

2022 FLYSTRIKE RD&E TECHNICAL FORUM

Welcome & Introduction

Bridget Peachey – AWI

10 August 2022





Source: ABC News



Source: Sky News Australia

Economic cost of flystrike (\$M)

	2015	2022
Treatment	\$11.34	\$12.50
Prevention	\$57.30	\$83.80
Production Losses	\$104.53	\$227.40
TOTAL	\$173.17M	\$323.7M





Final report

Priority list of endemic diseases for the red meat industry — 2022 update

Project code: B.AHE.0327

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Herd Health Pty Ltd

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Discussion Panel

Where is the future of flystrike RD&E?

Trent Perry - University of Melbourne

Peter James - University of Queensland

Jane Littlejohn - AWI General Manager, Research



FLYSTRIKE RESEARCH, DEVELOPMENT, EDUCATION, EXTENSION AND COMMUNICATION STRATEGY

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.

Flystrike vaccine fast tracked with funding boost from AWI

2 Aug 2021, 12:30 p.m.

News



CSIRO senior scientist Tony Vuocolo has conducted over 40 years of research into the impact of the sheep response on la... AWI

An extra \$650,000 in funding to fast track a flystrike vaccine approved by Australian Wool Innovation.

The extra funding for a collaborative project with CSIRO for further investigations into the development of a flystrike vaccine.



AWI chairman promises to be a "game changer".

"It's an important investment on behalf of woolgrowers."

AWI to invest \$2.5 million in sheep flystrike vaccine research

by Sheep Central, 04 December 2018



AUSTRALIAN Wool Innovation will spend \$2.5 million over four years to research a flystrike vaccine for sheep, seen as a potential option to mulesing. AWI today announced the investment and preliminary research into development of a flystrike vaccine targeting the Australian sheep blowfly as part of a collaboration with the University of Melbourne and CSIRO.

Gains made in flystrike fight

Vaccine the subject of decades of work

Evidence of successful development of a flystrike vaccine

BY CHRIS MCLENNAN

SCIENTISTS believe they are closing in on a commercial vaccine for flystrike.

Prototype vaccines have already been developed halfway through a four-year \$2.5-million research project between the wool industry and the CSIRO.

A potential vaccine against flystrike has been the subject

of a vaccine gained focus through almost a decade of research at The University of Melbourne, which culminated in the mapping of the fly's full genome in 2015 after three years of work.

This \$2.5-million collaborative project with Australian Wool Innovation

is producing these 'bullets' in a form that will specifically hit the maggots in vulnerable spots and be powerful and plentiful enough to penetrate and ultimately over-run the maggots' armour-like protection.

The blowfly proteins, called antigens, used in the prototype vaccines to gain

response of the sheep result in the death of the blowfly maggot when they feed on the sheep serum.

Serum is the component of blood that contains the antibodies.

Unfortunately producing a commercial vaccine through this approach using native antigens is not viable and

Scientists are testing vaccines to defeat flystrike

Chris McLennan @McLennanCm

30 Mar 2021, 6 a.m.



Scientists believe they are closing in on a commercial vaccine for flystrike. Prototype vaccines have already been developed half way through a four-year \$2.5 million research project between the wool industry and CSIRO.



A potential vaccine against flystrike has been the subject of decades of research work.



Livestock

Sheep blowfly vaccine shows promise in the lab but fails in field

Research is battling to find a vaccine to control flystrike but early tests keep falling at the first hurdle. Here's what the next move is.

Fiona Myers

2 min read June 22, 2022 - 5:00AM The Weekly Times

0 comments



Flystrike vaccine fails early tests

Research is battling to find a vaccine to control flystrike but early tests keep falling at the first hurdle. Here's what the next move is.

Vaccine researchers strike out, but press on

FIONA MYERS

FLYSTRIKE vaccines that work in a laboratory are failing to produce the same results on sheep.

But researchers are hopeful they can find ways to make two candidate vaccines work more effectively out in the field.

CSIRO researcher Dr Tony Vuocolo said there had been a resurgence in work on a flystrike vaccine after it stalled in about 2000.

"We did some great foundation work over a period of 10 years from the mid-1980s to middle of 2000 and then the work stopped," Dr Vuocolo said.

"We had really come as far

as we could with the technologies that were available, but we are in a position now where there is a convergence of technology and capability and knowledge.

"It was time to give the vaccine another good go."

Dr Vuocolo said producing a vaccine was "like an assault on Mount Everest".

"We need to establish a really good base camp of understanding and then plan your assault as you are moving up," he said.

"I am happy to say we are past base camp and have not quite reached Hillary's step yet, but we are well on our way."

The research is now at a point where many vaccines

are raising strong immune responses in sheep in laboratory trials and having a real effect on survivability of maggots.

