Towards a Non-Mulesed Future

Selective Breeding to Counteract Flystrike in Australian Merino Sheep

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Foreword

BG Economics is a socioeconomic consulting firm in Brisbane, Australia. We are engaged by not-for-profit organisations, for-profit organisations and government to undertake economic analyses on a wide range of socially based issues and projects including employment, drugs and alcohol, housing and animal welfare.

Animal welfare has become increasingly important to consumers in recent decades and is often a major factor in their purchasing decisions of products and services. Industries and businesses that do not recognise this, or are slow to respond to changes in consumer demand, risk consumers making alternative purchasing choices where there is a substitute product. This is the case for wool which competes with cotton and synthetic fibres.

We were commissioned to conduct an independent survey and case studies of woolgrowers who have transitioned to plain-bodied Merinos that do not require to be mulesed by Humane Society International (Aust.) and FOUR PAWS. These two international animal welfare organisations are committed to the cessation of mulesing as an animal husbandry practice and supportive of selective breeding as a strategy to help prevent sheep flystrike. The survey collected a range of data on the experiences of producers from an operational, financial and animal welfare perspective to provide a 'big picture' understanding of why and how they made the transition to plain-bodied Merinos and the associated benefits and costs.

The report shows that nearly all woolgrowers have experienced increased financial benefits since transitioning to plain-bodied sheep and the welfare of their animals is also improved. Furthermore, they are now well positioned to meet the market in the years to come as more retailers make the decision to only stock products which use non-mulesed wool.

Future studies focused solely on analysing the financial benefits and costs to woolgrowers of plain-bodied selective breeding, the transitioning process and the science of plain-bodied genetic breeding, would be invaluable to provide deeper analyses given the increasing worldwide demand for wool from non-mulesed Australian Merino sheep.

Dr. Stephen Thornton
Principal

I welcome the independent report on sheep mulesing by the independent socioeconomic consulting firm BG Economics. This clearly confirms, first, that woolgrowers responding to customer demand for better animal welfare by eliminating mulesing find it profitable to do so; that transitioning to plain-bodied Merinos that don't need mulesing is achievable within 5 years; and moreover, that this transition is not costly, that it leads to increased lamb-growth and weaning percentages, and delivers wool price premiums whilst being integral to their increased profitability.

Charles Massy BSc. PhD. OAM
(author of 'Breaking the Sheep's Back')

It is rewarding to see sheep breeders adopting targets that will save sheep from being mulesed. In science we have known for up to 80 years that wrinkles on sheep lead to lower fertility of rams and ewes, less lambs weaned, slower lamb growth rates and poorer wool quality, more difficult shearing, more second cuts and more skin pieces in the fleece. Published science has always confirmed what is reinforced in this report based on farmer experience, that sheep with genetically bare breeches and plain bodies do not need mulesing and do not get so much flystrike and are cheaper to farm. I wish that we scientists had transferred that knowledge to woolgrowers faster and in more comprehensible formats against the tide of misguided belief promulgated by the industry in the past. I urge sheep breeders to use this knowledge promptly and wisely.

Dr. David Scobie, Farm System Scientist (New Zealand)

It has been a great experience for The Schneider Group to support this research, by involving its Authentico growers to help gather valuable information around possible solutions to mulesing. We hope this open dialogue will help to provide further information about the use and success of different flystrike management options in the context of improving animal welfare standards.

Willy Gallia, Sustainability Manager – The Schneider Group (Italy)

Our organisation works with some of the largest wool processors to assist them to develop and further expand their business around the world. In doing so this brings us into daily contact with many clothing brands, retailers and apparel designers. Putting the Covid-19 crisis aside, the main topic for them is setting up a fully traceable and fully transparent supply chain i.e. from "sheep to shop". Without a doubt, for most, if not all, this means the use of non-mulesed wool. From our experience the use of non-mulesed wool from plain bodied sheep has been an easy story to explain, and easy for our retail and brand customers (the decision-makers) to understand and accept. The challenge now for us is to find larger supplies of these types of wool across a large range of microns as last year demand started to exceed supply.

Jimmy Jackson, Managing Director – Woolconsult Pty Ltd

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Glossary

AWI	Australian Wool Innovation Ltd
Breech	Rear end of a sheep around the rectum/vulva
Ceased mulesing (CM)	Wool from a property where no lamb has been mulesed past 12 mths
Crutching	Periodic shearing around sheep's tail and back of legs
Dag	Faecal material adhering to wool around the breech and down legs
Drenching	Liquid delivered by mouth to kill internal parasites in sheep
Dual-purpose Merino	Sheep bred for both wool and meat
Ewe	Female sheep
Fleece	Wool from main part of the body excluding wool from the neck, belly and pieces
Flystrike	Blowfly maggots feed on the skin, often around the breech area of a sheep, a condition which can be fatal if left untreated
Jetting	Insecticide externally applied to sheep to control flystrike, etc.
Lambing percentage	Number of lambs produced per one hundred ewes mated in a flock
Marking	Lambs ear tagged, tail docked, castrated and vaccinated
Micron	1000th of a millimetre used to measure wool fibre diameter
MLA	Meat and Livestock Australia
Mulesing	Removal of skin folds around the breech area (tail end) on lambs typically using mulesing shears to counteract flystrike
National Wool Declaration (NWD)	Standardised declaration method for Australia whereby woolgrowers declare their wool NM, CM, etc.
Non-mulesed (NM)	Mobs comprising only non-mulesed sheep
Plain-bodied Merino	Sheep with no, or only slight, skin wrinkling with standard skin type
Plain-bodied and thin-skinned Merino	Sheep with no, or only slight, skin wrinkling with loose skin type
Ram	Male sheep
Selective breeding	Breeding for desirable traits e.g. body wrinkle and breech cover
SRS®	'Soft Rolling Skin', a breeding system for fleece coated animals developed by Dr. Jim Watts
Steining/Steinfort Method	Use of liquid nitrogen to freeze a sheep's breech skin to create a plainer breech
Wether	Male sheep castrated at a young age
Wigging	Periodic shearing around sheep's face to keep wool out of eyes
Yield	The amount of clean fibre produced when a parcel of raw wool is processed often expressed as a percentage

Executive Summary

Mulesing sheep to manage flystrike has been a common practice in Australia for nearly 100 years. Flystrike occurs when blowfly larvae develop on sheep and maggots feed on their skin and flesh causing distress, and often death, if left untreated.

To counteract this, a process known as 'mulesing' was developed by J.H.W. Mules in the 1920s to aid in the control of flystrike in the breech of sheep. While mulesing has been effective in limiting flystrike around the breech area, it does not protect sheep from suffering flystrike on other parts of their body.

Mulesing involves the removal of skin folds around the breech on lambs typically by using mulesing shears. This is sometimes done without providing adequate pain relief medication meaning lambs can experience pain for many days after the procedure.

Millions of lambs in Australia are mulesed each year, estimated at 77 per cent of Merino ewe lambs and 66 per cent of Merino wether lambs.

Responding to animal welfare concerns, a growing number of woolgrowers have recently turned to selective breeding using genetics to breed 'plain-bodied' Merino sheep which have no, or only slight, skin folds in the body which significantly limits flystrike and removes the need for mulesing.

This report details the findings of a survey and seven case studies of the transition process to plain-bodied Merinos for woolgrowers, the transition outcomes for sheep, the financial benefits and costs of transitioning, and their future farm plans and observations.

The report covers woolgrowers in different states, climate zones and rainfall areas as well as different sheep types being plain-bodied, plain-bodied and thin skinned, and dual-purpose Merinos.

Survey

Data was analysed from the survey responses of 97 woolgrowers who undertook an online survey in December 2019 and January 2020. 61.9 per cent of growers were from NSW; 15.5 per cent from Victoria; 11.3 per cent from South Australia; 5.2 per cent from Queensland; 4.1 per cent from Tasmania and 2.1 per cent from Western Australia.

The most common farm type was 'Specialist woolgrower/self-replacing flock Merino farm' which comprised nearly half of farm types (47.9%). This was followed by 'Mixed enterprise farm (part Merino)' (24%), 'Stud/sheep breeder and Merino wool producer' (20.8%) and 'Commercial woolgrower with first-cross lambs' (7.3%).

Most farms received an annual average rainfall of 401mm to 800mm (81.4%).

Four in ten farms run more than 5,000 sheep (39.2%) with one-third of farms (33%) having a flock size of 2,001 to 5,000 sheep. One in five farms run 1,001 to 2,000 sheep (20.6%) with only a small number of farms having 1,000 sheep or fewer (7.2%).

Two-thirds of woolgrowers have sheep with no body wrinkle (65.3%) and 27.4 per cent with only a few small wrinkles. Fewer than one in ten growers have sheep with some slight wrinkling (7.4%).

84.2 per cent of woolgrowers stopped mulesing in the last 15 years. The main reason growers stopped mulesing and transitioned to plain-bodied sheep was for animal welfare considerations and believing it was an unnecessary procedure. They also found plain-bodied Merinos easier to manage.

Key findings of woolgrower survey

- 77.5% completed the transition to plain-bodied Merinos within five years and 42.7% within two years.
- 83.5% say transitioning to plain-bodied Merinos is not costly.
- 82% have experienced increased lamb growth rates. Lambing percentage is also increased.
- 72.2% experience <=0.5% breech strike and 92.5% <=0.5% body strike.
- 87.6% receive a price premium for their unmulesed wool.
- 84.1% have experienced an increased return on investment.
- 86.6% would recommend to other woolgrowers to undertake the transition to plain-bodied Merinos.
- 98% say not mulesing is important for their farm's future profitability.

Case Studies

The case studies are presented to showcase woolgrowers who have successfully made the transition to plain-bodied Merinos. They provide a snapshot of their farms and woolgrowing experiences and practices (<click here> to go to case studies).

The case study participants were selected primarily to provide plain-bodied woolgrowing experiences in a range of climate zones including high humidity and dry, hot conditions, and from different states.

- Case 1 – Chad and Louise Taylor, 'Mumblebone' Central West NSW.
- Case 2 – Mark and Vicki Murphy and family, 'Karbullah' Southern Queensland.
- Case 3 – Chris and Tarlee Atkinson, 'Wallaby Run' Southeastern South Australia.
- Case 4 – Nicholas Lyons, 'Mount Bodangora' Central West NSW.
- Case 5 – Lindsay and Rae Young, 'Lewisham' Northern Midlands Tasmania.
- Case 6 – David and Susan Rowbottom, 'Rowensville' Southwestern Victoria.
- Case 7 – Norman and Pip Smith, 'Glenwood' Central West NSW.

Mark Murphy 'Karbullah'

Four main points emerged from the data about how these woolgrowers successfully transitioned away from wrinkly type Merinos to plain-bodied types.

Key findings of woolgrower case studies

1. The 'mind shift' to make it happen is the number one hurdle to making the change. When in doubt talk to producers who have already made the transition to plain-bodied sheep as they have the practical knowledge.
2. Be totally committed to the transition process. There can be an initial increase in fly pressure when mulesing is stopped and the wrinkle is bred out. This pressure is a manageable short-term part of the transition that will rapidly reduce as the last of the skin wrinkle disappears. The challenge is to have the patience to see the transition through.
3. Education is key. Attend workshops or other information sessions. An understanding of basic wool biology is essential to avoid a relapse to wrinkly sheep.
4. Buy rams from a stud that has stopped mulesing. Find the studs that align with your breeding direction and those that carefully consider skin and wool qualities. Aim for easier to manage sheep and better 'do-ability'.

1

INTRODUCTION

1.1 Overview

The mulesing of sheep to manage flystrike has been a common practice in Australia for nearly 100 years. Flystrike occurs when blowfly larvae develop on sheep and the maggots feed on their skin and flesh causing distress and often death if left untreated.[1]

To counteract this, a process known as 'mulesing' was developed by J.H.W. Mules in the 1920s to aid in the control of flystrike in the breech of sheep. Mulesing involves the removal of skin folds around the breech (tail end) on lambs typically by using mulesing shears.[2] This is sometimes done without providing adequate pain relief medication to the animal.

The majority of producers in Australia mules their lambs with an estimated 77 per cent of Merino ewe lambs and 66 per cent of Merino wether lambs being mulesed.[3] The practice is most common in Victoria, South Australia and Western Australia[4] although it occurs in all states and territories apart from the Northern Territory where sheep are prohibited.

While mulesing has been effective in limiting flystrike around the breech area, it is also associated with negative animal welfare outcomes. Evidence suggests the stress response in lambs to mulesing is not dissimilar to surgical castration but persists for a longer period, likely due to the greater wound area,[5] with significant pain being experienced for at least two to three days and continuing discomfort persisting for possibly up to two weeks.[6]

Mulesed lambs

There has been some resistance to change in Australia with a view that transitioning to selective breeding is costly and difficult.

However, with changing consumer expectations, woolgrowers resistant to change are increasingly at risk of finding it more difficult to locate markets to take their wool at the prices to which they have become accustomed.

While most woolgrowers are resisting ceasing mulesing, a growing number are turning to selective breeding using genetics to breed Merino sheep which do not require mulesing.

These 'plain-bodied' sheep have no, or only slight, skin folds in the body which significantly limits flystrike. It offers a whole-body solution by providing resistance to all forms of flystrike.

While more woolgrowers have turned to plain-bodied selective breeding in recent years, it still comprises only a small proportion of all Merino breeding in Australia.

1.2 Purpose

Anecdotal evidence from woolgrowers suggests that transitioning away from wrinkly type Merinos to plain-bodied Merinos through selective breeding, where mulesing is not required, is not a difficult process and is financially cost effective.

However, there have been few studies, if any, undertaken to quantify this which is the purpose of this report.

The report presents the survey and case studies data of the transition process for woolgrowers, the transition outcomes for sheep, the financial benefits and costs of transitioning, and the future farm plans of woolgrowers following the transition from wrinkly breed types to plain-bodied Merinos.

Woolgrowers in different states, climate zones and rainfall areas as well as different sheep types being plain-bodied, plain-bodied and thin skinned, and dual-purpose Merinos are covered.

[1] Department of Primary Industries and Regional Development (WA). 2018. 'Managing non mulesed sheep'.
[2] Ibid.
[3] Kynetec. 2018. '2017 Merino Husbandry Practices Survey' (updated 27 February 2019).
[4] Ibid.
[5] Lee, C., & Fisher, A. 2007. 'Welfare consequences of mulesing of sheep'.
[6] Edwards, L. E. 2012. 'Lamb mulesing: impact on welfare and alternatives'.

1.3 Methodology

The study comprised two components, incorporating both quantitative and qualitative research methods being an online survey and case studies.

Non-random sampling is usually undertaken when it is difficult or impossible to obtain a random sample due to having limited information about the 'population' or group of people being studied e.g. population size and contact details. This is the case for plain-bodied Merino woolgrowers in Australia.

While random sampling is often preferred to non-random sampling, it is very difficult to achieve and sometimes studies using this type of sampling have flaws in their methodology.

Non-random sampling methods, like convenience sampling which has been utilised here, may be considered more conservative due to the analysis being focused on the sample being studied with no claims made about the wider population.

A draft questionnaire using SurveyMonkey was designed and piloted to test for validity and reliability and to ensure as best as possible that the questions were able to be understood by participants. The survey questions were formulated in conjunction with four woolgrowers and then pilot tested with these woolgrowers multiple times.

Some questions in the survey were aligned with a previous survey undertaken in 2017 by Kynetec for Australian Wool Innovation Ltd (AWI) for comparative purposes. These are referenced in the report.

The survey was distributed via email in two ways. First, by BG Economics using a database of woolgrower contacts based on the recommendations of growers provided by the funding organisations and second, by recruiting third party industry organisations to distribute the survey link to woolgrowers through their networks.

The survey was undertaken by woolgrowers who had already transitioned to plain-bodied Merinos and who do not mules their sheep.

The survey covered various geographic locations so they represent a variety of climate zones e.g high and low humidity parts of Australia.

