# Welfare issues with Mulesing: The progress and the problems

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## Introduction

In the past, mulesing has been viewed as a necessary procedure justified by its animal-welfare benefits in reducing fly strike. Because of welfare concerns about the pain and stress associated with this invasive procedure, the Australian wool industry is aiming to end the current practice of mulesing by 2010. This has placed pressure on the industry to find practical alternatives to control fly strike that do not compromise the welfare of sheep. This essay focuses on recent research that could help minimise stress associated with mulesing, and control fly strike in the future with minimal negative impact on animal welfare. Topics include genetic modification, vaccine development and analgesic treatments.

## Discussion

Genetic modification to improve production traits of sheep is not a new practice. It has been used successfully in the past to reduce undesirable traits such as breech wrinkle (James, 2006), and improve desirable traits such as fibre diameter. James (2006) states that most fly strike occurs in the breech area. The blow-fly (*Lucilia cuprina*), attracted by the odour of dags or urine staining, lays eggs on the wool. Thereafter dampness and warmth in the area allows the eggs to hatch and the breech becomes invaded by larvae. Any traits that reduce the attraction of the fly to the breech area, or compromise the development of the larvae can potentially be modified to reduce the incidence and severity of fly strike. These phenotypes include:

- Bare area around breech;
- Shedding of breech wool;
- Immunological resistance to larvae.

It would be possible to reduce the susceptibility of Merinos to fly strike by crossing with breeds such as the Wiltshire horn. This breed sheds wool from the breech region and has a naturally larger bare area around the breech. However, it also has a lower average wool clip, and higher fibre diameter. So a crossbreeding program that would result in a decreased incidence of fly strike might also reduce productivity (James, 2006).

Immunological resistance to *Lucilia cuprina* larvae is heritable and improvements in fly-strike resistance have already been achieved (James, 2006). Another method of improving immunological resistance is with the use of vaccines. Nisbett & Huntley (2006) state that even though fly strike normally does not result in persistent acquired immunity, antibodies are produced in response to proteins in the larvae so there is the potential to create an effective vaccine.

Antibodies bind to the endoperitrophic surface of the larvae reducing the availability of nutrients and inhibiting growth rate. That said, a threshold of 70-80% reduction in larval growth rate is needed to have a significant effect on larval mortality, and this is where problems arise. Using proteins extracted from larvae to stimulate an immune response results in a 61% decrease in growth rate, while the best achieved with recombinant protein is 17.5%. The challenge now is to develop an immunologically active recombinant protein that can be mass-produced (Nisbett & Huntley, 2006). Even if an effective vaccine can be produced, it would still need to be used in conjunction with other strike-management procedures, since vaccination alone can only reduce the severity of fly strike, not its incidence.

While genetic and immunological advances have the potential to replace the need for mulesing, in reality more research is needed into the heritability of variation in growth rate of *L. cuprina* larvae (James, 2006) and development of an immunologically active recombinant protein for use in vaccines (Nisbett & Huntley, 2006). A practical permanent solution may be some way off. In the meantime, a more immediate solution is needed to improve the welfare outcomes for mulesed sheep. Paull *et al.* (2007) have conducted a study into the effectiveness of non-steroidal anti-inflammatory drugs (NSAIDs) and topical anaesthetics in reducing the behavioural and physiological indicators of pain and stress associated with mulesing. By recording cortisol concentrations and behavioural indicators of pain in a group of lambs, they compared responses to mulesing using a range of different analgesic treatments. It was concluded that the use of a topical anaesthetic and NSAIDs (e.g., carprofen) significantly decreased indicators of pain and stress. These results suggest that animal-welfare outcomes for mulesed lambs can be improved by using the aforementioned drug therapy (Paull *et al.,* 2007).

This is not a long-term solution though, as the cost of the drugs and the increased labour required for administering them is currently uneconomical. However, as long as welfare-driven consumers can underwrite this additional production cost, this could be an acceptable short-term measure until other more permanent solutions are found.

## Conclusion

In order for any mulesing alternatives to gain wide acceptance among farmers, they must be practical. Drug therapy is expensive and labour intensive so it may not become widely accepted. However, it may be used transiently while more research is conducted into genetic and immunological solutions. Any permanent genetic solutions will require crossbreeding and so come at the cost of wool quality. A trade-off must therefore be made between the requirement for an alternative to mulesing and other production goals. An effective vaccination program still requires more research and would not be a stand-alone solution. It appears that genetic modification in conjunction with a vaccination program could potentially replace the need for mulesing in Australia, but it may be some time before a practical solution is developed.

## References

James, P. J. (2006) Genetic alternatives to mulesing and tail docking in sheep: a review. *Australian Journal of Experimental Agriculture*. 46, 1-18.

Nisbett, A. J. & Huntley, J. F. (2006) Progress and opportunities in the development of vaccines against mites, fleas and myiasis-causing flies of veterinary importance. *Parasite Immunology*. 28, 165-172.

Paull, D. R., Lee, C., Colditz, I. G., Atkinson, S. J. & Fisher, A. D. (2007) The effect of topical anaesthetic formulation, systemic flunixin and carprofen, singly or in combination, on cortisol and behavioural responses of Merino lambs to mulesing. *Australian Veterinary Journal.* 85, 98-106.