But it is a huge step to move on to later stages, Dr Vuocolo said.

"A maggot is like a World War I tank — it's armoured and a really difficult thing to target," he said.

The research has shown the best target area is the maggot's gut. Two vaccines have been developed — one that uses proteins extracted from maggots to produce a vaccine and the other is a molecular approach where key proteins are put into cells and then into a vaccine.

There were more than 50 prototype vaccines developed

during the past three years, which have been narrowed down to two lead prototypes.

In the lab, those vaccines caused maggot growth to be stunted, dying or moribund and there was a 75 per cent reduction in weights and growth rates.

But that was not replicated when the trials moved outside the lab with only a 20 per cent reduction on sheep.

"The biggest hurdle at the moment (is working out) what we can do to amplify the immune response on the sheep to be much more resilient to larvae," Dr Vuocolo said.

"We are pretty early into the project and while I would like to be able to tell you there

will be a vaccine in the next couple of years, really that is not right."

A spokesman for Australian Wool Innovation said it had invested \$2.85 million to support the development of a flystrike vaccine.

Strike force: CSIRO vaccine team members Suzie Briscoe, Neil Bagnall and Tony Vuocolo.



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PROJECT FINAL REPORT



Project No.: ON-00550
 Contract No.: 4500011260
 AWI Project Manager: Bridget Peachey
 Contractor Name: CSIRO
 Prepared By: Alison Small, Andrew Fisher, Caroline Lee and Ian Colditz
 Publication Date: June 2020

Gap Evaluation of Pain Alleviation Research

Evidence of investigations into novel pain relief options



The Animal Welfare Science Centre



Published by Australian Wool Innovation Limited, Level 6, 68 Harrington Street, THE ROCKS, NSW, 2000

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AWI invests in research, development, innovation and marketing activities along the global supply chain for Australian wool. AWI is grateful for its funding which is primarily provided by Australian woolgrowers through a wool levy and by the Australian Government which provides a matching contribution for eligible R&D activities © 2020 Australian Wool Innovation Limited. All rights reserved.



Systematic Review

Analgesia for Sheep in Commercial Production: Where to Next?

Alison Small ^{1,*}, Andrew David Fisher ², Caroline Lee ¹ and Ian Colditz ¹

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 - Animal Welfare Science Centre, University of Melbourne, Parkville, VIC 3052, Australia; adfisher@unimelb.edu.au
- * Correspondence: Alison.small@csiro.au; Tel.: +61-2-6776-1435

Simple Summary: Increasing societal and customer pressure to provide animals with ‘a life worth living’ continues to apply pressure on industry to alleviate pain associated with husbandry practices, injury and illness. Although a number of analgesic solutions are now available for sheep, providing some amelioration of the acute pain responses, this review has highlighted a number of potential areas for further research.

Abstract: Increasing societal and customer pressure to provide animals with ‘a life worth living’ continues to apply pressure on livestock production industries to alleviate pain associated with husbandry practices, injury and illness. Over the past 15–20 years, there has been considerable research effort to understand and develop mitigation strategies for painful husbandry procedures in sheep, leading to the successful launch of analgesic approaches specific to sheep in a number of countries. However, even with multi-modal approaches to analgesia, using both local anaesthetic and non-steroidal anti-inflammatory drugs (NSAID), pain is not obliterated, and the challenge of pain mitigation and phasing out of painful husbandry practices remains. It is timely to review and reflect on progress to date in order to strategically focus on the most important challenges, and the avenues which offer the greatest potential to be incorporated into industry practice in a process of continuous improvement. A structured, systematic literature search was carried out, incorporating peer-reviewed scientific literature in the period 2000–2019. An enormous volume of research is underway, testament to the fact that we have not solved the pain and analgesia challenge for any species, including our own. This review has highlighted a number of potential areas for further research.



Citation: Small, A.; Fisher, A.D.; Lee, C.; Colditz, I. Analgesia for Sheep in Commercial Production: Where to Next? *Animals* **2021**, *11*, 1127. <https://doi.org/10.3390/ani11041127>

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PAIN RELIEF RESEARCH FOR MULESING

Research co-funded by AWI has shown that using a combination of the Tri-Solifen® and Buccalgesic® pain relief products provides more prolonged relief from mulesing than using each of the products on its own.

Tri-Solifen is a topical product applied after mulesing and contains local anaesthetic and anti-inflammatory agents to reduce bleeding and soothe the skin. In a study conducted in 2019, Tri-Solifen was found to provide relief for at least six hours post-mulesing based on behavioural observations and up to 16 hours based on physiological parameters. Dr Small said, "Tri-Solifen provides rapid-onset analgesia, but the duration of analgesic effect of Tri-Solifen alone was shorter than that of Buccalgesic. Buccalgesic was slower to provide obvious analgesia, but the duration of effect of analgesia was longer than that of local anaesthetic agents."