Participants were required to provide their name, farm name and email address to be included in the analysis. While this undoubtedly meant fewer woolgrowers participating in the survey, it was considered prudent to ensure, as far as possible, that the survey was completed by genuine woolgrowers.

The survey controls were set to not collect IP addresses and only one completion by a single device.

The survey contained two screening questions:

1. Do you run plain bodied (or only slightly wrinkled) Merinos in Australia, and identify all mobs on your property as either ceased-mulesed or non-mulesed, and 'steining'/liquid nitrogen has never been applied to any mobs as a mulesing alternative?
2. Do you have good knowledge of the operation of the farm to complete the survey?

The survey went live on 9 December 2019 and closed on 19 January 2020, being open for approximately six weeks. The time period for the survey was 'to exhaustion' where responses to the survey had stopped.

116 woolgrowers undertook the survey however 19 either did not provide their name, farm name and email address at the end of the survey or were found to not meet the eligibility criteria which included a body wrinkle score of 3 or lower and their responses were deleted as part of the data cleaning process.

In addition, seven qualitative case studies were conducted to better understand the experiences of woolgrowers. The case studies are included to showcase woolgrowers who have successfully made the transition to plain-bodied Merinos and provides a description of their farms and woolgrowing practices and experiences.

1.4 Report Structure

The report comprises the following sections:

- Section 1 - Introduction
- Section 2 - The Australian Wool Industry
- Section 3 - Survey Data and Analysis
- Section 4 - Case Studies
- Section 5 - Conclusions

2

THE AUSTRALIAN WOOL INDUSTRY

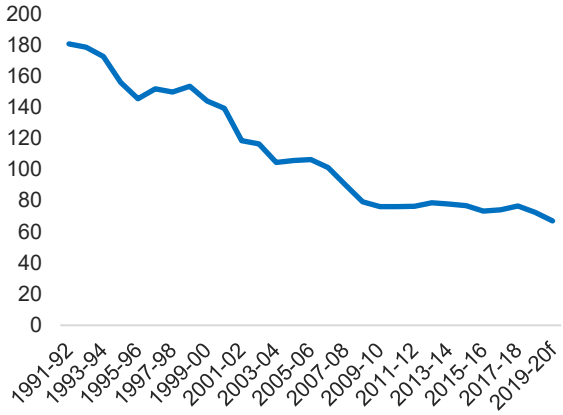
2.1 Overview

Australia is one of the world's largest wool producers, being around 25 per cent of all greasy wool sold on the world market.[7]

Wool is produced in all states and territories in Australia except for the Northern Territory where sheep are prohibited. New South Wales produces the greatest volume of wool from its 22.9 million sheep comprising approximately one-third of the nation's 68 million flock. Victoria (14.8M), Western Australia (14.4M), and South Australia (11.9M) are the other significant wool producing states with Queensland and Tasmania each having about two million sheep.[8]

The number of sheep shorn in Australia has been declining for many decades. In 1991-92, there were 180.9 million sheep shorn with just over one-third of that number shorn now (67.1M).[9]

Figure 1: Number of sheep shorn in Australia since 1991-92 (million)



2.2 Australian Merino Wool

The Australian Merino is not a single homogenous breed but a number of 'strains' of sheep. There are four traditional strains of Merino sheep being the:

- Peppin Merino
- South Australian Merino
- Saxon Merino
- Spanish Merino[10]

These are all wrinkly type Merinos which has been the mainstay of the Australian wool industry and continues to be today, although selective breeding to produce plain-bodied Merino types that do not require mulesing has become more common due to animal welfare concerns. The Merino wool types are: [11]

- Strong – >= 22.6 micron
- Medium – 20.6 to 22.5 micron
- Fine Medium – 19.6 to 20.5 micron
- Fine – 18.6 to 19.5 micron
- Superfine – 17.6 to 18.5 micron
- Ultrafine – 16.1 to 17.5 micron
- Extra Ultrafine – <=16.0 micron

Australia is known for its high-quality fine wool, although it does also produce stronger wool. Extra Ultrafine Merino wool can attract more than twice the sale price of Strong wool in a good market.

While it also costs more to produce, Australia has a competitive advantage vis-à-vis other wool producing countries given its focus on breeding toward finer wool over many decades. As such, Australia produces more than 90 per cent of the world's supply of wool less than 19.5 micron.[12]

From 1 July 2019 to 2 April 2020, of 926,081 bales of wool sold, 344,807 bales (37.2%) was for wool less than 18.6 micron; 438,916 for 18.6 – 24 micron (47.4%) and 142,358 for wool greater than 24.5 micron (15.4%). However, only 164,504 bales or 17.8 per cent were declared as NM (non-mulesed) or CM (ceased mulesing).[13]

2.3 The Value of Merino Wool to the Australian Economy

Wool represents one of Australia's more valuable agricultural exports. Almost all wool produced in Australia is exported. This is important to note as the industry is heavily reliant on overseas purchasing decisions and competition with other wool growing countries like New Zealand which banned mulesing in 2018. These aspects are relevant now and into the future.

[7] Australian Department of Agriculture. 2019. 'Wool'.
[8] Australian Wool Innovation Ltd. 2020. 'Sheep numbers by state'.
[9] Ibid.
[10] Australian Association of Stud Merino Breeders. 2016. 'Evolution of the Australian Merino'.
[11] Ibid.
[12] Learn About Wool. 2020. 'The Wool Market'.
[13] AWEX. 2020. 'Mulesing Status Declarations'.

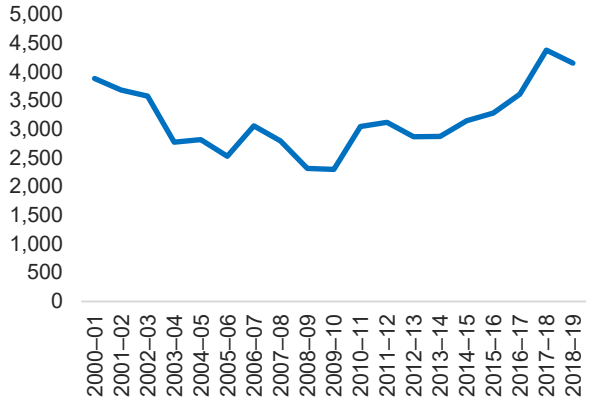
Wool exports in 2018-19 totalled $4.15 billion as shown in Figure 2 however the recently revised forecast for 2019-20 and 2020-21 is for a decrease to $3.02 billion and $2.61 billion respectively due to the impacts of the drought, COVID-19 and the price of oil holding synthetic fibre prices low.[14]

The price of wool is generally determined by the two key factors that apply to almost any market, demand and supply, as well as the characteristics of the wool product and external factors e.g. shipping deadlines.[15] However, the price is now also determined by whether the wool is produced from non-mulesed sheep.

Animal welfare concerns have resulted in price premiums for non-mulesed wool over the past decade.

For example, average price premiums for non-mulesed Merino wool at auction reached 108 cents per kilogram for 16-micron wool in July to September 2019.[16]

Figure 2: Value of Australian wool exports 2000-01 to 2018-19 ($M)



2.4 The Growing Demand for Non-Mulesed Australian Merino Wool

Mulesing has attracted increased negative attention in recent decades with retailers responding to consumer demands for more ethically sourced product by taking the decision to either not stock garments and other wool apparel or to phase it out of their range.

The International Wool Textile Organisation (IWTO) acknowledges wool is increasingly seen by consumers as a sustainable lifestyle choice for fashion and interior textiles and that the global wool industry is committed to the highest standards of sheep care and well-being.[17] Mulesing is clearly incompatible with that aim.

Woolgrowers declare the mulesing status via the National Wool Declaration (NWD). The relevant Status Codes are:[18]

- NM = Wool from mobs that are declared to be Non-Mulesed
- CM = Wool from mobs where the grower has declared Ceased Mulesing

In Australia, retailers David Jones and Country Road Group in August 2019 committed to phasing out mulesed wool from their clothing range.[19] Kmart[20] and Target[21] have also announced they would stop selling products containing mulesed wool for their own brand clothing and bedding by 2023.

They join a growing number of brands internationally who have committed to no longer being associated with wool from mulesed sheep.

The growing demand for non-mulesed Merino wool has also seen a range of assurance schemes created under which Australian woolgrowers who do not mules their sheep can be registered.

These schemes provide confidence to the market and include:

- **Authentico** – requires the completion of the NWD and only NM or CM status wool is accepted. Woolgrowers must have implemented the '5 Freedoms' for animals as established by the RSPCA. The clip must be classed by an AWEX Registered Wool Classer. Random audits are conducted by third party auditors.[22]

[14] ABARES. 2020. 'Agricultural commodities: June quarter 2020'
[15] AWEX. 2014. 'The Australian Wool Market An introduction (for prospective participants)'.
[16] Department of Agriculture, Water & the Environment. 2020. 'Natural Fibres: March quarter 2020'.
[17] International Wool Textile Organisation (IWTO). 2019. 'Animal Welfare'.
[18] AWEX. 2020. 'Mulesing Status'.
[19] Ellicott, J. 2019. 'Top fashion outlets move to remove mulesed wool from range'.
[20] Kmart. 2020. 'Animal Welfare'.
[21] Target. 2020. 'Animal Welfare'.
[22] The Schneider Group. 2020. 'The Authentico Integrity Scheme by Schneider'.

- **NATIVA** – the NATIVA seal of approval means wool meets the internationally validated criteria stated by the Responsible Wool Standard, plus its own extended set of policies to guarantee animal welfare, responsible management of the land, and an ethical working environment throughout the supply chain.[23]

- **New Merino** – full certification allows woolgrowers to be listed as a Preferred Producer. Mulesing is not permitted. Parallel production is not allowed. Buying mulesed sheep in and claiming CM status for the farm is not permitted. The farm will not comply if any lamb born on the farm in the previous 12 months has been mulesed. An on-farm audit is conducted.[24]

- **RWS** – the Responsible Wool Standard (RWS) requires all sites to be certified, beginning with the wool farmers and through to the seller in the final business to business transaction. Farms are certified to the Animal Welfare and Land Management and Social Modules of the RWS. Mulesing is strictly prohibited.[25]

- **SustainaWOOL** – operated by the Australian Wool Exchange (AWEX) with over 1,000 accredited woolgrower suppliers. The scheme identifies those suppliers who do not mules (ceased or never mulesed) as SustainaWOOL 'green' suppliers. 20 per cent of member farms are inspected each year, in addition to the over 200 farm inspections conducted for NWD declarants.[26]

- **ZQ Merino** – mulesing is not permitted on properties that supply ZQ wool. Growers must adhere to the ZQ Standard which prioritises animal welfare. ZQ certification is valid for three years with ZQ farms audited on a regular basis by a third-party Certified Accreditation Body.[27]

2.5 Plain-bodied Selective Breeding

Traditional type Merinos in Australia have been bred to be wrinkled in order to have more skin and therefore to grow more wool per sheep.

However, as discussed in Section 1, flystrike occurs when blowfly larvae develop on sheep and the maggots feed on the skin causing distress and often death if left untreated.

The folds of the skin in wrinkly sheep are particularly susceptible to flystrike, especially around the breech.

Selective breeding to produce naturally resistant plain-bodied Merinos which have no, or only slight, skin folds in the body has been described as the 'long term, sustainable solution to reducing the risk of breech strike'.[28]

Sheep that are relatively high in fleece weight and low in wrinkle have been identified and the industry is selecting and breeding from these to ensure they maintain and/or increase productivity whilst decreasing wrinkle in their flocks.[29]

While selective breeding has been occurring for decades, it is only in the last 15 years where a small though significant number of woolgrowers have transitioned away from wrinkly sheep.

This is largely due to the work of veterinarian and scientist Dr. Jim Watts who spent over 40 years researching and developing selective breeding protocols to produce plain-bodied sheep with good body reserves of muscle and fat.

Dr. Watts' Soft Rolling Skin (SRS®) Merinos have been bred using reproductive technology and selection methods introduced and established as industry practice in the 1990s whereby sheep are selected for high fleece weight per unit area of skin.[30]

This is as opposed to simply trying to breed for greater skin surface area as in the wrinkly types.

[23] NATIVA. 2020. 'Certification'.
[24] New Merino. 2020. 'Certification'.
[25] Textile Exchange. 2020. 'Responsible Wool Standards'.
[26] SustainaWOOL 'SustainaWOOL Integrity Scheme'.
[27] ZQ. 2020. 'The ZQ Difference'.
[28] Australian Wool Innovation Ltd. 2020. 'Breeding for Breech Strike Resistance'.
[29] Ibid.
[30] Burns, S. 2016. 'Plain bodies for big weaning'.

SRS® plain-bodied Merino wethers

It is noted that not all woolgrowers use SRS and there are other plain-bodied selective breeding programs available with some successful growers developing their own over many years.

One of the important attributes of the plain-bodied Merino, apart from being naturally resistant to flystrike and not requiring to be mulesed, is said to be its ability to control its body temperature and hydration more efficiently than wrinkly breeds in hot environments.[31]

This is especially important in a country like Australia which is experiencing hotter and dryer weather and more severe droughts.

The impact on woolgrowing into the future in regard to climate change is acknowledged by financial institutions, including the Commonwealth Bank of Australia, which recently stated:[32]

> *'Livestock regions face significant farmer profitability declines by 2060, with falls of up to 40% due to a deterioration in pasture growth and quality. However, adaptive measures can significantly improve livestock production, with most regions able to convert an absolute decline in profitability to an improvement above the baseline by 2060 … potential adaptive measures include* ***breeding for increased tolerance to heat and humidity****, improving pasture quality in harsher conditions and cooling livestock by providing shade and water sprays'.* (note - BG Economics bolding).

One criticism sometimes made of plain-bodied sheep is that they cannot produce very fine and desirable wool. As will be shown in Section 3, the majority of growers participating in the survey produce fine to superfine Merino wool in the 18 – 19.9 micron range (60.9%) with almost one-third producing even finer wool (31.9%).

Additionally, while having transitioned to plain-bodied Merinos in the 1990s, one pioneering plain-bodied woolgrower from southwestern Victoria, in 2020, has again grown the finest Merino wool in the world.[33] David and Susan Rowbottom's achievement is detailed in Section 4 (see Case 6).

Other criticisms expressed are the time required to undertake and complete the transition process and the cost of transitioning.

Over three-quarters of survey participants (77.5%) completed the transition within five years and more than eight in ten (83.5%) say it is not costly to transition to a plain-bodied Merino enterprise.

[31] Ibid.
[32] Commonwealth Bank of Australia. 2019. 'Annual Report 2019'.
[33] Graham, V. 2020. Farmonline 'Major Zegna wool awards go to Victoria and Tasmania'.

3

SURVEY DATA & ANALYSIS

3.1 Overview

The analysis is conducted with four research themes considered as detailed below.

Each of the research themes is addressed in Sections 3.3 to 3.6.

1. **Transition process for woolgrowers**
   How long does it take to transition to a plain-bodied, non-mulesed Merino farm operation and how and why is it done? How costly is it to undertake the transition?

2. **Transition outcomes for sheep**
   What level of breech strike and body strike is experienced by plain-bodied, non-mulesed Merinos? What breech cover, body wrinkle and dag scores are the sheep? What changes, if any, is there to lambing? Is animal welfare improved and, if so, how is it improved?

3. **Financial benefits and costs of transitioning**
   Do woolgrowers who have transitioned to plain-bodied, non-mulesed Merinos realise improved financial outcomes? Are there any differences considering the following variables?
   - Merino type
   - climate zone
   - annual rainfall
   - flock size
   - farm business type

4. **Future farm operations and observations**
   Do woolgrowers who have transitioned to a plain-bodied, non-mulesed Merino farm operation plan to continue with plain-bodied types and do they plan to expand their farming operation and why? Would they recommend the transition to other woolgrowers? Do they have any other observations?

