

# FLYSTRIKE RD&E PROGRESS

AWI's flystrike research, development and extension (RD&E) program is achieving significant and incremental progress in a wide range of research projects and trials conducted on farms and in laboratories. Read here the latest updates from the program.

Flystrike continues to be a major disease and welfare risk for the sheep industry. Each year, prevention, treatment and lost production costs associated with flystrike are estimated to exceed \$173 million.

The Australian wool industry is determined to ensure woolgrowers have access to the latest in best practice welfare-improved flystrike prevention practices, informed by a robust research, development and extension (RD&E) program. The RD&E program pursues the principles of integrated pest management in the search for practical solutions for woolgrowers to prevent flystrike, whatever their sheep type, environment or business priorities.

Since 2001, AWI has invested \$70 million in sheep health and welfare RD&E, including \$40 million specifically in RD&E related to flystrike. It is aimed at providing woolgrowers with a range of options for ensuring the lifetime welfare of individual sheep, whilst reducing reliance on mulesing – addressing supply chain expectations and increasing the demand for Australian wool.

AWI has recently endorsed an updated *Flystrike Research, Development, Education, Extension and Communication Strategy 2019/20 to 2024/25* to guide investment in evidence-based RD&E to minimise the health and welfare impacts of flystrike on the Australian sheep flock (see previous page). This strategy update is largely a continuation of AWI's previous flystrike strategy, with industry continuing to support a balance between long- and short-term investment in flystrike RD&E.

One of five pillars of the strategy is Education, Extension and Promotion, with an aim for:

**“Adoption of best practice strategies to improve the lifetime welfare of sheep, reduce reliance on mulesing and support transparency in the supply chain.”**

A key activity under this pillar is AWI's Flystrike RD&E Update forum which has been held every two years since 2008. The one-day forum is regularly attended by more than 100 woolgrowers, researchers, consultants, commercial providers, veterinarians and animal welfare advocacy groups. The forum includes presentations

and discussion of the latest in AWI-funded RD&E developments and trial results and updates in industry adoption of best practice management of flystrike prevention.

Unfortunately, due to government social distancing guidelines regarding coronavirus, the 2020 Flystrike RD&E Forum, intended to be held in April, had to be cancelled. Instead AWI-funded researchers were invited to submit written reports providing their updates on recently completed or current projects.

These summary project reports will be available on the AWI website at [www.wool.com/flystrikelatest](http://www.wool.com/flystrikelatest). Some of the RD&E highlights since the last forum are as follows:

## MORE THAN 90% USE ANALGESICS AND/OR ANAESTHETICS

Woolgrower adoption of analgesics and anaesthetics for mulesing continues to grow. More than 90% of respondents to a national online survey, undertaken by the University of New England (UNE), of Australian sheep producers to benchmark their 2018 parasite control practices, reported using pain relief (analgesics and/or anaesthetics) when mulesing their wether lambs. This is a significant increase from a similar 2014 survey, reporting on 2011 practices, (2014 Benchmarking Australian Sheep Parasite Control) in which 64% of respondents reported using pain relief when mulesing wether lambs. In the 2017 AWI Animal Husbandry Practices Survey 84% of respondents used pain relief for their wether lambs.

## NATIONAL WOOL DECLARATIONS INCREASE

The proportion of woolgrowers declaring their wool through the National Wool Declaration (NWD) continues to increase. The NWD creates transparency and choice in the marketplace for retailers and suppliers wanting to source wool that has been produced using husbandry practices preferred by the buyer. The declaration by woolgrowers of their use of Analgesics and/or Anaesthetics (AA, previously Pain Relief) for mulesing is increasing, as is the proportion of Non Mulesed (NM) declarations (see Table 1 below).

## BREEDING UPDATE

A project completed in late 2019, led by the University of Adelaide, investigated the rate of genetic gain in reducing breech flystrike. It demonstrated that if a ram breeder's flock was fully measuring pedigree, key production traits and the three breech flystrike indicators, it would take 10 years to move to an increasingly productive and naturally resistant flock in low dag environments starting with fine/medium type sheep. The report also showed that superfine sheep in high dag environments could take four decades to breed productive and naturally resistant sheep. Clearly there is a range of other management options used for these sheep types to move to a Non Mulesed enterprise. See the final report on the AWI website for more information. The MLP Project is collecting a large amount of data on reproduction, productivity, breech strike traits (including urine stain), which will improve breeders' ability to select for more highly

Table 1. National Wool Declaration rates by Mulesing Status (Source: AWEX)