Buccalgesic being applied to the internal cheek of a sheep during mulesing. The Buccalgesic® pain relief formulation has a thick consistency so that application is confined to the oral cavity and the mucous membrane of the mouth.

PREPARE AND CONDUCT T WELFARE PRACTICE 1B MARKING PROCEDURES

ING GUIDE

Wool Producers Australia
 LCA



OBSERVED BENEFITS OF USING BUCCALGESIC WITH TRI-SOLFEN

South Australian woolgrower Richard Halliday has been using Tri-Solifen® on his lambs for many years for mulesing and marking, and he has now started using Buccalgesic® in combination with Tri-Solifen. He is reporting Tri-Solifen to recover faster with less negative behavioural effects – and the costs of treatment are more reasonable than he expected.

ANAESTHETICS AND ANALGESICS WIDELY ADOPTED BY WOOLGROWERS

There has been large scale adoption of good-operative pain relief (Tri-Solifen®) during the last few years. New non-operative products, Buccalgesic® and Meltacem 20® were released in 2020. There are now products available to more frequently address a significant portion of pain relief.

PAIN RELIEF WIDELY ADOPTED

FAST FACTS

HOW DO THE PAIN RELIEF OPTIONS WORK?

WHAT ARE THE DIFFERENCES BETWEEN ANALGESIC AND ANAESTHETIC PAIN RELIEF REQUIREMENTS?

WHAT FACTORS SET THE PAIN RELIEF PRODUCTS APART?

FOR MORE INFORMATION

PAIN RELIEF FREQUENTLY ASKED QUESTIONS

There has been large scale adoption of good-operative pain relief (Tri-Solifen®) during the last few years. New non-operative products, Buccalgesic® and Meltacem 20® were released in 2020. There are now products available to more frequently address a significant portion of pain relief.

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FOR MORE INFORMATION

Friday, 22 July 2022 08:55

Aussies look at new approach to flystrike control

Written by Staff Reporters

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Tiny nanoparticles less than a thousandth of a millimetre in size are providing a promising new method to protect sheep against flystrike, according to University of Queensland research.



Dr Peter James believes nanotechnology could be part of the solution to a problem that costs the Australian sheep industry AUS173 million a year.

Senior Research Fellow Dr Peter James from UQ's Centre for Animal Science believes nanotechnology could be part of the solution to a problem that costs the Australian sheep industry AU\$73 million a year.

"New methods that can provide longer periods of protection are required to counter the development of resistance to flystrike, insecticides and to support the reduced reliance on mulesing, a surgical technique that has been relied upon over many years," James says.

The Australian Wool Innovation (AWI) funded project is designing and testing unique silica nanocapsule particles with surface spikes purpose-built to give prolonged periods of protection against flystrike and lice.

Nanotechnology extends period of flystrike protection in sheep



By Shan Goodwin

Updated July 5 2022 at 3:52pm, first published June 30 2022 at 8:00am



Question for the Panel:
What opportunities are there for nanotechnology with respect to improved delivery of current analgesia and or anaesthesia options?



MANAGING CHEMICAL RESISTANCE

CASE STUDY: REBALANCING FLYSTRIKE PREVENTION TOOLS IN A NON-MULESED ENTERPRISE
November 2021

PETER AND ANGELA SCHUSTER
Location: Central West New South Wales
Property size: 5,500 ha
Climate: Temperate
Rainfall: 600 mm annual average
Merino sheep: Self-replacing fine non-mulesed Merino flock
Flock size: 10,000 sheep, joining 4,500 ewes to Merino rams
Merino wool: Average 18-micron bright stylish wool



Peter and Angela Schuster operate a mixed farming and grazing operation across 5,500 ha south of Dubbo in Central West NSW, incorporating dryland and irrigated cropping as well as sheep and cattle enterprises. The average annual rainfall is about 600 mm which falls fairly consistently but not always reliably throughout the year.

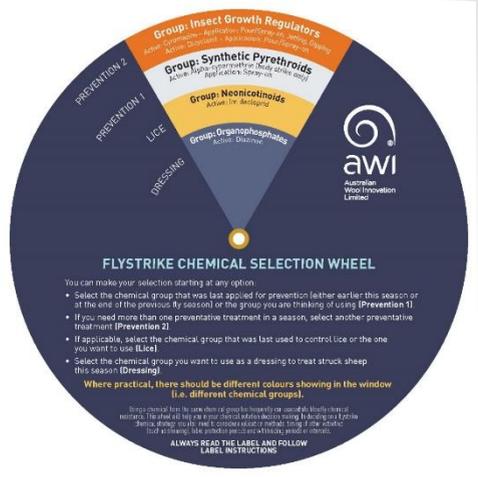
The Schusters' main sheep enterprise is based on a Merino flock, with the sale of wool and surplus stock an important income source. The flock comprises about 10,000 sheep with 4,500 ewes to be joined to Merino rams in 2022. In 2016 the Schusters moved to a non-mulesed enterprise and in doing so have reconfigured their flystrike management approach.