3.2 Farm and Flock

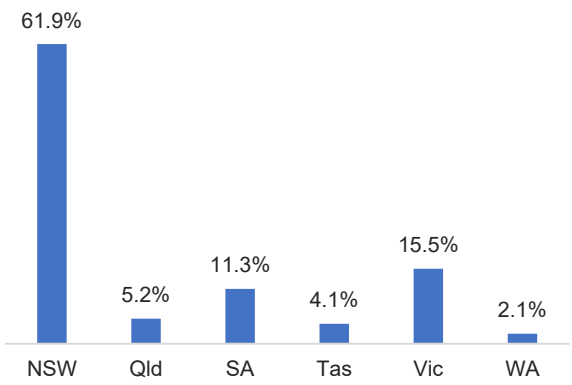
This section provides a profile of the woolgrowers who participated in the survey, their farms and sheep.

3.2.1 State location of farms

Growers from all states are represented although there was a disproportionately higher number of growers from NSW, even when accounting for the state comprising approximately one-third of the nation's flock. This is likely due to the SRS breeding program, introduced by Dr. Jim Watts, originating in NSW.

Six in ten growers (61.9%) were from NSW; 15.5 per cent from Victoria; 11.3 per cent from South Australia; 5.2 per cent from Queensland; 4.1 per cent from Tasmania and two (2.1%) from Western Australia.

Figure 3: Woolgrowers by state (n=97)



3.2.2 Climate zones

While the state location of farms is interesting, the more important factor for the purposes of understanding how plain-bodied Merinos fare in different parts of Australia is not by state borders but by climate zones and also rainfall.

In regard to climate zones, growers were asked to nominate which zone on the climate zone map their farm was located (see Figure 4).

While the climate zone map is a useful tool, it does have some shortcomings. For example, some of the crude zone areas such as Zone 3 on the northern side of the Queensland/NSW border and Zone 4 on the southern side.

- Climate zone 1 - high humidity summer, warm winter (brown)
- Climate zone 2 - warm humid summer, mild winter (yellow)

- Climate zone 3 - hot dry summer, warm winter (light brown)
- Climate zone 4 - hot dry summer, cool winter (cream)
- Climate zone 5 - warm temperate (green)
- Climate zone 6 - mild temperate (light blue)
- Climate zone 7 - cool temperate (dark blue)
- Climate zone 8 – alpine (white – amongst dark blue)

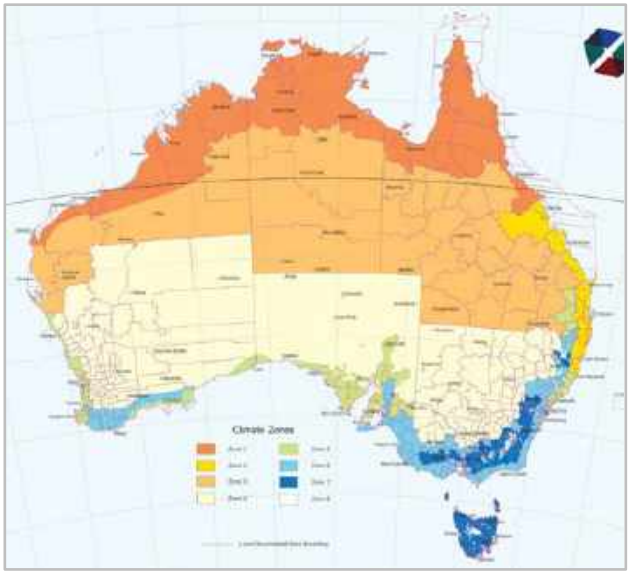


Figure 4: Climate zone map[34]

While all eight climate zones were included in the survey for completeness, very few woolgrowing enterprises are located in zones 1 and 2.

Zone 1 takes in the entire top end of Australia which experiences extreme heat temperatures and tropical cyclones and is not conducive to woolgrowing.

Zone 2 is a relatively narrow strip along the east coast of southern Queensland and northern NSW which are largely urban areas with small cropping farms.

Most wool in Australia is grown west of the Great Dividing Range in the eastern states; in most of the agricultural and pastoral lands of South Australia and Western Australia; and in the northeast of Tasmania.[35]

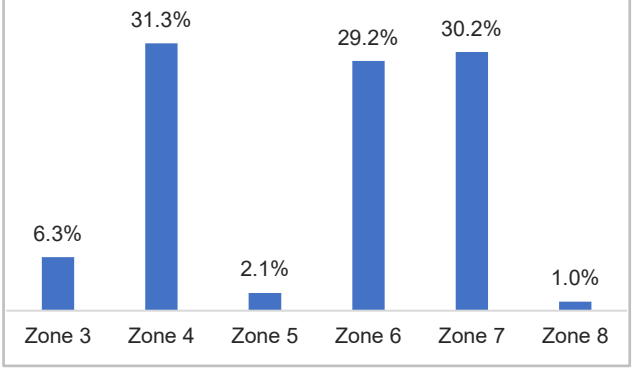
Given this, it is not surprising that nine of ten farms (90.7%) were located in three climate zones being:

- Zone 4 – covering most of western NSW, northern parts of Victoria, most of South Australia, and a large part of the central and southern areas of Western Australia;
- Zone 6 – covering eastern inland areas of NSW and large parts of southern Victoria and the southeast area of South Australia as well as the southernmost part of Western Australia; and
- Zone 7 – covering small areas of NSW and Victoria and most of Tasmania.

Survey responses were also received from:

- Zone 3 – covering most of western Queensland and mid-northern parts of Western Australia;
- Zone 5 – covering very small areas of Queensland and NSW and larger parts of South Australia and a strip of southwestern Western Australia; and
- Zone 8 – covering a few small areas in NSW e.g. around the Armidale area and in some parts of Victoria.

Figure 5: Woolgrowers by climate zone (n=96)



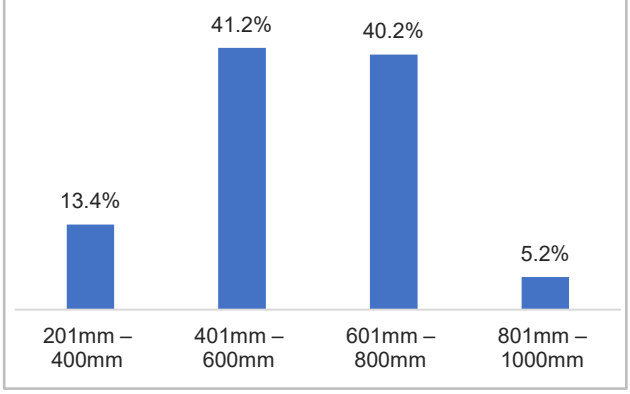
3.2.3 Farm rainfall

Figure 6 shows growers' average annual farm rainfall in a typical non-drought year. This ranged from 201mm to 1000mm with most farms receiving between 401mm and 800mm (81.4%). Only 13.4 per cent of farms receive 201mm to 400mm and 5.2 per cent 801mm to 1000mm.

[34] Australian Building Codes Board (ABCB). 2019. 'Australia Climate zone map'.

[35] AgriFutures Australia. 2017. 'Wool'.

Figure 6: Average annual (non-drought) on-farm rainfall (n=97)



3.2.4 Farm type

The most common farm type of respondents was 'Specialist woolgrower / self-replacing flock Merino farm' which comprised nearly half of farm types (47.9%).

This was followed by 'Mixed enterprise farm (part Merino) (24%), 'Stud / sheep breeder and Merino wool producer (20.8%) and 'Commercial woolgrower with first-cross lambs' (7.3%) as shown in Figure 7.

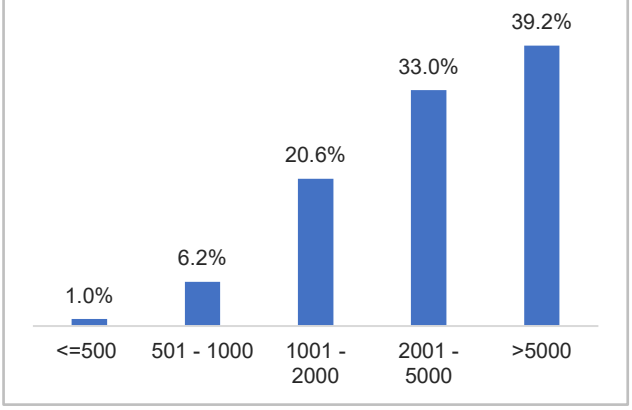
Figure 7: Farm type (n=96)

3.2.5 Flock size

The usual non-drought flock size of farms is shown in Figure 8. Four in ten farms run more than 5,000 sheep (39.2%) with one-third of farms (33%) having a flock size of 2,001 to 5,000 sheep.

One in five farms run 1,001 to 2,000 sheep (20.6%) with only a small number of farms having 1,000 sheep or fewer (7.2%).

Figure 8: Flock size (n=97)

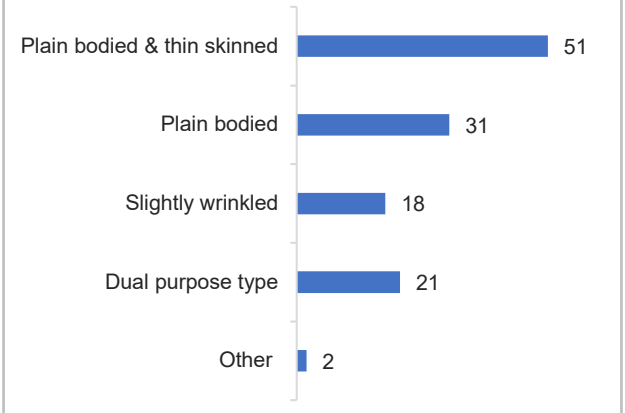


3.2.6 Merino type

Woolgrowers were provided with four answer options and an 'other' option for the Merino 'type' they run. More than one answer option could be selected. Figure 9 shows the number of Merino types (not percentage) on the farms.

The most common type is 'Plain-bodied and thin skinned' (51) followed by 'Plain-bodied' (31) and 'Dual purpose type' (21). 'Slightly wrinkled' Merinos were identified by 18 growers with two selecting 'other'.

Figure 9: Merino type (multiple answers) (n=97)



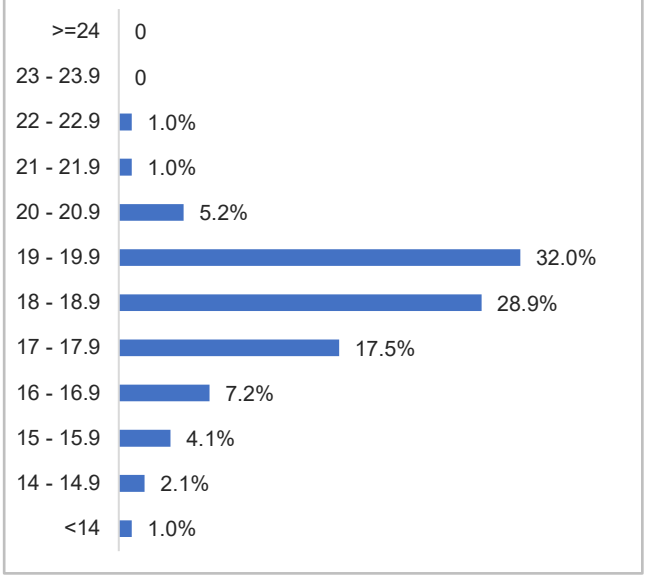
3.2.7 Fibre thickness

The diameter of wool fibres is measured in 'microns', being one-thousandth of a millimetre.

Figure 10 shows the majority of growers produce fine to superfine Merino wool in the 18 – 19.9 micron range (60.9%) with almost one-third producing even finer wool (31.9%).

Only one grower likely produces strong wool at the bottom of the strong wool scale (>= 22.6 micron) with a small number of growers producing medium type wool (20.6 - 22.5 micron).

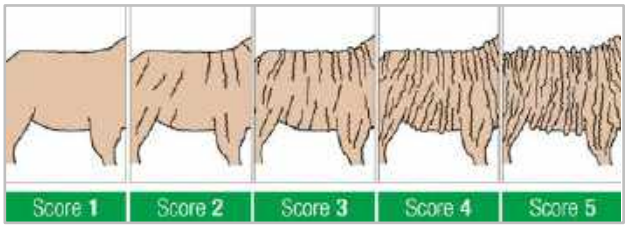
Figure 10: Average adult Merino ewe micron (n=97)



3.2.8 Body wrinkle scores

A visual score method of rating body wrinkle is shown below ranging from no body wrinkle (Score 1) to very heavily wrinkled (Score 5).[36] Growers were asked to identify which score was most applicable to their flock.

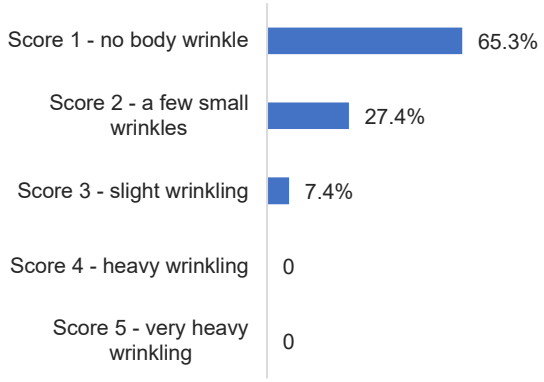
It is noted that there is a very strong correlation[37] or relationship[38] between body wrinkle and breech wrinkle.



Two-thirds have Score 1 sheep with no body wrinkle (65.3%) and nearly one-third have Score 2 sheep with only a few small wrinkles (27.4%). Fewer than one in ten growers have sheep with a Score 3 meaning they have some slight wrinkling (7.4%).

Any grower who indicated they grew wool from Score 4 or Score 5 sheep did not meet the eligibility criteria for the survey.

Figure 11: Ewe body wrinkle score (n=95)



Plain-bodied sheep

3.2.9 Breech scores

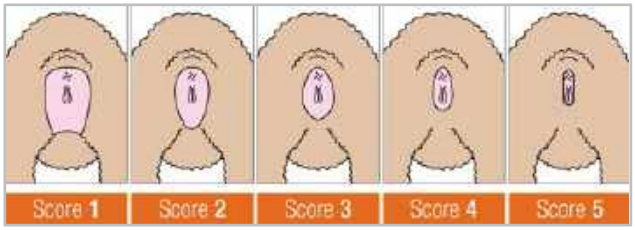
Growers were asked to indicate the breech cover score that was generally applicable to their ewes.

This ranged from Score 1 (natural bare area that extends outwards around the anus and vulva, and right down to the bottom of the breech area) to Score 5 (complete or mostly complete wool cover i.e. no natural bare area at all) as shown below.

Figure 12 shows Score 3 to be the most common (40%) with Scores 1 and 5 the least common (9.5% and 6.3% respectively).

[36] Australian Wool Innovation Ltd (AWI) and Meat & Livestock Australia (MLA). 2013.

[37] Sheep Genetics. n.d. 'Sheep Genetics Health'.
[38] FlyBoss. 2020. 'Breech wrinkle scoring and selection'.



