanted breeding, and if lambs are born in the spring and sold by Christmas (as is common in a lot of flocks) then the need to castrate becomes questionable.

Male and female lambs must be separated either at weaning time or by 20 weeks of age, as it is around this time that puberty occurs. Entire male lambs remaining on pasture after weaning benefit from having no females in their surrounding environment. Trials have shown that ram lambs kept isolated from female sheep outdoors on grass had more tender meat than rams kept with female sheep, and their meat tended to be preferred overall. This means having at least one field between sexes – and good fences are obviously essential!

### **Another option: short scrotum castration**

Sheep are commonly also castrated by application of tight rubber rings to the neck of the scrotum, above the testes. Structures below the ring have their blood supply interrupted, die and then drop off after a period of time.

Another option is the "short scrotum" method in which the testes are pushed up against the body wall, and the ring applied below the testes. The scrotum dies and drops off, and the testes survive. Using this method results in far less pain for the lamb as the ring is only cutting off the blood supply to the skin of the scrotum, rather than the more complex and richly enervated testes. The testes continue to produce androgenic hormones (testosterone), but not spermatozoa. These lambs therefore grow faster under the influence of these hormones and continue to behave as males, although they are infertile.

## **What pain relieving drugs can be used for sheep?**

Options for pain relief in sheep are complicated by the fact that there are currently no local anaesthetics licensed in the U.S. for use in sheep.

Research has shown that lignocaine hydrochloride is a highly effective pain reliever when castrating sheep. Other trials have used the non-steroidal anti-inflammatory drug diclofenac. The timing and site of injection is very important to maximize the pain relieving effect. Researchers found that injection of local anaesthetic into the testes was less effective than injection into the neck of the scrotum at the site of the ring.

Lignocaine gives the best pain relief when injected two minutes before castration using a burdizzo, rubber ring or combined burdizzo and rubber ring, although a good pain relief response was still found when it was injected only 15–20 seconds before castration. Diclofenac must be injected 20 minutes before castration, making it less practical as each lamb would have to be handled at least twice; once to inject it and then again 20 minutes later to perform the castration. Evidence is also accumulating about the efficacy and safety of xylazine as an analgesic for sheep.

Several possibilities therefore exist for pain relief for sheep, although these are not freely available to sheep farmers in the U.S. at present. We suggest that you speak to your vet about any options they may be able to offer for the use of such drugs during castration.

## **Summary**

If you must castrate your lambs you should seek to carry out the operation as soon as possible after the lamb has taken colostrum and bonded with its mother.

Remember that surgical castration is not allowed under Animal Welfare Approved standards at any age. There is ample evidence that this is the most painful method, and researchers have shown that even if you could use local anesthetic it would not markedly reduce the pain of surgical castration.

Burdizzo only methods of castration are more painful than clamp and ring methods, and some producers have found that burdizzo alone was ineffective on some lambs, leaving them exhibiting male behaviors and/or fertile. Ring castration should remain the basic animal method.

However, we shouldn't lose sight of the fact that all these methods will cause pain. Assuming that pain relieving drugs are not available, the best option from a welfare perspective is to use the burdizzo in addition to the ring for lambs less than one week of age, applying the clamp across the full width of the scrotum for 10 seconds.

## **References and further information**

Arnold A. M. and Meyer H. H. (1988). Proportions and feeding regimen on lamb longissimus fiber type influences of gender, time of castration, genotype, birthtype. *Journal of Animal Science*, 66:2476-2483.

Farm Animal Welfare Council (2008). *FAWC Report on the Implications of Castration and Tail Docking on the Welfare of Lambs*, Farm Animal Welfare Council, London.  
[www.fawc.org.uk/pdf/report-080630.pdf](http://www.fawc.org.uk/pdf/report-080630.pdf)

Hanrahan, J.P. (1999). *Genetic and non-genetic factors affecting lamb growth and carcass quality*. Teagasc Research Centre  
[www.teagasc.ie/research/reports/sheep/2551/eopr-2551.pdf](http://www.teagasc.ie/research/reports/sheep/2551/eopr-2551.pdf)

Hayward, M. (2002). Pain and its Control In Routine Husbandry Procedures In Sheep and Cattle. Report for the *ACT Animal Welfare Advisory Committee*, March 2002

Hybu Cig Cymru (2004). *Rearing Entire Males*  
[www.hccmpw.org.uk/medialibrary/pdf/EN\\_539\\_Rearing%20Entire%20Males.pdf](http://www.hccmpw.org.uk/medialibrary/pdf/EN_539_Rearing%20Entire%20Males.pdf)

Kent, J.E., Molony, V., Jackson, R.E., Hosie, B.D. (1999). Chronic inflammatory responses of lambs to rubber ring castration: are there any effects of age or size of lamb at treatment? In: A.J.F. Russel, C.A. Morgan, C.J. Savory, M.C. Appleby, T.L.J. Lawrence eds. *Farm Animal Welfare - Who writes the rules?* 23 ed., British Society of Animal Science. Pages 160–162

Lester, S.J., Mellor, D.J., Holmes, R.J., Ward, R.N. and Stafford, K.J. (1996). Behavioural and cortisol responses of lambs to castration and tailing using different methods New Zealand. *Veterinary Journal* 44: 45-54.

Mellema, S.C., Doherr, M.G., Wechsler, B., Thueer, S., and Steiner, A. (2006). Influence of local anaesthesia on pain and distress induced by two bloodless castration methods in young lambs. *Veterinary Journal*, 2006 Sep; 172(2): 274–83. Epub 2005 Jul 26.

Mellor, D.J. (1991). Effects of castration on behaviour and plasma cortisol concentrations in young lambs, kids, and calves. *Research in Veterinary Science*, 51:149-154.

Mellor, D.J. and Stafford, K.J. (2000). Acute castration and tailing distress and its alleviation in lambs, *New Zealand Veterinary Journal*, 48: 33-43

Molony, V., Kent, J.E., Hosie, B.D., and Graham, M.J. (1997). Reduction in pain suffered by lambs at castration. *Veterinary Journal*, 153 (2): 205-213.

Kent J. E., Molony V., and Robertson I. S., (1993). Changes in plasma cortisol concentration in lambs of three ages after three methods of castration and tail docking. *Research in Veterinary Science*, 55 (2): 246-251.

Kent J. E., Molony V., and Robertson I. S., (1995). Comparison of the burdizzo and rubber ring methods for castrating and tail docking lambs. *Veterinary Record*, 136 (8):192-196.

Kent, J.E., Molony, V., and Graham, M.J. (1998). Comparison of methods for the reduction of acute pain produced by rubber ring castration or tail docking of week-old lambs. *Veterinary Journal*, 55 (1): 39-51.

## **Links**

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