Managing flystrike in a non-mulesed enterprise has been a learning curve for the Schusters. Mulesing is one tool in the toolbox when it comes to controlling flystrike and chemicals are another. Taking one tool out of the toolbox doesn't mean solely relying on another but rather, for the Schusters, it increases the importance of rebalancing the remaining tools in an integrated approach to flystrike management.

The Schusters have experienced periods where fly activity has extended throughout the year (such as in 2020). These years have reinforced the need for an annual plan to ensure they can implement a range of preventative activities in a timely manner. Labour shortages have also emphasised the importance of staying ahead of a problem by being proactive rather than reactive.

PROACTIVE APPROACH TO FLYSTRIKE

MANAGING CHEMICAL RESISTANCE: CASE STUDY 1



MANAGING CHEMICAL RESISTANCE

KEY POINTS

- Flystrike is estimated to annually cost the Australian sheep industry in excess of \$170 million in terms of production losses and prevention and treatment costs.
- Chemical resistance in blowflies is more likely to occur with long term use and over reliance on just one chemical group.
- There are only a limited number of groups registered against flystrike so increasing resistance will have a significant impact on the industry.
- There is an urgent need for sheep producers to strategically manage the use of chemicals to maximise flystrike control and to maintain the efficacy of available products on their property.
- When selecting chemicals you need to consider chemical groups for flystrike prevention, lice control and treating struck sheep.

UNDERSTANDING CHEMICAL RESISTANCE

DO YOU HAVE RESISTANT FLIES?
Before you conclude your flies are resistant, check that:

- There was not heavy or persistent rain following treatment, resulting in chemical wash out
- The sheep affected were actually treated
- Dags did not make penetration of the chemical difficult
- The chemical was applied following the label instructions and with the right equipment
- The appropriate amount of chemical was applied using the right application pattern
- The wool length was consistent with label instructions

RESISTANCE MANAGEMENT STEPS

1. Use a range of chemical and non-chemical tools – don't rely on only one tool
2. Know the chemical groups and rotate them, where practical
3. Optimise the number and timing of chemical and non-chemical treatments
4. Follow the label directions and keep treatment records
5. Regularly monitor for flystrike and kill any maggots from struck sheep

FURTHER RESOURCES
AWI has a range of resources to help you manage flystrike on your property, available at www.wool.com/flystrike/resources. For more flystrike management information visit the FlyBoss website www.flyboss.com.au.

RESISTANCE TESTING CONTACT
Narelle Sales
Elizabeth Macarthur Agricultural Institute
Email: email.insectresistance@dpi.nsw.gov.au
Direct Ph: 02 4640 6446 Switch Ph: 02 4640 6333

Developed integrated parasite management strategies to minimise the impact of chemical resistance