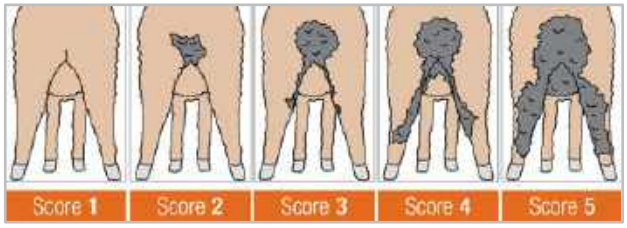


Figure 12: Breech score (n=95)

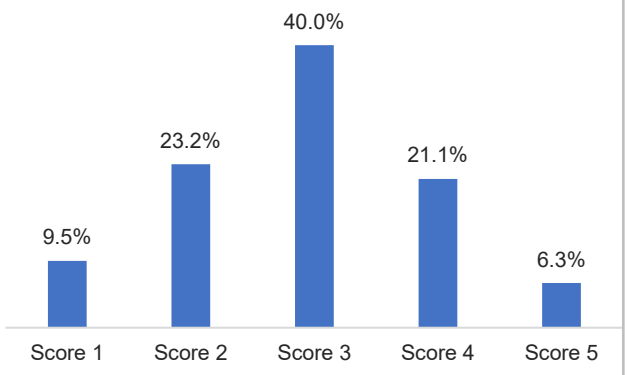
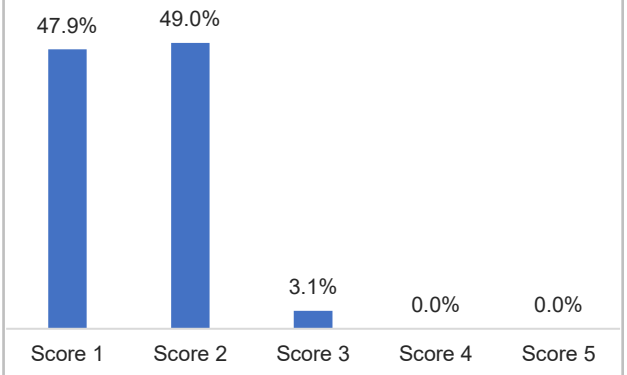


Figure 13: Dag score (n=96)



Merino ewe with plain breech

3.2.10 Dag scores

Dag formation is caused by the adhesion of faecal material to the breech area and a dag score is estimated based on the quantity of faecal material adhering to the wool surrounding the breech and extending down the hind legs.[39]

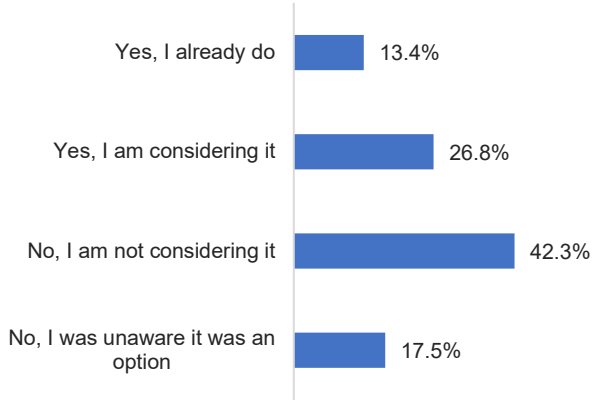
Almost all of the 96 growers who answered this question reported that their sheep are generally Score 1 (47.9%) or Score 2 (49%) with only 3.1 per cent of growers reporting a dag Score 3 and no growers reporting Scores 4 or 5.

3.2.11 Tails

Although Merino tails are not the subject of the survey, a question was included asking growers whether they had considered using, or if they were already using, genetic selection to breed sheep with naturally short tails.

Four in ten growers already do or are considering this (40.2%) with around the same number not considering it (42.3%). 17.5 per cent of growers were unaware it was an option.

Figure 14: Selective breeding Merinos with short tails (n=97)



[39] Australian Wool Innovation Ltd (AWI) and Meat & Livestock Australia (MLA). 2013.

3.3 Transitioning to Plain-bodied Selective Breeding

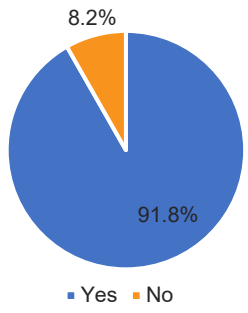
This section details the transition process for growers. The survey questions were formulated with the following research questions in mind.

- How long does it take to transition to a plain-bodied, non-mulesed Merino farm operation?
- How and why is it done?
- How costly is it to undertake the transition?

3.3.1 Previously mulesed

Figure 15 shows that nine in ten growers had previously mulesed (91.8%) while only one in ten had never mulesed (8.2%).

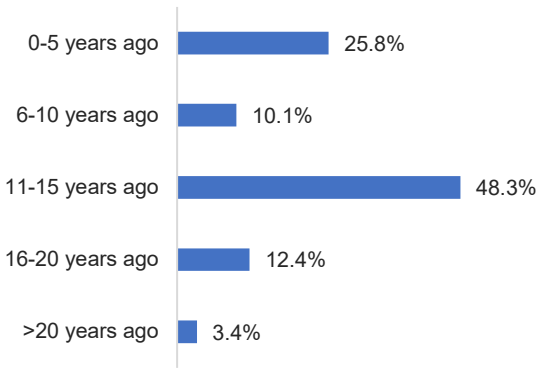
Figure 15: Woolgrowers who have previously mulesed (n=97)



3.3.2 When stopped mulesing

Of the 89 growers who had previously mulesed, 84.2 per cent stopped in the last 15 years with only 3.4 per cent stopping more than 20 years ago. This indicates that plain-bodied selective breeding is quite a recently adopted woolgrowing technique for many growers.

Figure 16: When stopped mulesing (n=89)



3.3.3 Why stopped mulesing for selectively bred Merinos

Figures 17 and 18 show that the main reason growers stopped mulesing and transitioned to plain-bodied sheep was for animal welfare considerations and believing it was an unnecessary procedure.

They also found plain-bodied Merinos easier to manage.

Interestingly, financial considerations appear to have been a lower order consideration.

Figure 17: Why stopped mulesing (multiple answers) (n=90)

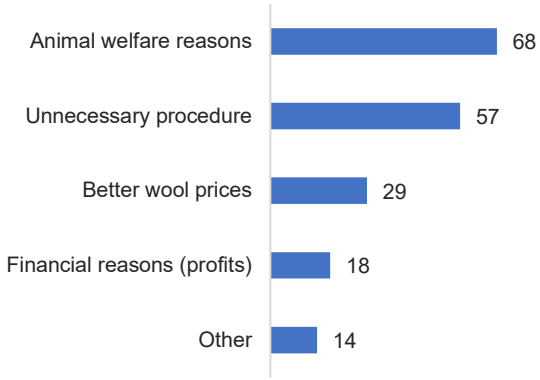
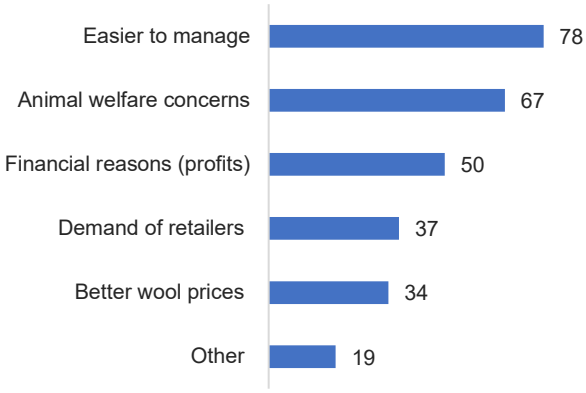


Figure 18: Why selectively bred plain-bodied Merinos (n=97, multiple answers)



'I believe the industry as a whole needs to listen to the consumers and retailers that are telling us they want unmulesed wool only. If we can't provide that then they may go to another fibre at the expense of wool'
(survey participant)

3.3.4 Selective breeding assistance

Woolgrowers were asked if they received assistance to transition to plain-bodied Merinos.

Just under half of growers received selective breeding assistance to stop mulesing (44.3%) with 55.7 per cent not receiving any assistance as shown in Figure 19.

Received Assistance

'Guided by experts in the SRS group, including a skilled sheep classier. Also completed several training workshops presented by SRS group. SRS Wool classing, SRS sheep selection'

'We were helped by the stud we use (classing & ram selection). We also did our own research and went to SRS workshops'

'Advice from our sheep classer'

'Sheep were initially classed by ram supplier and breeding advice offered'

'Sheep classer advice. SRS workshops'

No Assistance

'I selected plain bodied rams with bare breeches, open heads (no wool around the eyes)'

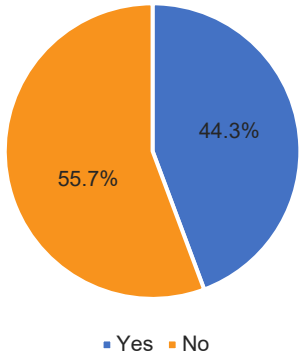
'We look for plain body sheep in our ram breeding flock and ram selection process'

'Culled flystrike prone breeders whether shoulder strike or tail strike'

'We made the decision then overcame problems as they arose'

'ASBV and visual'

Figure 19: Received selective breeding assistance to stop mulesing (n=88)



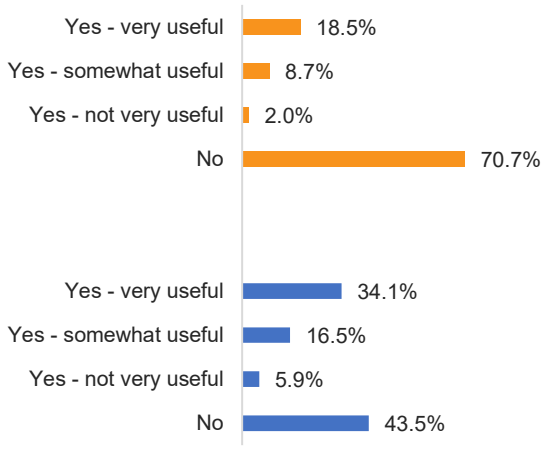
3.3.5 Use of ASBVs

Australian Sheep Breeding Values (ASBVs) are an estimate of an animal's true breeding value based on pedigree and performance recorded information and are used to project how that animal's progeny will perform for a range of traits.[40]

ASBVs is a metrics-based system designed to be used in conjunction with visual selection.

Figure 20 shows the majority of growers did not use ASBVs to assist in their transition (70.7%) although it is important to note that some growers commenced their transition to plain-bodied sheep prior to the development of this breeding value system. Interestingly however, nearly half of growers still do not use them (43.5%). Of those who use ASBVs currently, nine in ten (89.6%) find them useful.

Figure 20: Use of ASBVs (orange - start of transition n=92; blue - current n=85)



[40] Sheep Genetics. n.d. 'ASBVS and Indexes explained'.

3.3.6 Transition time

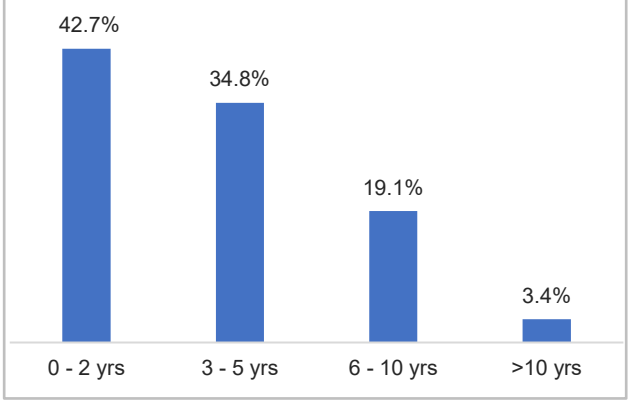
Woolgrowers were asked how long it took to transition to a plain-bodied non-mulesed farm enterprise. Transition time can be determined by a range of factors including starting wrinkle scores, genetics and breeding management practices.

As shown in Figure 21, 42.7 per cent of growers transitioned in two years or less and 34.8 per cent in three to five years.

77.5% of woolgrowers completed the transition to plain-bodied Merinos within five years

One in five growers took six to ten years to transition while very few growers took longer than ten years (3.4%).

Figure 21: Years to transition to non-mulesed farm (n=89)

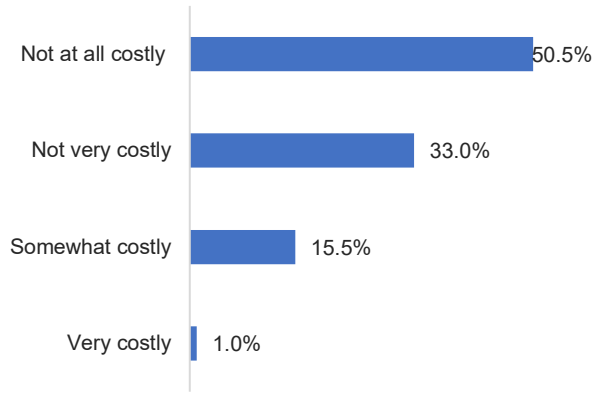


'Ceasing mulesing wasn't as difficult as I thought it might be but it's early days and time will tell. Nevertheless, I am very pleased to have changed my ram source to a breeder who is an industry leader'
(survey participant)

3.3.7 Cost of transitioning

The vast majority of growers (83.5%) considered it not costly to make the transition from wrinkly type sheep to plain-bodied sheep with 15.5 per cent of growers considering it to be somewhat costly.

Figure 22: Cost of transition to non-mulesing (n=97)



83.5% of woolgrowers say transitioning to plain-bodied Merinos is not costly

3.4 Wool Growing, Lambing and Husbandry Practices

This section details the wool growing, lambing and husbandry practices of woolgrowers.

The survey questions were formulated with the following research questions in mind.

- What level of breech strike and body strike is experienced by plain-bodied, non-mulesed Merinos?
- What breech cover, body wrinkle and dag scores are the sheep?
- What changes, if any, is there to lambing?
- Is animal welfare improved by not mulesing and, if so, how is it improved?

3.4.1 Shearing

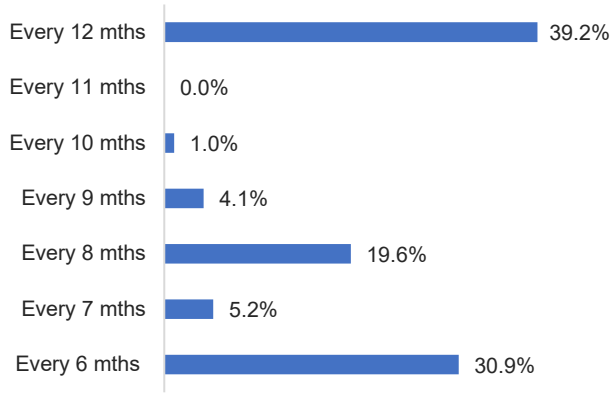
Figure 23 and Figure 24 show the shearing program of growers, that is, how often they shear their mobs and in which months.

Four in ten growers use a yearly shearing program (39.2%) while three in ten prefer to shear twice a year (30.9%).

The other common time period is to shear every eight months with two in ten growers doing this (19.6%).

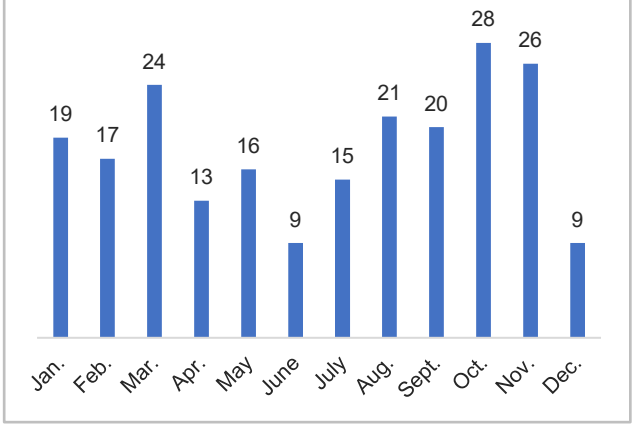
This represents a significant difference to the Kynetec 2017 survey results where 84 per cent nationally shear every 12 months, nine per cent every 8 – 9 months and only six per cent shearing every six months.[41]

Figure 23: How often mobs shorn (n=97)



The most common month to shear is October, closely followed by November and March. June and December are the least favoured months to shear.

Figure 24: Months mobs are shorn (multiple answers) (n=97)

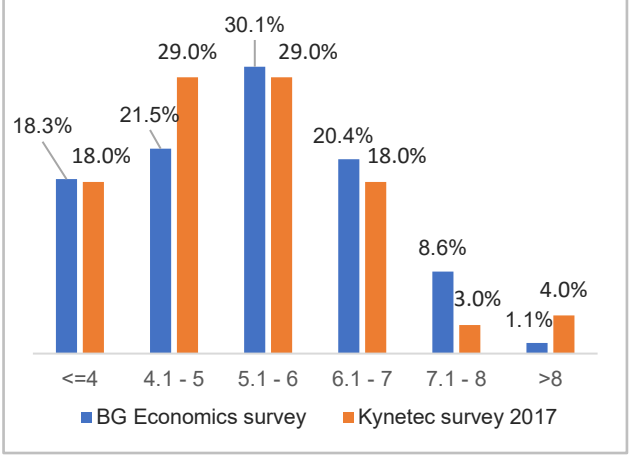


3.4.2 Wool cut

Figure 25 shows the wool cut per ewe in a normal non-drought season with 18.3 per cent of woolgrowers cutting four kilograms or less, 21.5 per cent cutting 4.1kg to 5kg, 30.1 per cent cutting 5.1kg to 6kg, 20.4 per cent cutting 6.1kg to 7kg, 8.6 per cent cutting 7.1kg to 8kg and 1.1 per cent cutting more than eight kilograms.