	2008	2011	2017	2019 YTD* (2019/20)
Non Mulesed	3%	6%	12%	14.1%
Ceased Mulesed	3%	2%	3%	3.5%
Analgesic and/or Anaesthetic	3%	12%	32%	37.9%
Mulesed	29%	24%	20%	17.5%
Not Declared	62%	56%	34%	27.0%
<b>Australian Clip</b>	<b>38%</b>	<b>44%</b>	<b>66%</b>	<b>73.0%</b>

Figures based on % sum of bales, all breeds and wool types, first-hand offered, P & D Certificates  
\* YTD = as at 30 April 2020

fertile, low wrinkle animals. Ram breeders are increasingly collecting data on the three breech flystrike resistant indicator traits of wrinkle, dag and breech cover. The genetic trends in these traits are moving in the right direction but it will take time to build the genetic momentum across a national flock. The options for a breech flystrike genomic flock continue to be reviewed and the coming Data Quality Index in MERINOSELECT will be an important part in that process (ram breeders meeting high data quality criteria are potential co-operators in any 'virtual' future genomic flock).

## GENE EDITING TECHNOLOGY PROGRESS

A project, completed in 2018, successfully developed protocols for use of the 'CRISPR' gene modification technology in blowflies. Use of CRISPR in blowflies has broad implications for identifying and better understanding the function and purpose of potential gene targets, making the formulation and registration of new flystrike prevention chemicals easier. University of Melbourne researchers knocked out the eye colour (*white*) gene and produced a blowfly with white eyes, an easily observed marker to show that the technique is working. They also successfully deleted the *Orco* gene, producing blowflies that cannot smell.



## GENES IDENTIFIED UNIQUE TO BLOWFLY

An update to the blowfly genome, which was completed in 2019, identified 572 genes that are unique to the blowfly and which could be targeted by new chemical treatments or vaccines. Outcomes from this project are already being used to identify potential flystrike vaccine candidate genes that might impact larval growth and development, in a collaboration between the University of Melbourne and CSIRO to develop a flystrike vaccine (see below).

## FLYSTRIKE VACCINE DEVELOPMENT UNDER WAY

A preliminary 4-year research program to develop a blowfly vaccine, that commenced in January 2019, is already achieving valuable outcomes. CSIRO researchers have identified key proteins in blowfly larvae that are important for their growth and development and have developed and tested prototype flystrike vaccines that help the sheep's immune system build a defence mechanism



that will target and destroy these proteins. The University of Melbourne research team meanwhile have been focused on collecting, identifying and characterising blowfly samples from across Australia as well as looking at the molecular processes these parasites use to survive on sheep. Working with CSIRO, the University of Melbourne population sampling work is already informing the selection of effective vaccine candidate genes, ensuring the proteins they are targeting are the same in blowfly populations across Australia.

## CHEMICAL RESISTANCE MONITORED

A project to update our understanding of increasing chemical resistance in blowflies is nearing completion. This project, co-funded and delivered by NSW DPI, is providing evidence of increasing blowfly resistance to currently available chemicals. Increasing chemical resistance is driving industry adoption of integrated pest management approaches to preventing flystrike, which hopefully will be bolstered by a flystrike vaccine. Outcomes from this project have already contributed to the development of information for growers on resistance management strategies, available through FlyBoss ([www.flyboss.com.au](http://www.flyboss.com.au)).

## FLYSTRIKE RISK FACTORS REVIEWED

A comprehensive review of the predisposing risk factors for breech flystrike, undertaken by a team of flystrike experts, led by the University of Queensland, was completed in 2019. The review noted that AWI has supported significant RD&E towards better flystrike control methods and reducing the welfare impacts of flystrike over many years. Whilst it was acknowledged that a significant portion of the overall variability between sheep in the incidence of flystrike remains unexplained, the report identified a number of recommendations for further research in flystrike, some of which are already being addressed by current AWI funded research, with others still under consideration.

## BEST PRACTICE VIA PARABOSS

ParaBoss, funded by AWI and MLA, and delivered by UNE, continues to regularly promote best practice advice on flystrike prevention through both FlyBoss ([www.flyboss.com.au](http://www.flyboss.com.au)) and WormBoss ([www.wormboss.com.au](http://www.wormboss.com.au)). In addition to its website(s), e-newsletter and Facebook page, ParaBoss in 2019 launched a series of podcasts (called Wormcasts) that included episodes relevant to flystrike prevention ([www.paraboss.com.au/multimedia](http://www.paraboss.com.au/multimedia)).