Modelling of Blowfly Chemical Resistance



Department of Primary Industries
Department of Regional NSW

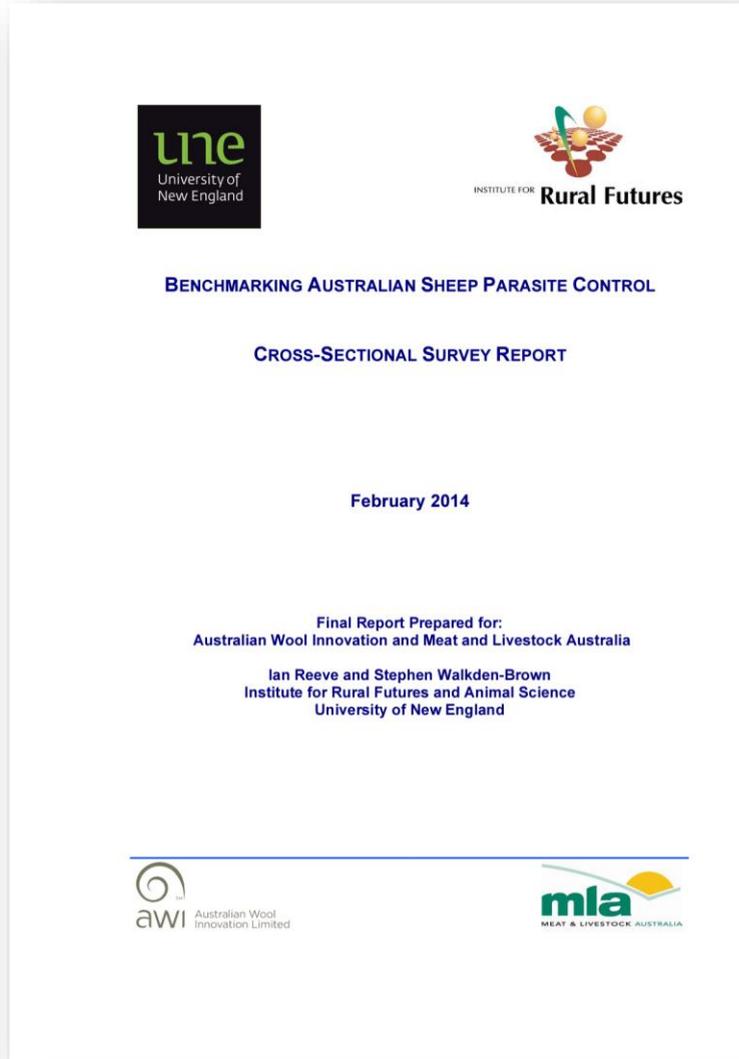


TIA is a joint venture of the University of Tasmania and the Tasmanian Government

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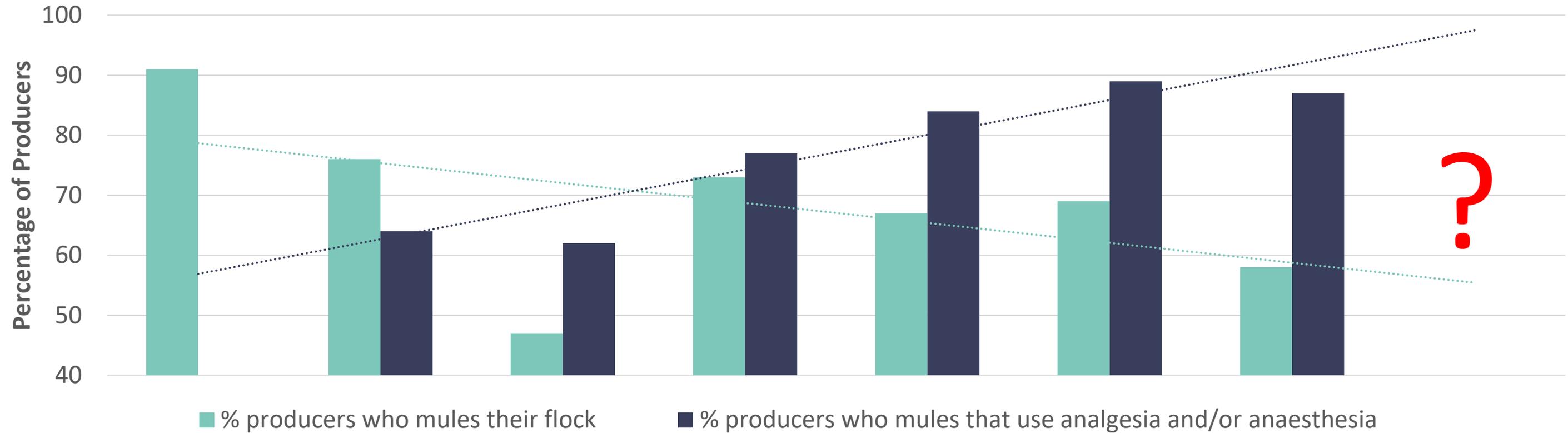


Tasmanian Institute of Agriculture



Demonstrate a 10% increase in adoption of animal welfare practices

Change in Mulesing Practice since 2005



YEAR	2005	2010	2011	2013	2017	2019	2020	2021
REPORT	N = 1,290 PHONE	N = 1,000 PHONE	N = 575 ONLINE	N = 580	N = 1,200 CATI	N = 354 ONLINE	N = 1,011 ONLINE & CATI	N = 1,203 ONLINE & CATI
% producers who mules their flock	91%	76%	47%	73%	67%	69%	59%	?
% Producers who mules who use analgesia and/or anaesthesia	N/A	64%	62%	77%	84%	89%	87%	?