Although a direct comparison is difficult to achieve due to differences in micron and other factors, including sample size, the wool cut from plain-bodied sheep compares favourably to the Kynetec survey national results.[42]

Figure 25: Wool cut per ewe in normal non-drought season (kg) (n=93)



SRS® Merino ram wool

3.4.3 Wool yield

Wool yield refers to the amount of clean fibre expected to be produced after scouring and is often expressed as a percentage of the mass of raw wool prior to processing.[43]

The most common wool yield is 70% - 74% with nearly half of growers achieving this (46.9%).

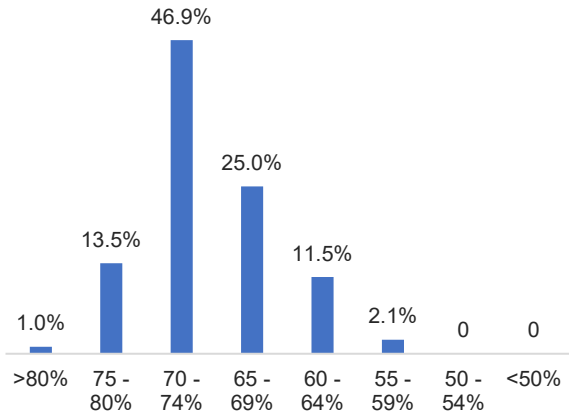
[41] Kynetec. 2018. '2017 Merino Husbandry Practices Survey' (updated 27 February 2019). Note – the Kynetec survey also included plain-bodied Merinos.

[42] Ibid.

[43] Australian Wool Testing Authority. n.d. 'Yield and Fibre Diameter'.

One-quarter of growers achieve a slightly lower yield of 65% - 69% with 13.5 per cent achieving a higher yield of 75% - 80%.

Figure 26: Wool yield (n=96)



3.4.4 Wool characteristics

Six wool characteristics were included in the survey and are shown in Figure 27, relating to:

1. Wool colour – whiteness/yellowness of wool.
2. Fleece rot - dermatitis caused by moisture and bacterial growth at skin level.
3. Wool character (crimp) – waves in the wool making it springy and soft to the touch.
4. Staple structure - cluster arrangement of the fibre bundles.
5. Scouring – contaminants in the wool.
6. Staining – breech, tail and leg wool stained by urine.

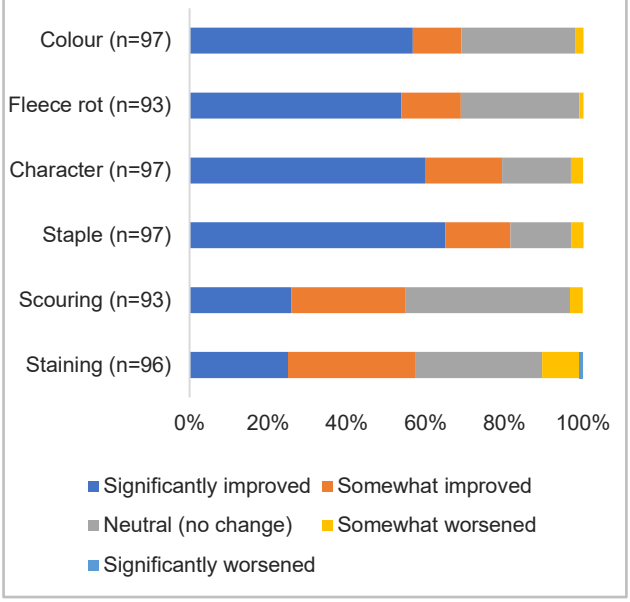
Growers were asked to indicate to what degree each of the wool characteristics had either improved, worsened, or remained unchanged.

Significant improvement was reported for colour (56.7%), fleece rot (53.8%), crimp (59.8%) and staple structure (65.0%) with a smaller number reporting a slight improvement in these four characteristics. Fewer than three per cent reported any worsening.

Significant improvement in wool colour (56.7%), fleece rot (53.8%), crimp (59.8%) and staple structure (65.0%)

In regard to scouring and staining, growers have seen somewhat less improvement with around one-quarter experiencing significant improvement (25.8% and 25.0% respectively) and slight improvement (29.0% and 32.3% respectively). Approximately ten per cent of growers experienced a worsening in staining.

Figure 27: Changes in wool characteristics



3.4.5 Joining and lambing percentage

Figures 28 and 29 detail the months in which joining usually occurs and the lambing percentage from joined ewes.

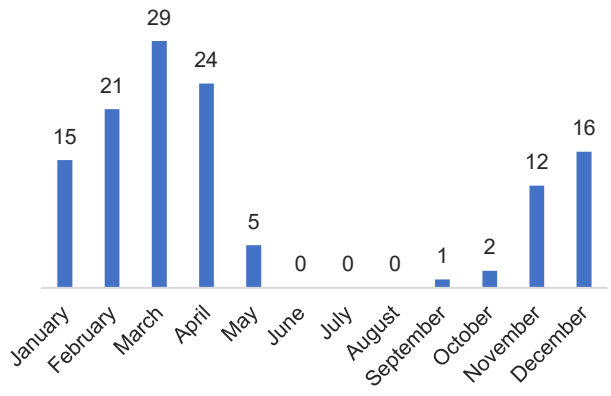
The February to April period is most favoured by woolgrowers for joining followed by the November to January period.

The lambing percentage for growers has significantly increased since transitioning to plain-bodied types. Previously, 81.3 per cent of growers were experiencing a lambing percentage of 100% or less with only one grower seeing better than 120%.

Lambing percentage for growers has significantly increased since transitioning to plain-bodied Merinos

Now, the majority of growers (62.9%) are experiencing over 100% with one-quarter (24.7%) seeing a lambing percentage of more than 120%.

Figure 28: Months usually join (n=97)



3.4.6 Lamb growth rates

Lamb growth rates are shown in Figure 30. Nearly half of all growers (47.2%) report that the growth rate of their lambs has significantly increased since transitioning with over one-third also seeing an increase (34.8%).

82% of woolgrowers have experienced increased lamb growth rates with lambing percentage also increased

No grower reported a decrease in lamb growth rates.

Figure 29: Lambing percentage changes from joined ewes (n=97, n=80)

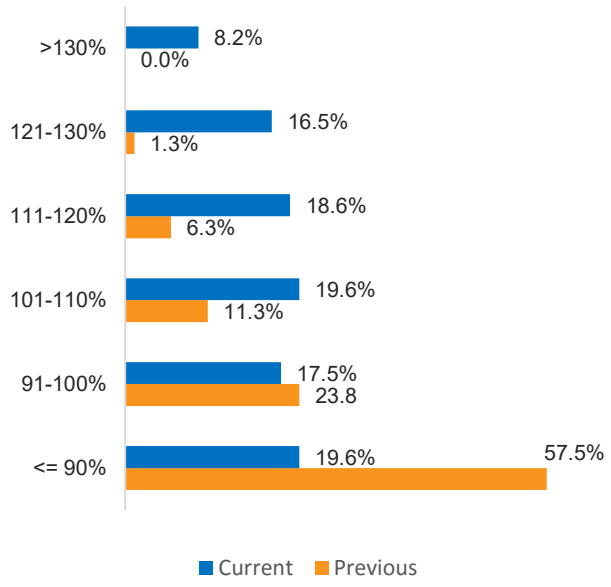
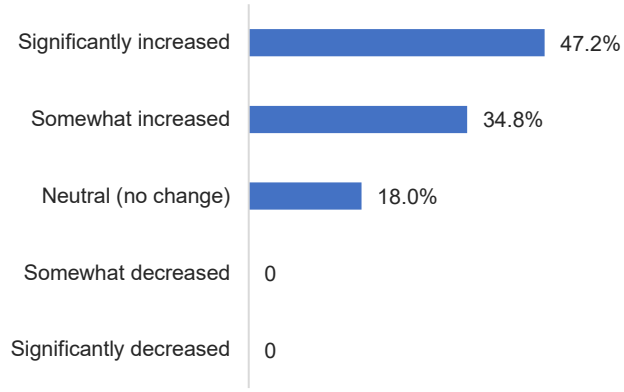


Figure 30: Lamb growth rates (n=89)



'the lambs do much better without the healing strain on their body' ***(survey participant)***

Plain-bodied rams

Plain-bodied Merino ewe and lamb

3.4.7 Jetting, wigging, crutching and drenching

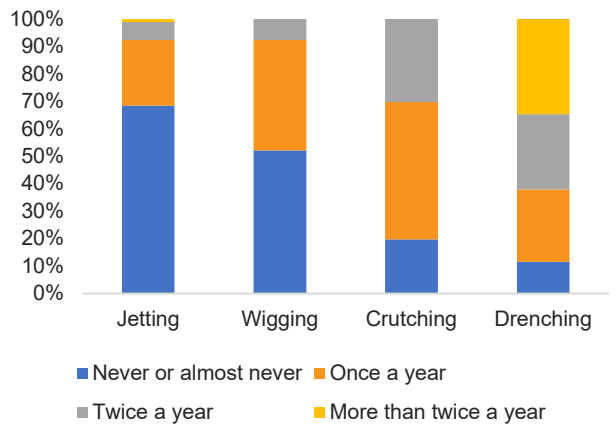
Woolgrowers were asked to nominate how often they jetted, wigged, crutched and drenched their sheep. Figure 31 shows that just over two-thirds of growers never or almost never jet (68.5%) and one-quarter only jet once a year (23.9%).

52.2 per cent of growers never or almost never wig with 40.2 per cent performing this activity once a year.

Crutching is done more often however with four in five growers doing this one to two times a year.

Drenching is the most often performed activity with nearly all growers drenching at least once a year (88.4%) and just over one-third doing this more than twice a year (34.7%).

Figure 31: How often jet, wig, crutch & drench (n=92, n=92, n=96, n=95)



3.4.8 Breech and body strike

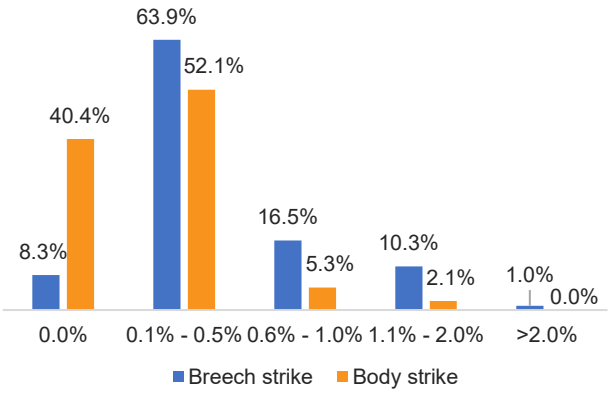
Figure 32 shows the proportion of breech and body strike in woolgrowers' plain-bodied, non-mulesed sheep. 72.2 per cent of growers say they get 0.5% or less breech strike in their flock and a further 16.5 per cent saying they get 0.6% - 1.0%. Only one grower reported breech strike in their flock over 2.0%.

This result compares favourably to the Kynetec 2017 national survey results of 51% getting 0.5% or less breech strike, 27% at 0.6% - 1.0%, 12% at 1.1% - 2.0%, and 10% greater than 2.0%.[44]

Body strike was non-existent in 40.4% of cases with a further 52.1 per cent experiencing only very limited strike between 0.1% and 0.5%.

72.2% of growers experience <=0.5% breech strike and 92.5% <=0.5% body strike

Figure 32: Breech strike (n=97) & body strike (n=94)

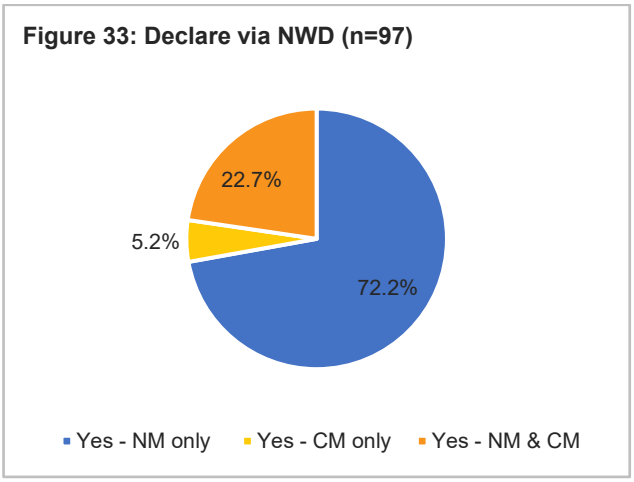


3.4.9 National wool declarations

Australian woolgrowers declare their wool via a National Wool Declaration (NWD) system.

72.2 per cent of growers declare their wool NM (non-mulesed) only with just under one-quarter declaring both non-mulesed and ceased mulesing (22.7%) and 5.2 per cent declaring ceased mulesing only.

Figure 33: Declare via NWD (n=97)



[44] Kynetec. 2018. '2017 Merino Husbandry Practices Survey' (updated 27 February 2019).

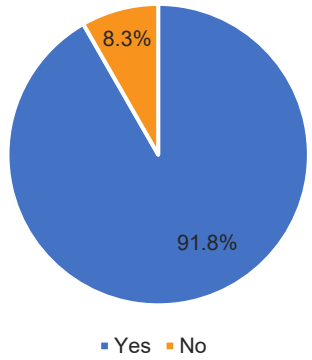
3.4.10 Animal welfare benefits

The animal welfare benefits of transitioning to a Merino sheep type which does not require mulesing to prevent flystrike include the absence of pain and suffering involved in the removal of skin folds around the breech area on lambs typically using mulesing shears which results in many days of discomfort.

Figure 34 shows that 91.8 per cent of growers believe animal welfare is improved by not mulesing sheep.

A text box was provided for growers to briefly explain how the welfare of sheep is improved by not mulesing with a selection of comments.

Figure 34: Animal welfare improved by not mulesing sheep (n=97)



Animal Welfare Benefits

'Less fly strike'

'Survival and stress of the lambs is much improved'

'No body strike'

'The lambs do not have the added stress at marking time not as many sheep suffering from cancers on their tails or around the exposed area'

'Less stress on the lambs'

'Mulesing is cruel and can lead to infections or death'

'Reduced pain and suffering after the operation'

'Stress at marking reduced. No pain after marking'

3.5 Financial Benefits of Plain-bodied Selective Breeding

This section details the financial benefits to woolgrowers of transitioning to plain-bodied Merinos. The survey questions were formulated with the following research questions in mind.

Do woolgrowers who have transitioned to plain-bodied, non-mulesed Merinos realise improved financial outcomes? Are there any differences considering the following variables?

- Merino type
- climate zones
- annual rainfall
- flock size
- farm business type

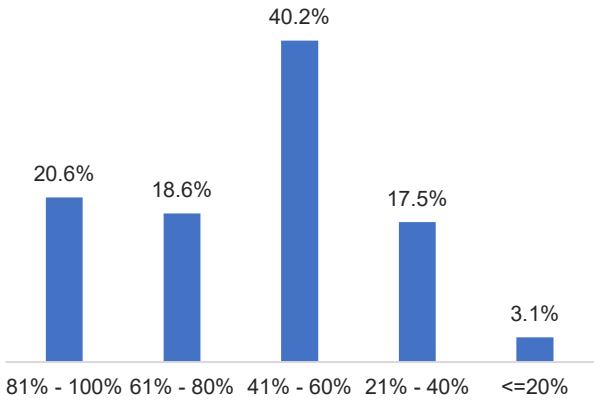
3.5.1 Farm income from woolgrowing

Figure 35 shows the farm income from Merino wool growing.