## COMMUNICATION OF BEST PRACTICE

AWI continues to regularly distribute information for woolgrowers and their advisors on best practice flystrike prevention practices. AWI staff and researchers have presented at various industry events across the country, including in WA, SA, Victoria and NSW. Available on the AWI website at [www.wool.com/flystrikelatest](http://www.wool.com/flystrikelatest) are recent flystrike prevention publications, project final reports and relevant *Beyond the Bale* articles. Flystrike prevention publications that are available include:

- Plan, prepare and conduct best practice lamb marking – 80-page training guide (February 2020). See page 55.
- Dealing with dag – 44-page advisor manual (August 2019)
- Managing breech flystrike – 44-page manual (February 2019)

Relevant *Beyond the Bale* articles include:

- Anaesthetics and analgesics including FAQs (December 2019)
- Can genomics assist with reducing the risk of breech flystrike? (September 2019)
- Genetically reducing breech flystrike (June 2019)
- Flystrike treatments during drought (March 2019)
- Tail docking – don't cut it short (March 2019)
- How well performing are your blowfly and lice treatments? (September 2018)
- Premiums and discounts for mulesing status (September 2018)

## MORE INFORMATION

Further information on the above projects and others that make up AWI's current diversified investment portfolio in flystrike prevention RD&E, is available on AWI's website at [www.wool.com/flystrikelatest](http://www.wool.com/flystrikelatest).



# AWI BREECH FLYSTRIKE STRATEGY 2019/20 - 2024/25

AWI recently endorsed an updated Flystrike Research, Development, Education, Extension and Communication Strategy 2019/20 to 2024/25. It will guide AWI investment in evidence-based research, development and extension (RD&E) to minimise the health and welfare impacts of flystrike on the Australian sheep. This diagram summarises the five key pillars of AWI investment for the flystrike program.

## AWI FLYSTRIKE RESEARCH, DEVELOPMENT, EDUCATION, EXTENSION AND COMMUNICATION STRATEGY 2019/20 TO 2024/25

### VISION

ENSURE THE LIFETIME WELFARE AND PRODUCTIVITY OF SHEEP AND REDUCE THE RELIANCE ON MULESING.

### BREEDING AND SELECTION

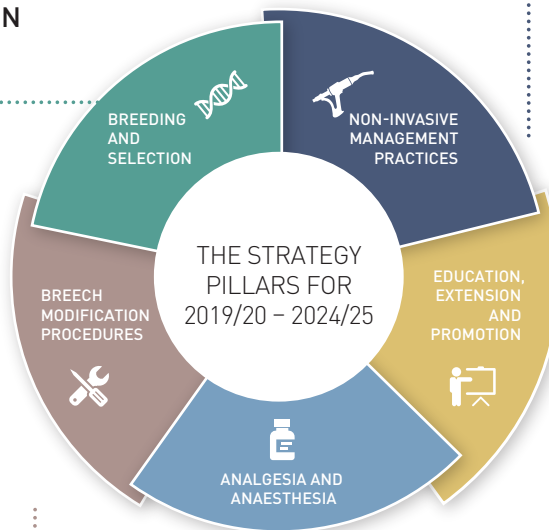
THE AIM: Long term solutions to advance lifetime welfare.

- Understand the performance and economic impacts of breeding for reduced flystrike.
- Investigate the, as yet unknown, factors that cause flystrike.
- Improve the accuracy of selection for flystrike resistance traits through phenotyping and genotyping.
- Better understand how to reduce the incidence of dags and urine stain through breeding.
- Track genetic trends for breech wrinkle, breech cover, dags and higher productivity.

### BREECH MODIFICATION PROCEDURES

THE AIM: Breech modification procedures to improve lifetime resistance to flystrike.

- Undertake further R&D of the animal welfare impacts of breech modification procedures.
- Undertake further R&D to refine the application protocols for breech modification procedures.
- Support best practice mulesing training.



### NON-INVASIVE MANAGEMENT PRACTICES

THE AIM: Improved management practices to reduce the risk of flystrike.

- Monitor and define blowfly resistance to chemicals.
- Refine blowfly chemical resistance best practice management advice.
- Invest in early trials of new potential actives and parasitic control treatments and vaccines.
- Complete a population study of blowflies to identify potential genetic differences to inform blowfly management programs.

### EDUCATION, EXTENSION AND PROMOTION

THE AIM: Adoption of best practice strategies to improve the lifetime welfare of sheep, reduce reliance on mulesing and support transparency in the supply chain.

- Develop and implement education, training and extension strategies to improve lifetime welfare of sheep.
- Monitor, evaluate and improve the success of education, training and extension strategies.
- Engage with woolgrower advisors on the RD&E program.
- Ongoing engagement with domestic and international stakeholders to ensure they understand best practice management of flystrike and the welfare implications.

### ANALGESIA AND ANAESTHESIA

THE AIM: Improved provision of analgesia and anaesthesia for surgical husbandry practices.

- Investigate longer acting, cost effective anaesthesia and analgesia options.
- Extend advice on analgesia and anaesthesia to woolgrowers.