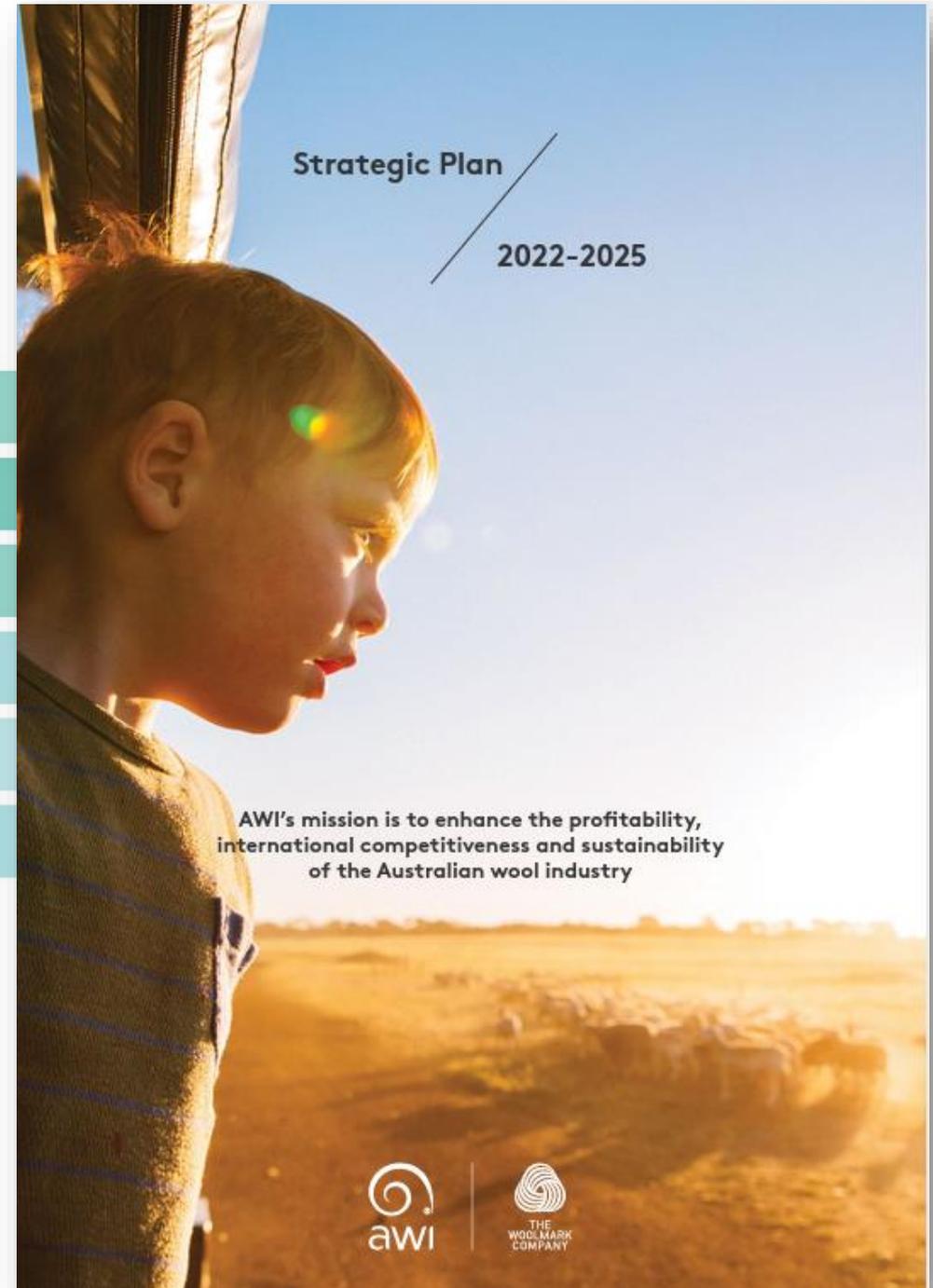