Four in ten growers (40.2%) derive around half of their farm income from this activity with another four in ten growers (39.2%) having it as the main form of farm income.

It is noted that while the Kynetec survey had a slightly different question 'on average, roughly what percentage of income came from sheep' which presumably includes lamb sales, the national average was 60 per cent.

Figure 35: Farm income from Merino wool growing (n=97)



3.5.2 Cost of production and sale price

Cost of production (COP) is a measure of the efficiency of producing wool. Growers were given the option of answering in both 'greasy' and 'clean' however almost all answered in 'greasy'.

The question 'What is the cost of producing your wool in a normal, non-drought season?' was asked to understand the total dollar cost of producing wool per kilogram. It was assumed that overhead costs would be included in responses however this cannot be confirmed for all cases.

The midpoint has been used to analyse the data which asked growers their cost of production and sales prices in ranges of $1.00. For example, $2.01 - $3.00 COP was taken as $2.50 and $13.01 - $14.00 sale price was taken as $13.50.

As with the cost of production question, the sale price question, 'What average price do you get for your wool (fleece, pieces and bellies) in a normal, non-drought season?', also is a general type question given market price fluctuations and that some farms in the survey have been in drought for a number of years while others have experienced milder drought conditions.

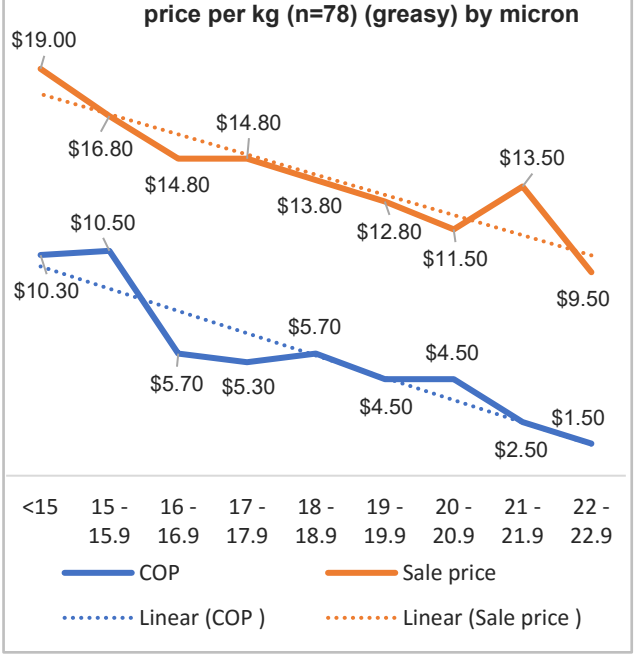
The gross margins below, being sale price less cost of production, therefore should be treated with some caution and especially those outside of the 17 to 19.9 micron range where there were significantly fewer responses for these categories.

- 22-22.9 micron - $8.00/kg*
- 21-21.9 micron - $11.00/kg*
- 20-20.9 micron - $7.00/kg*
- 19-19.9 micron - $8.30/kg
- 18-18.9 micron - $8.10/kg
- 17-17.9 micron - $9.50/kg
- 16-16.9 micron - $9.10/kg*
- 15-15.9 micron - $6.30/kg*
- <15 micron - $8.70/kg*

*low number of responses

Figure 36 shows the average cost of production per kilogram (greasy) compared to the average sale price per kilogram (greasy) by micron.

Figure 36: Cost of production per kg (n=75) & sale price per kg (n=78) (greasy) by micron



3.5.3 Price premium

A price premium in the context of the survey refers to 'extra' price achieved for growers' non-mulesed wool than comparable wool prices achieved from sheep which have been mulesed.

Price premiums do occur depending on market conditions. For example, in 2019, non-mulesed wool was fetching a price premium as high as $2.00 a kilogram extra at auction.[45] 87.6 per cent of woolgrowers say they receive a price premium for their wool as shown in Figure 37.

87.6% of woolgrowers receive a price premium for their unmulesed wool

Growers were also asked to nominate what price premium they typically achieved which is shown in Table 1.

It is noted that in a number of instances it was not stated whether the price was 'greasy' or 'clean' and these have been excluded from the table. Similarly, for other answers e.g. '5%', resulting in 30 valid responses.

[45] Jeffery, C. & Hogan, H. 2019. 'Non-mulesed wool commands premium price during market slump'.

Where answers were given across two price categories the higher category has been applied e.g. $1.00 - $2.00 greasy has been assigned to the $1.51 - $2.00 column.

It is noted that two woolgrowers state they receive a price premium well above others being '600 cents clean' (for 19 – 19.9 micron wool) and '$10 per kg greasy' (for 14 – 14.9 micron wool).

Considering other answers by these two woolgrowers on sale price, etc. it is likely the former could be an error while the latter may be correct.

Figure 37: Premium price for wool (n=97)

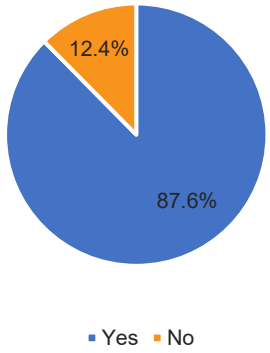


Table 1 details the price premiums by greasy and clean categories from the survey.

Table 1: Price premium for non-mulesed wool $/kg (n=30)

	Greasy	Clean
<$0.50	7	3
$0.51 - $1.00	2	1
$1.01 - $1.50	5	0
$1.51 - $2.00	8	2
$5.51 - $6.00	0	1
$10.00	1	0

'A wool broker said to me many years ago that he thought there would be more of a premium for unmulesed wool than organic. He was correct'
(survey participant)

3.5.4 Lamb sale price

Lamb sale prices are shown in Table 2. This was a text box answer in the survey and therefore some responses were required to be assigned to price categories based on best fit.

For example, the response '$150, 6-9 Mths' has been assigned in the table as $150 in the 7 – 8 month column.

Where multiple prices have been given the top price only has been included e.g. '$110 - $120, 10 - 11 mths' has been assigned as $120 in 11 – 12 column.

Table 2: Lamb sale price $/carcass (n=27)

	<5 mths	5 – 6 mths	7 – 8 mths	9 – 10 mths	11 –12 mths
$80	1			1	
$90	1				
$100				1	
$120	1	1	1	1	1
$130			1	1	1
$140			3	1	
$150			1	3	2
$170					1
$190				2	
$200+				1	1

3.5.5 Return on investment

Woolgrowers were asked what change in return on investment (ROI) they have experienced since transitioning to plain-bodied Merinos.

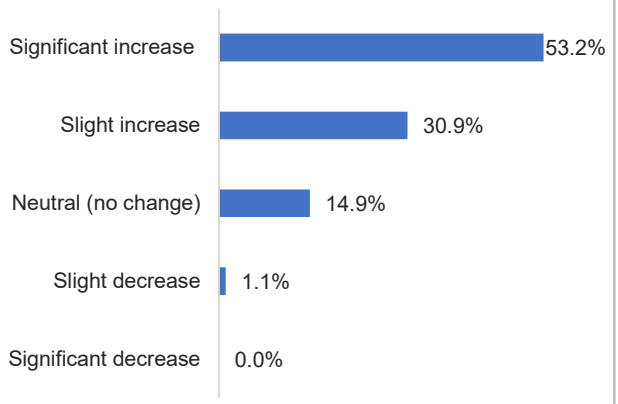
This is the best indicator of the financial gains or otherwise made by growers in the survey as it considers the financial performance of individual farms pre and post transition.

Figure 38 shows that 84.1 per cent of growers have an increased ROI with around half (53.2%) experiencing a significant increase.

84.1% of woolgrowers have experienced an increased return on investment since transitioning to plain-bodied Merinos

As shown previously, nearly nine in ten growers realise a price premium for their unmulesed wool and more than eight in ten have seen increased lamb growth rates with lambing percentage also increased. These are all factors in determining a better return on investment.

Figure 38: Change in return on investment (n=94)



ROI for woolgrowers did however vary when taking into account the following variables as shown in Tables 3 to 7.

- Merino type
- climate zones
- annual rainfall
- flock size
- farm business type

In regard to Merino type, as shown previously in Figure 9, growers could select more than one sheep type applicable to their flock, for example, where they run dual-purpose Merinos which are also plain-bodied. Therefore, only responses where one Merino type was selected are included in Table 3, this being 37 plain-bodied and thin-skinned, 19 plain-bodied, 14 slightly wrinkled and six dual-purpose.

Leaving aside dual-purpose Merinos, for which the number of responses were very few in number, the most significant increase in ROI is experienced by growers who have plain-bodied and thin-skinned sheep (67.6%).

Table 3: ROI by Merino type (n=76)

	SI	I	N	D	SD
Plain-bodied & thin-skinned	67.6%	24.3%	8.1%	-	-
Plain-bodied	31.6%	47.4%	21.1%	-	-
Slightly wrinkled	14.3%	42.9%	35.7%	7.1%	
Dual-purpose*	83.3%	16.7%	-	-	-

SI = significant increase; I = slight increase; N = neutral (no change); D = slight decrease; SD = significant decrease
*caution, low number of responses

Table 4 shows return on investment according to climate zones. The focus should be on Zones 4, 6 and 7 in which 90.7 per cent of farms are located and reasonably well distributed among the three zones as shown previously in Figure 5.

81.5 per cent of growers in Zone 4 report they experience a significant increase in their return on investment with only 3.7 per cent reporting they have experienced no change. Growers in Zones 6 and 7, which are mild and cool temperate climates, experienced less significant returns than growers in Zone 4 however their returns have still increased since transitioning.

Table 4: ROI by climate zone (n=93)

	SI	I	N	D	SD
Zone 3*	50.0%	50.0%	-	-	-
Zone 4	81.5%	14.8%	3.7%	-	-
Zone 5*	50.0%	-	50.0%	-	-
Zone 6	46.2%	30.8%	23.1%	-	-
Zone 7	34.5%	41.4%	20.7%	3.4%	-
Zone 8*	33.3%	66.7%	-	-	-

SI = significant increase; I = slight increase; N = neutral (no change); D = slight decrease; SD = significant decrease
*caution, low number of responses

Table 5 shows return on investment by average annual rainfall. Returns appear to be somewhat better on farms which receive less rainfall. However, even farms in high rainfall areas have experienced significant increases in ROI.

Table 5: ROI by annual rainfall (n=94)					
	SI	I	N	D	SD
201-400mm*	61.5%	23.1%	15.4%	-	-
401-600mm	59.0%	33.3%	7.7%	-	-
601-800mm	45.9%	32.4%	18.9%	2.7%	
801-1000mm*	40.0%	20.0%	40.0%	-	-

SI = significant increase; I = slight increase; N = neutral (no change); D = slight decrease; SD = significant decrease
*caution, low number of responses

Return on investment by flock size is shown in Table 6. There was only one grower with a flock size of 500 sheep or less and six growers with 501 to 1,000 sheep and therefore those results should not be considered.

The results show that flock size does not appear to be a factor in return on investment when flock sizes greater than 1,000 sheep are considered.

Table 6: ROI by flock size (n=94)					
	SI	I	N	D	SD
<=500*	-	-	-	-	100%
501-1000*	66.7%	16.7%	16.7%	-	
1001-2000	55.6%	27.8%	16.7%	-	
2001-5000	58.1%	25.8%	16.1%	-	
>5000	47.4%	39.5%	13.2%	-	

SI = significant increase; I = slight increase; N = neutral (no change); D = slight decrease; SD = significant decrease
*caution, low number of responses

Finally, Table 7 shows return on investment by farm business type.

The results show that stud/sheep breeders and wool producers experienced the best return on investment followed by mixed enterprise and then specialist woolgrowers.

Commercial Woolgrower (with first-cross lambs) results should be treated with some caution given there were only six respondents in the survey operating this type of farm business.

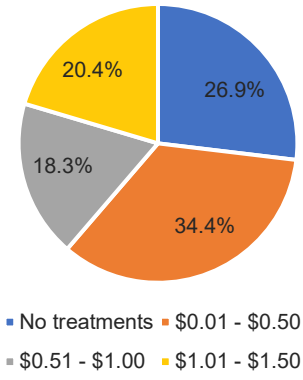
Table 7: ROI by farm business type (n=93)					
	SI	I	N	D	SD
Specialist woolgrower	37.8%	42.2%	17.8%	2.2%	-
Mixed enterprise	60.9%	26.1%	13.0%	-	-
Stud/sheep breeder & wool producer	78.9%	10.5%	10.5%	-	-
Commercial woolgrower*	66.7%	16.7%	16.7%	-	-

SI = significant increase; I = slight increase; N = neutral (no change); D = slight decrease; SD = significant decrease
*caution, low number of responses

3.5.6 Cost of preventative flystrike treatments

Figure 39 shows the cost of preventative flystrike treatments per year now applicable. Approximately one-quarter of growers do not require any treatments (26.9%), 34.4 per cent costing $0.01 - $0.50, 18.3 per cent $0.51 - $1.00 and 20.4 per cent $1.00 - $1.50.

Figure 39: Cost of flystrike preventative treatments per year (n=93)



3.5.7 Drought tolerance

An important financial consideration for woolgrowers is drought, especially given the severe drought affecting large parts of Australia in recent years.

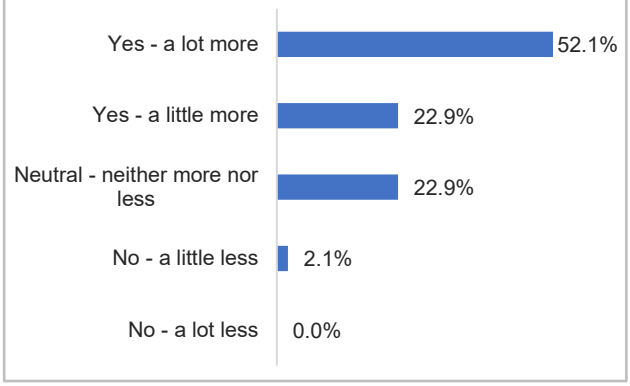
One of the important attributes of the plain-bodied Merino is said to be its ability to control its body temperature and hydration more efficiently than wrinkly breeds in hot environments, as previously stated in section 2.5.

This is especially important in a country like Australia which is experiencing hotter and dryer weather and more severe drought.

75% of growers believe plain-bodied Merinos are more drought tolerant

Woolgrowers were asked whether they believed plain-bodied types were more drought tolerant compared to wrinkly sheep. Three-quarters (75.0%) of growers indicated they were more drought tolerant.

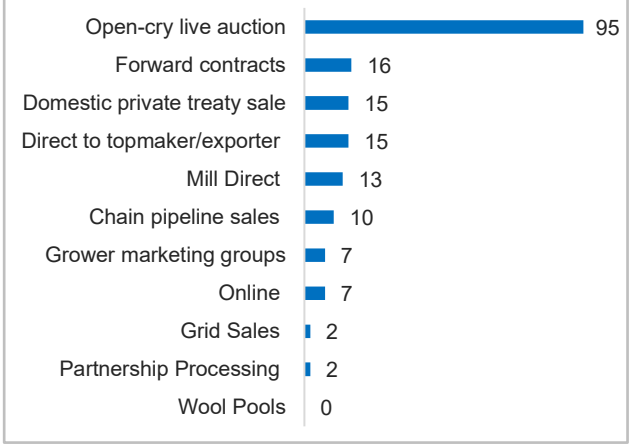
Figure 40: Drought tolerance compared to wrinkly breeds (n=96)



3.5.8 Wool sale methods

Growers were asked to nominate which wool sale methods they have used in the last five years. While all 97 growers answered this question, some have used more than one method and therefore the data reported is not in percentage terms. The vast majority of growers used open-cry live auctions to sell their wool which is consistent with other reports.