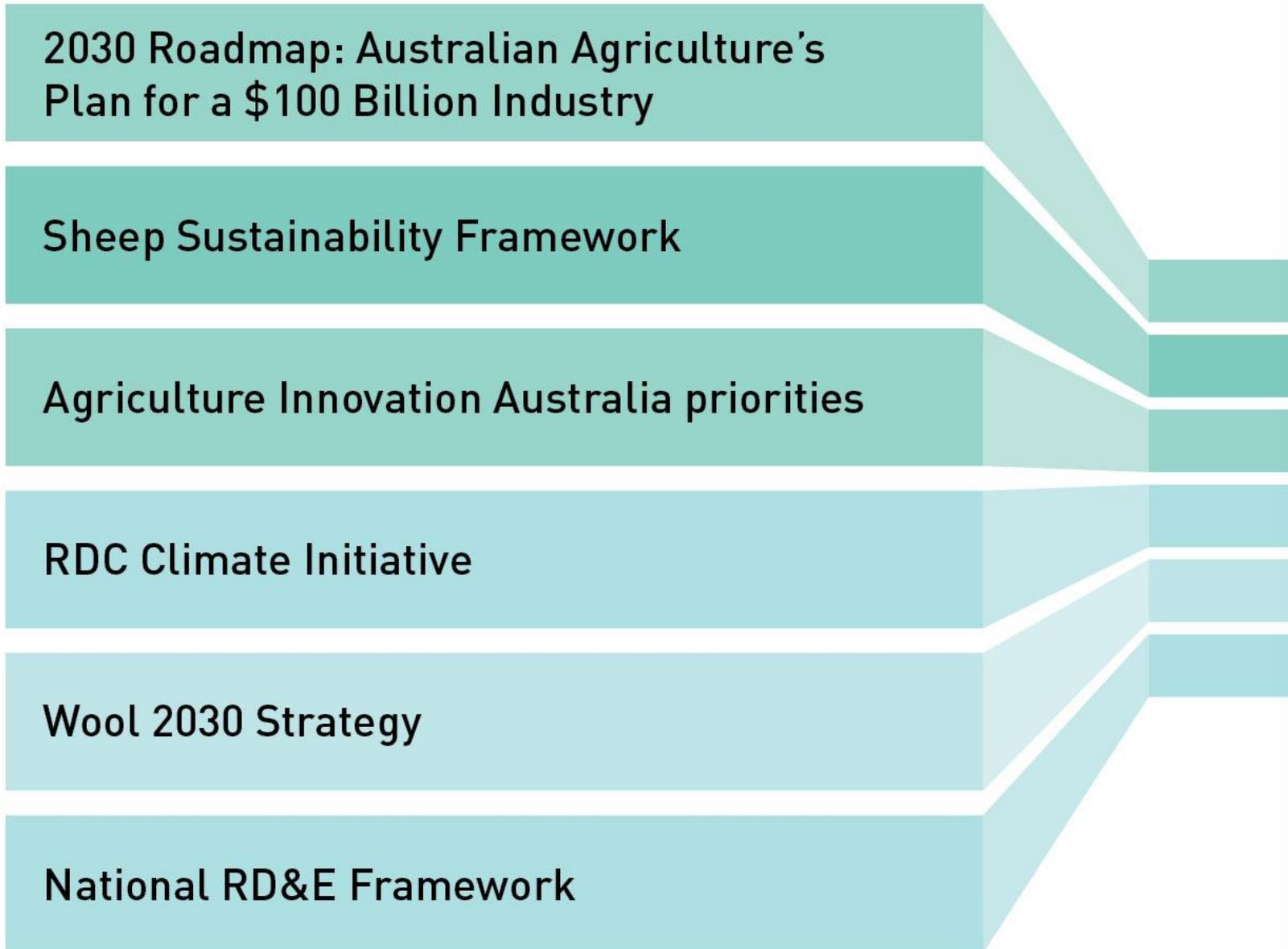
AWI Flystrike RD&E Program AVA Audit

“AWI continues to invest in research aimed at decreasing breech strike and specifically to decrease the reliance of wool producers on mulesing.”

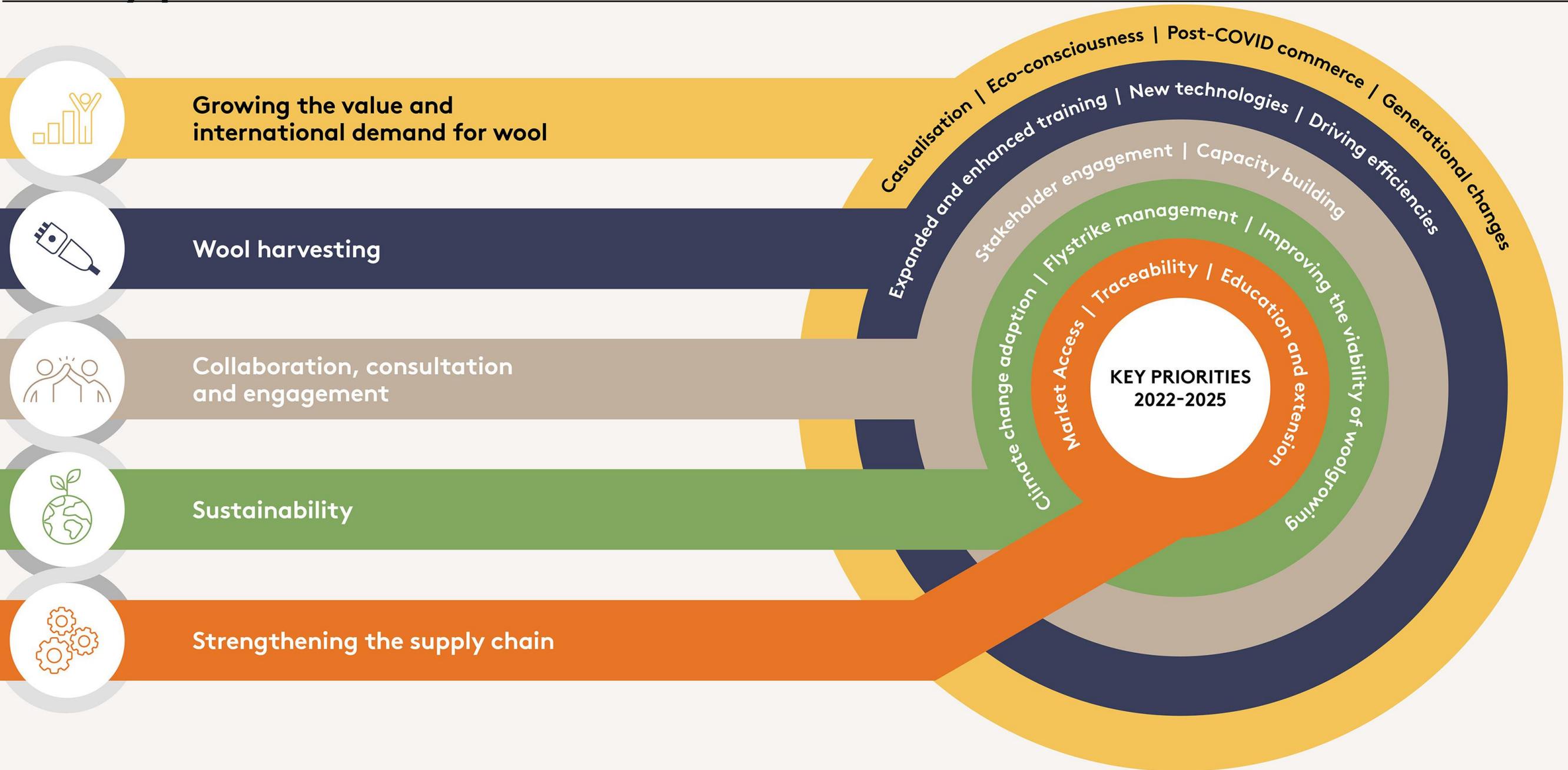
“This work, while still focused on finding alternatives to mulesing, continues to support much broader sheep welfare outcomes. In this reporting period there is continuing emphasis specifically on vaccine development, and a strong focus on extension of control methodologies.”

Professor Bruce Allworth and Dr Graham Lean – April 2022

Full report available on www.wool.com/sheep/welfare/breech-flystrike/progress/



Key priorities 2022-2025



Flystrike Extension Targets for 2022/23



35 woolgrower extension events held on flystrike management knowledge and skills

6 woolgrower extension workshops held on moving to a non-mulesed enterprise

15 advisors trained to assist woolgrowers to move to a non-mulesed enterprise

80 percent increased awareness of tools and confidence to make changes from workshop



AWI FLYSTRIKE EXTENSION PROGRAM



Supporting woolgrowers to improve the lifetime welfare of their sheep, reduce their reliance on mulesing, optimise chemical use and increase whole farm profitability, through the provision of practical information and tools and access to accredited advisor support on flystrike management.

TOOLS AND RESOURCES

It's Fly Time!™

Practical, just-in-time information in the lead up to, and during, high-risk flystrike periods

DemystiFly™

Practical information about managing chemical resistance in blowflies



Information and tools on flystrike management

Breeding and selection

Information and tools to help you breed better sheep

WORKSHOPS AND ADVISOR COACHING AND SUPPORT

SimpliFly™

A one-day workshop to develop a property-specific, strategic flystrike management plan

ClassiFly™

A one-day workshop to increase understanding and skills in breeding for flystrike resistance

StrateFly™

A one-day workshop to develop a property-specific, whole-of-farm strategy for moving to a non-mulesed enterprise

AmpliFly™

One-on-one coaching and support from a trained and accredited advisor to assist you over time to implement your whole-of-farm strategy for moving to a non-mulesed enterprise

Discussion Panel

Where is the future of flystrike RD&E?

Trent Perry - University of Melbourne

Peter James - University of Queensland

Jane Littlejohn - AWI General Manager, Research



Introducing Scott Williams...





This publication is based on information presented at the Australian Wool Innovation Limited (AWI) Flystrike RD&E Technical Forum held on 10th August 2022. Some information in this publication has been contributed by one or more third parties and licenced to AWI, and AWI has not verified whether this information is correct. This publication should only be used as a general aid and is not a substitute for specific advice. To the extent permitted by law, we exclude all liability for loss or damage arising from the use of the information in this publication. Except to the extent permitted under Copyright Law no part of this publication may be reproduced by any process, electronic or otherwise without the specific written permission of AWI. Neither may information be stored electronically in any form whatsoever without such permission. AWI is grateful for its funding, which is primarily provided by Australian woolgrowers through a wool levy and by the Australian Government which provides a matching contribution for eligible R&D activities. © 2022 Australian Wool Innovation Limited. All rights reserved.