Figure 41: Wool sale methods used in last five years (n=97, n.b. multiple answers)



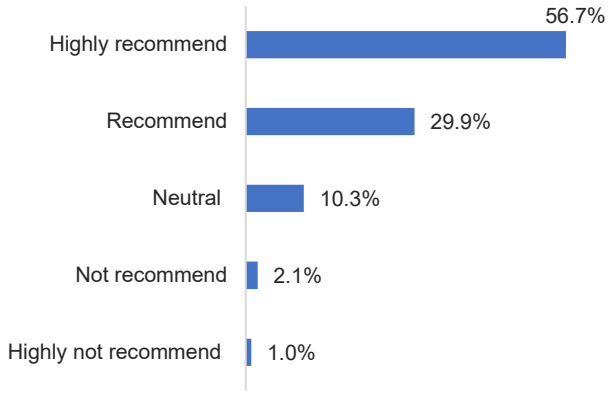
3.5.9 Recommend transition

Woolgrowers were asked whether they would recommend the transition to plain-bodied Merinos to other woolgrowers based on the financial outcomes they have experienced and/or are forecasting to achieve.

Figure 42 shows that 86.6 per cent of growers would recommend undertaking the transition.

86.6% of woolgrowers would recommend undertaking the transition to plain-bodied Merinos

Figure 42: Recommend the transition to other woolgrowers (n=97)



3.6 Future Farm Operations and Observations

The final section covers the expected future farm operations of woolgrowers as well as other pertinent observations.

The survey questions were formulated with the following research questions in mind.

- Do woolgrowers who have transitioned to a plain-bodied, non-mulesed Merino farm operation plan to continue with plain-bodied types and do they plan to expand their farming operation and why?
- Would they recommend the transition to other woolgrowers?
- Do they have any other observations?

3.6.1 Continuing with plain-bodied Merinos

The decision to continue with plain-bodied Merinos can be understood to be an indicator of the confidence woolgrowers have in this sheep type.

All woolgrowers (100.0%) indicated they plan to continue with plain-bodied types as shown in Figure 43. Some of the reasons growers gave are provided as follows:

'Easy care, no disadvantages, more robust animal that can handle any conditions'

'Increased premiums in wool market place, it gives me social licence to market my sheep and wool and is low cost to implement'

'They are profitable and productive sheep'

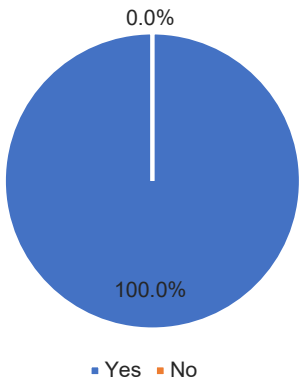
'Easy care, excellent fibre, suited to our landscape and business goals'

'Much easier to manage with less chemical input. Much hardier and will do better in tough conditions'

'It's so damn easy and gives us more satisfaction, more money, hugely less work and the sheep are more ethically treated as a result. Isn't that better for everyone?'

'We could not conceive of returning to conventional wrinkled merinos'

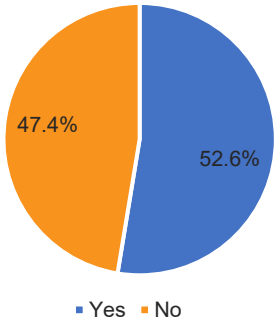
Figure 43: Growers planning to continue with plain-bodied Merinos (n=97)



3.6.2 Plans to expand business

Figure 44 shows that just over half of woolgrowers (52.6%) plan to expand their business.

Figure 44: Growers planning to expand their business (n=97)



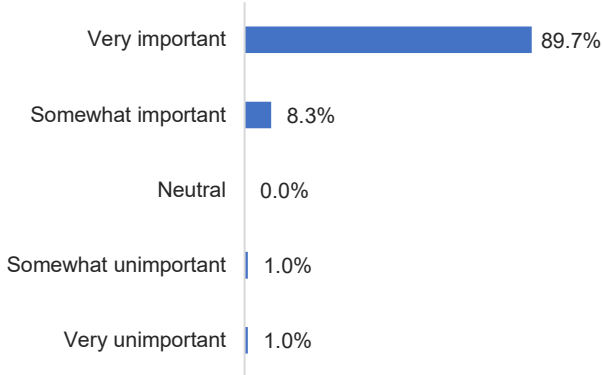
3.6.3 How important not mulesing for future farm profitability

Woolgrowers were asked how important not mulesing is to their farm's future profitability.

Figure 45 shows that nine in ten growers (89.7%) consider it very important and a further 8.3 per cent consider it somewhat important, a total of 98.0 per cent.

98% of woolgrowers say not mulesing is important for their farm's future profitability

Figure 45: How important not mulesing is for future farm profitability (n=97)



3.6.4 Other observations

The final survey question asked woolgrowers if they wished to expand on any of their answers or if they had any other comments to make.

The following is a selection of comments provided.

'Mulesing exposes the breach area to sun burning and cancers. Uncomfortable for joining. Why perform an unnecessary operation, causing pain and suffering. Producers should be encouraged to use SRS rams to prevent wrinkly bodied sheep. which have high maintenance'

'One thing that became very obvious to me during the transition to not mulesing was the need to cull for dagginess regardless of breech wrinkle. I have found dagginess to be very repeatable and it appears to be heritable enough to be able to make progress relatively quickly'

'The skin of an animal is the largest organ. An animal with a large thick skin at e.g. 60kg will have less carcass value than an animal that has a thin skin weighing the same amount. The thick skin weighs significantly heavier on the animal than that of a thin skin sheep'

'Genetic selection is the obvious long-term answer to ceasing mulesing. Once seedstock breeders make breech characters and related flystrike and stain traits a higher priority in their selection indices, (while maintaining or improving all other traits) mulesing will gradually disappear'

'Fortunately, there are now a number of young progressive breeders out there who recognise the problem and are using Genomics and EBV to speed up superior genetic selection'

'Very happy and excited with the genetic change and the possibilities it has for the future of the wool/sheep industry. With non-mulesing we gain in our goal of not using chemicals. Increased do-ability is an advantage in both dry and wet years'

'Mulesing should be banned immediately. We are losing opportunities for our products while we procrastinate. We are the laughing stock of the world. Buyers are bypassing us in favour of other non mulesed countries. It will be banned eventually'

'I am disappointed that a genetic solution for the problem of flystrike has been available for 20 years or more but traditional stud breeders are continuing to resist the change and are trying to hold fast to mulesing. If wool buyers turn away from Australia trying to source ever more quantities of unmulesed wool we may see our industry jeopardised'

4

CASE STUDIES

CASE 1

Chad & Louise Taylor
'Mumblebone'
Central West NSW

Chad and Louise with dog Rex

'I think it's very important to evolve in business, and as an industry, to stay in touch with contemporary production systems and contemporary consumer attitudes. Mulesing is no longer accepted by many of the retail brands that sell woollen products and so we must evolve to accommodate this change in sentiment if we are to remain in business. Many still think we can tell our consumer what we are going to sell them, that they have to buy it, when of course they don't'. Chad Taylor

Business profile

LOCATION: Wellington NSW

LAND SIZE: 2,800ha owned; 1,400ha leased

FARM OPERATION: Stud/sheep breeder and Merino wool producer

FARM INCOME FROM WOOL GROWING: 29%

WEBSITE: www.mumblebone.com.au

Farm and flock

Mumblebone is located in Climate Zone 4 in central NSW which experiences hot dry summers and cool winters. The average annual rainfall in a typical non-drought year on the farm is 600mm however they have been in drought for the past three years.

The family has been farming in the district for five generations with Merinos being central to the business at every stage. Chad and Louise run dual-purpose Merinos. Their typical non-drought flock size is 4,500 ewes however the current flock is back to 2,400 ewes with 1,400 ewe lambs up to 60+ kgs that are also being joined in containment.

Their ewes have been bred to include the carcass traits of muscle and fat along with high growth, high reproduction and all of the well-known wool traits.

Sheep are Score 1 body wrinkle, Score 2.5 breech and Score 2 dag with a 19.2 micron fleece. Wool yield is 65% to 74% and sheep are shorn every six months in May and November with 6.6kg to 8kg (greasy) cut per year.

Crutching, wigging and jetting never or almost never has to be done. They drench twice a year. Breech strike is less than 0.5% with zero body strike. The wool is certified with RWS, ZQ Merino, New Merino, SustainaWOOL and Authentico.

The Stud operation is the main focus of their business. They are currently selling over 400 rams a year to every state in Australia as well as genetics to four other countries around the world.

Ceased mulesing in 2006

The initial reason for breeding plain-bodied sheep for the Taylors was to remove the water stained wool and flystrike pressure from their traditional, heavy skinned

flock. They then found that their plain-bodied sheep were more fertile and faster growing, which they say are great traits to lift profitability.

Chad and Louise were a part of the SRS group at the time and closely followed the work of research veterinarian and wool scientist, Dr. Jim Watts. Selection away from skin wrinkle towards a soft, wrinkle free skin opened the door to ceasing mulesing. A better knowledge of skin biology made a significant difference to understanding how to maintain good fleece weight on a plain-bodied animal.

Chad says it's now relatively easy for flocks to move away from mulesing as the depth of genetics, and the data available to make genetic decisions with, have improved enormously over the last five or so years.

Financial gains

The lambing percentage at Mumblebone is now 121% - 133%, a significant increase from 89% - 107% previously. They say their wrinkly Merino lambs that had been mulesed were around 5-8kgs lighter on average at 10 months of age. Lamb sale price last year was $230/head at 10-11 months of age, this year it is $184/head average at 7 months.

There has been no increase in the cost of production, only a saving on the cost of mulesing. A price premium is often achieved for their non-mulesed wool although Chad says it varies and is difficult to accurately calculate. Adding this to more lambs that grow quicker and the opportunity to shear twice a year and the return on investment is 'somewhere between excellent and outstanding'. And they no longer need fly preventative treatments or a mulesing contractor.

Drought tolerance

Chad says there is no comparison between the old and new types of sheep when it comes to drought tolerance - the old type just isn't in the running.

This difference has been created by breeding out skin wrinkle and through the use of ASBVs to select for EMD (eye muscle depth) and fat in their sheep.

These traits allow sheep to store energy in their system when feed is cheap, or readily available, allowing them to draw it down when under pressure from drought, lambing, worm burdens, cold winters or during any other period of challenge.

The selective breeding for skin type, coupled with selection for higher growth and carcass traits, has led to sheep that cut slightly more wool (mainly due to higher growth rates and longer staple length), at a similar or slightly lower average micron. The most important gains, however, have come with higher reproduction – the sheep are having 25% more lambs in a drought year.

Advice to growers

Chad's advice to woolgrowers is to find a stud that aligns with their breeding direction. At Mumblebone, they aim to offer growers a broad range of breeding values, including EBWR (early breech wrinkle) for those looking to move away from mulesing, so clients are able to make informed selection decisions on combining the traits important to their flock.

Growers can then use this information to identify their three or four key traits, to focus their selection on those traits while also avoiding obvious weaknesses elsewhere. Merino breeding is multi-faceted and good information is essential to genetic progress.

He says it is also important to commit to the change and 'make it happen', as opposed to seeing 'if' it will happen. There may be an increase in fly pressure around the breech in the early stages of the change and the management of the sheep will need to deal with this.

This pressure is a short-term part of the change that will rapidly reduce as the last of the skin wrinkle disappears.

Chad with dual-purpose Merinos

CASE 2

Mark & Vicki Murphy and family 'Karbullah' Southern QLD

Mark and Vicki Murphy

'If the industry doesn't get its mind around what is required it will disappear. Sheep production is being severely compromised by the ongoing mulesing debate. Australia is the only country left where mulesing is still legal and that is a very sad state of affairs'. Mark Murphy

Business profile

LOCATION: Goondiwindi Queensland

LAND SIZE: 3,184ha

FARM OPERATION: Stud/sheep breeder and merino wool producer

FARM INCOME FROM WOOL GROWING: 40%

WEBSITE: www.karbullahpollmerinos.com.au

Farm and flock

'Karbullah' is located in Climate Zone 3 in southern Queensland. They get good summer rain making for humid conditions with the average annual rainfall in a typical non-drought year being 580mm.

The region has been drought declared since March 2014 although some good rain this year has been welcomed by family members Mark, Vicki, Luke, Sarah, Ben Murphy and Steph Terry.

They run plain-bodied and thin-skinned Merinos along with cattle and goats. The typical non-drought flock size is 3,000 although they are currently back to 2,200.

Sheep are Score 1 body wrinkle, Score 1 breech and Score 1 dag with a 19 micron fleece. The wool yield averages 70% to 74% and sheep are shorn every six months in May and November with 4.1kg to 5kg clean cut in total.

Breech strike is 0.1% - 0.5% with no body strike. Mark cannot remember the last time his sheep had body strike despite summer rain and warm weather.

The tensile strength of the fleece wool off the ewes has recently tested up to 79nkt which puts it up the near top of wool tested. Mark says this is a very good reflection on the improved efficiency of their sheep.

They almost never crutch, wig, jet or drench unless an individual sheep requires it and that animal is culled. They do however crutch weaners six to eight weeks before shearing to bring them in line with general shearing.

The importance of fat, muscle and thin skin

The Murphys started the transition to plain-bodied types in the mid-90s and ceased mulesing in 2004 when Vicki wanted to do things a different way that was more animal welfare friendly. Mark was onboard quickly with the idea.

Appreciating the role fat, muscle and thin skin plays in getting the best from your sheep is critical, they say. The science of skin biology developed by veterinarian Dr. Jim Watts and understanding the breeding value of fat and muscle as a measure of metabolic resiliency is important and these breeding values are generated by sheep genetics.

This has been especially evident in lambing in recent drier times. Karbullah has seen far better lamb survival rates due to this understanding and breeding of fat and muscle in production. The role of fat in particular.

Lambing is now at 121%-130%, up from 110%-120%. Importantly, their lamb survival rate is high at around 90% with just a 10% lamb loss.

The plain-bodied sheep is a much higher metabolically efficient animal, says Mark. It requires less mega joules of energy to maintain itself and they don't have a thick heavy skin to maintain. Previously, the 'do-ability' of the animal was being compromised.

Return on investment

Transitioning to a plain-bodied and thin-skinned type Merino has resulted in a significant increase in return on investment for the Murphys.

Their wool often attracts a price premium which can be up to 300 cents per kilogram (clean) and isn't restricted to fleece wool. Mark says when you get the right skin you increase fibre density and wool processors get a better product with better wool quality.

Their chemical costs are low with just some chemical put on the lamb tail to help them heal.

Lamb carcasses are sold for $170-$190 but more recently they have been getting over $230 (net) for 26kg+ dressed weight at $8.80/kg through a local butcher at 8 months.

Mark says the cost of transitioning was minimal. The initial rams that were bought and the semen used was no more expensive than what they had been doing.

Advice to growers

The Murphys transitioned to a plain-bodied enterprise in two generations however they say nowadays you could probably do it in a generation with the improved data and techniques available.

Mark and Vicki have six important pieces of advice for woolgrowers contemplating transitioning to plain-bodied type Merinos.

1. The 'mind shift' to make it happen is the number one hurdle to change. When in doubt talk to producers who have already made the transition as they have the practical knowledge.

2. Buy rams from a stud that has ceased mulesing. Find the studs that have very good and productive skins and wool quality and higher lambing percentages, easier to manage and better do-ability.

3. Bringing in some expertise to help with the transition can be very advantageous but some paradigms are awfully hard to change.

4. No rubber rings on tails – you want bare skin under the tail. There are far better alternatives available.

5. Learn how to manage the dags if it's a problem. 99% of the time it's not a problem but 'pig weed' on their farm creates a few issues from time to time.

6. Get tough on fertility. 'Preg scan' the ewes then identify and manage the twinners constructively. They sell all the drys especially the maidens. Far better lamb survival means you have more weaners for replacements/sale.

Mark with sires

CASE 3

Chris & Tarlee Atkinson
'Wallaby Run'
Southeastern SA

Chris, Tarlee and kids *Photo credit: Woolmark/AWI*

'If I was designing a new product, I would research high and low what people want and then try to make a product to suit. I wouldn't design a product on my own specs and then tell people they need to buy it. Each year people all over the world are saying more and more that they want wool from non-mulesed sheep. To get ahead of the ball and have a product that will be in high demand in 5 or 10 years' time start your breeding program now and don't get left behind'. Chris Atkinson

Business profile

LOCATION: Penneshaw & Harrogate SA

LAND SIZE: 1,830 hectares arable

FARM OPERATION: Specialist woolgrower/self - replacing flock

FARM INCOME FROM WOOL GROWING: 65%

WEBSITE: www.atkinsonlivestock.com.au

Farm and flock

Wallaby Run is located in Climate Zone 6 in southeastern South Australia just east of Adelaide with part of the farming operation also on Kangaroo Island.

The region has a mild temperate climate with cold and wet winters with an average annual rainfall on the farm of 650mm although it also experiences very dry and hot summers.

The Atkinsons run a self-replacing flock of non-mulesed Merinos with an emphasis on good animal welfare and at the same time caring for the environment.

The usual flock size is 8,000 although with the drier conditions experienced over the last two years the flock currently stands at 7,000.

They join in December and their sheep are Score 3 for breech, Score 1 body wrinkle and Score 2 dag with a 17-18.9 micron fleece and 70%-74% wool yield. Shearing ewes occurs every six months in March and September with wethers shorn every eight months in January, September and May.

They cut 4.1 – 5kg greasy and wool colour, wool character (crimp) and staple structure have all significantly improved with some improvement also seen in scouring and staining. Their wool is certified with Authentico and New Merino.

The Atkinsons crutch once a year before their spring shearing to limit stain, use a spray on flystrike preventative once a year in September and drench and vaccinate also once a year. They experience very little breech and body strike, less than 0.5%.

Through a recent flock profile DNA test, they've found they are in the top 5% in the country for the early breech wrinkle ASBV which is rewarding as they've been breeding towards this style of sheep for the last 12 years.

The family has only been farming since 1985 and Chris says they are always striving to learn more and to find better ways to do things. This has been paramount being a growing farm and not an established generational farm.

Increased lamb growth rates since 2008

Mulesing ceased at Wallaby Run in 2008. This was largely because they were experiencing a large setback in lamb growth after marking and even some lamb deaths. Once they stopped mulesing, they saw an increase in lamb growth rates post marking.

Lambing percentage is now 91% - 100%. Previously it was 85%.

The ability to shear twice a year means the ewes feel the weather at lambing time and will take their lambs into shelter when rain or cold weather hits. This has also assisted with lamb survivability.

Chris and Tarlee say they personally don't like mulesing and for their operation, running plain-bodied and thin-skinned Merinos, it is unnecessary pain and suffering for the sheep. Their goal is to treat their animals as best they can in order to get the best return from them.

A good financial decision

The return on investment for the Atkinsons has been very good since transitioning 12 years ago. Chris describes it as a large increase, mainly due to improvements in wool.

The cost of production is a difficult one to estimate, he says, as it changes yearly depending on what sort of season they have and also lambing percentages, market prices, what maintenance needs doing and feed to buy in. Similarly, with sale price.

As a guide, however, cost of production usually falls around $5.01 - $6.00/kg (greasy) with an average sale price $12.00/kg (greasy).

A price premium is also realised for their non-mulesed wool estimated at $2.00/kg (clean).

Their costs are still very similar with the only real cost for transitioning being to pay more for premium rams which met their needs. In fact, Chris says, all the improvements far outweigh the small cost of researching the right rams and spending the extra money on them.

Advice to growers

Everything on Wallaby Run has had to be learned from scratch since the first block was purchased in 1985.

Even though the Atkinsons are now at a point where the farms are running very well, they say they will not stop trying to find new ways to improve their wool growing methods.

The biggest piece of advice to changing to this type of Merino they say is to talk to the different studs to find out what they are breeding towards and pick the right fit for your operation.

The type of Merino Chris and Tarlee wanted to breed towards had many characteristics with an emphasis on fine wool with a long staple length. This type of Merino is naturally plain bodied and free of too much breech wrinkle.

They now selectively breed their ewes with rams picked from Australian Sheep Breeding Values (ASBVs) and from only two different studs which they have researched and 'know are on the same page as us and what we want to breed towards'.

Chris says most studs are more than happy to get you started in the right direction and some will even come out and help you class your replacement ewe lambs.

Recently shorn Merinos at Wallaby Run

CASE 4

Nicholas Lyons
'Mount Bodangora'
Central West NSW

Michael (father), Nick with son William & grandfather David

'I think mulesing is a barbaric practice that is totally unnecessary. Producers who choose to breed wrinkly type sheep that require the practice have chosen an unsustainable enterprise. Having family in the buying side of the wool industry the most alarming comment is that companies are already making the investment to other wool producing nations including Africa, Argentina, Russia and China in order to fill the NM gap and demand from consumers'. Nick Lyons

Business profile

LOCATION: Wellington NSW

LAND SIZE: 2000 hectares

FARM OPERATION: Specialist woolgrower/self - replacing flock

FARM INCOME FROM WOOL GROWING: 70%

Farm and flock

Mount Bodangora is located in Climate Zone 4 in central NSW which experiences hot dry summers and cool winters. The average annual rainfall in a typical non-drought year on the farm is 600mm although the farm has been in drought since 2017-18 and received only one-third of its usual rainfall in 2019.

The farm was established by the Lyons family who are sixth generation Merino breeders. The farm runs plain-bodied and thin-skinned Merinos.

The typical non-drought flock size is 3,000-3,500 Merino ewes, 3,000 Merino wethers and 3,500-3,700 Merino lambs.

Their sheep are Score 1 for body wrinkle, Score 2 breech and Score 1 dag with an 18-18.9 micron fleece.

The wool yield averages 72-74% and sheep are shorn every eight months in February, June and October with 6.1kg to 7kg cut (greasy) annually. They do a standard crutch 2-3 months before shearing.

Nick says 99 per cent of their flystrike is breech and only one per cent body however the numbers are extremely low being around ten sheep a year in total for ewes. No chemicals used (i.e. click) and jetting hasn't been done since 2005.

He says they do see more fly in their lambs after weaning and they are tipped before the start of the summer period in October. This solves any fly issue and also removes any potential problem from grass seed that normally falls late October.

Their wool is certified non-mulesed and accredited with SustainaWOOL and Authentico.

Misconceptions about selective breeding

A common misconception Nick hears about is the reduction of fleece weight during the transition where supposedly less greasy wool is produced as the surface area deceases when breeding out heavy wrinkling.

However, as the wrinkle decreases, he says follicle density increases when the skin is thinned secondary

to primary ratios (50:1) traditionally increases (90:1) and therefore the amount of wool being produced per square millimetre is increased.

Financial benefits of plain-bodied types

Nick says they have experienced a significant increase in their return on investment since transitioning to plain-bodied Merinos in 2007.

Their cost of production, excluding capital costs, is approximately $3.00 a head for feed and animal health with a harvesting cost of around $10.00 a head being for crutching, shearing and staff. Costs for their feedlot lambs are $30.00 a head for animal health and feed. While sales prices can vary greatly, they can usually expect to get $17.00-$18.00/kg for their wool (clean).

In addition, they sell merino lambs at eight to nine months of age ranging from $130.00 to $160.00.

Another cost saving has been in the drought for feed. He says his sheep have seemed to maintain their condition on less grain in the drought. Where a traditional type dry ewe at a 60kg body weight might require a ration of 600g per day of barley a '3 Score' body wrinkle sheep can be maintained on 400g to 450g per day dependent on feed availability.

They have observed that the animal's skin wrinkle has been reduced and therefore there is also a corresponding reduction in energy required for the sheep to maintain itself. Subsequently, their sheep have bounced back from a drought condition sore of 2.5 to 3 to a breeding condition of 3.5 to 4 score within 3 weeks over the late January to mid-February period associated with some good rain.

By using SRS breeding principles, their sheep exhibit higher environmental fitness markers. i.e. larger ears (heat stress and body temperature regulation), larger rumps (walking distance to feed and water), and an increase in size and weight.

The body and wool is able to handle significant rain over the summer hot periods. Reduction in sweat glands reduce flystrike risk, 'easily wet, easily dry'.

Nick's conclusion is that they are animals fit for the environment in which they live. Highly fertile, highly productive and highly profitable.

Advice to growers

Nick says they transitioned over seven years however due to the genetics available today he would be surprised to see it take longer than four years. The transition period can be difficult without the correct advice in order to maintain wool quality and this is why some growers abandon the process in the first two years.

Getting the correct scientific advice is very important and not necessarily relying on your current stud master for the transition. Also, finding and talking to those who have successfully transitioned to plain-bodied types helps reduce the unknowns.

He believes there is a huge difference between the way they have bred their sheep through selective ewe and ram pressures and someone simply putting an NM ram over their traditional merino ewes. In his view, this changes the wool characteristics to something the breeder is actively selecting against e.g. a bolder crimp from a fine crimp. This is where the danger is.

The transition, and not understanding the basic wool biology and what causes crimp development often results in a relapse to wrinkly sheep.

Mount Bodangora

CASE 5

Lindsay & Rae Young
'Lewisham'
Northern Midlands TAS

Lindsay and Rae with their daughter and grandchildren

'We manage our farm with animal welfare at front of mind, minimising stress and pain during animal husbandry procedures such as shearing, lamb marking and weaning. This picture means excellent production, the two concepts are a perfect marriage'. Rae Young

Business profile

LOCATION: Ross, Tasmania

LAND SIZE: 1,140 hectares

FARM OPERATION: Specialist woolgrower/self - replacing flock

FARM INCOME FROM WOOL GROWING: 40%

Farm and flock

Lewisham is located in Climate Zone 7 in Tasmania's northern midlands between Launceston and Hobart. The region has a cool temperate climate with an average annual rainfall on the farm of 450mm.

The farm is just over 1100 hectares of undulating land with spectacular views, regal old growth eucalypts and a wonderful array of animals including echidnas and Tasmanian Devils with a variety of birds including Wedge tailed Eagles and Masked owls.

The Youngs say they work with nature to improve production, matching carrying capacity with stocking rates. Their stocking rates are adjusted each season to match prevailing weather conditions.

The farm is permanently fenced off into 160 paddocks, each one with a water trough serviced with 63 mm underground lines ensuring they fill up rapidly. This ensures adequate water in summer. Perennial pastures are rotationally grazed, giving them long resting periods between grazing to recover.

This gives them superior pasture composition and naturally enhanced weed and parasite control. This also allows ewes to be lambed in small mobs.

They run plain-bodied Merinos with a usual flock size of 7,000 although their current flock size is around 5,000 due to drought conditions experienced in recent years.

Their sheep are Score 1 breech, Score 1 body wrinkle and Score 1 dag with the fleece being 17-20 micron with a 74% wool yield. The Youngs shear every eight months, and cut 5.1 – 6kg greasy. They join in April.

Crutching occurs once between shearings. They jet in summer, and lambs where necessary get a second jetting in summer to afford protection. They regularly worm test and use this to inform their drenching regime and rotate through the different drench groups. Flystrike is extremely low being less than 0.5% for both breech and body strike.

Animal welfare pays dividends

Lewisham is a 'Responsible Wool Standard' property. Animal welfare is a high priority for Lindsay and Rae. Although they are production animals, they like to know their animals live with freedom, are safe from predation and are free from hunger, thirst, discomfort, injury and disease.

Fortunately, this also means excellent production and they say happy animals are productive animals.

Lindsay and Rae say they opted for plain-bodied Merinos for their fertility and ease of management. They describe their sheep as a good body size with clear faces which are more fertile and lower maintenance.

This was accomplished by selective breeding over time which has produced sheep requiring less chemical inputs, resulting in uncontaminated wool.

They keep their sheep in condition Score 3 all year round.

They describe their wool as long free growing wool which processes into durable, silky wool fabric with an inherent ability to stretch and take up dyes readily. Staple strength has improved, they see good wool character (crimp) and scouring and staining have all somewhat improved with less wool colour.

Lambing percentage has been a big driver of increased return on investment with it now being 125% - 130% whereas previously it was around 95%.

Their lamb sale weights are 18-24 kgs cw at 7 to 10 months.

Cost of production is usually $4.00 - $5.00/kg (greasy). They do use a lot of painkiller at marking which increases costs but they say it is worth it.

Their average sale price is $13.00 - $14.00/kg (greasy) depending on the market with a price premium for their non-mulesed wool estimated at $1/kg greasy.

Advice to growers

Make sure your sheep are fit for purpose, choose something you like and are passionate about and do it well. Make it profitable and be sure to meet the market demands for your product. We find big plain bodied, fast growing, fertile sheep are profitable.

Additionally, they meet market demands and income is not reliant on one product.

Whatever you do, just do it well and the best way to do that is to look after your animals and your landscape.

Plain-bodied sheep on Lewisham

CASE 6

David & Susan Rowbottom
'Rowensville'
Southwestern Victoria

David and Susan Rowbottom

'I believe growers must be seen to do the right thing in the consumer's eyes and mulesing must stop if we are to have a future and selective breeding is the best alternative in the long run. Improved wool quality to produce softer, more desirable product along with acceptable animal welfare practices is the only way forward'. David Rowbottom

Business profile

LOCATION: St Helens Victoria

LAND SIZE: 520 hectares

FARM OPERATION: Specialist woolgrower/self - replacing flock and stud / sheep breeding

FARM INCOME FROM WOOL GROWING: 70%

Farm and flock

Rowensville is located in Climate Zone 6 bordering on Climate Zone 7 in southwestern Victoria. The region has a mild temperate climate with cold and wet winters.

The average annual rainfall on the farm is around 850mm.

David and Susan run 3,000 ultra-fine Merinos with 1,500 White Suffolks located on a separate farm.

Their Merinos are Score 4 breech, Score 1 body wrinkle and Score 1 dag. Shearing occurs every 12 months in November with 3.5kg greasy cut. Wool yield is 70%-74%.

Joining occurs in February/March with the lambing percentage being 70% - 90%.

Their sheep receive no body strike and very little breech strike, only seven or eight sheep in a bad year. As such, they use no chemicals to prevent flystrike so costs are low.

Selective breeding pioneers

The Rowbottoms purchased their first Merinos in 1976 which averaged 19.4 micron and were very wrinkly with an average fleece weight of 3.14kg.

David was a shearer by trade and did some share farming for an absentee landowner while Susan worked at Fletcher Jones.

They built up the farm from scratch and mulesed for three years however thought it was cruel and disliked the practice even though they say it did work in preventing flystrike.

A selective breeding program was started to get rid of the wrinkle which they say was a very difficult task in those days as the trend was to put more and more skin on sheep via the Merino studs and the vast majority of woolgrowers were in line with that thinking.

Suitable rams of super fine breeding were 'nigh on impossible' to find and they began breeding their own in the early 1990s. Selection was for plain-bodied but not thin-skinned sheep with wool of exceptional white

colour, long staple and more stylish than traditional superfine wool.

David says they have never attempted to breed bare breeched Merinos as their wool type appears to be resistant to flystrike with no wrinkles on the breech to hold urine.

Selection for very good 'doing ability' means the sheep are less likely to get daggy which helps considerably. A preventative drenching program is also important along with the timing of crutching, shearing, etc.

The Rowbottoms say it took approximately seven years before all mulesed sheep were sold off and took around 20 years to become very successful.

The finest Merino wool in the world

Wool colour, wool character (crimp), staple structure, scouring and staining have all significantly improved since making the change to plain-bodied Merinos, says David.

Their wool is certified with Authentico and SustainaWOOL.

With an average 14.2 micron fleece, the wool sale price most often exceeds $20.00/kg (greasy) however the price for below 15 micron wool has been a little lower in recent years.

When combined with an average cost of production (excluding capital costs) of around $10.00/kg (greasy) and an estimated price premium of $1.00 to $3.00 per kilogram (greasy), depending on market conditions, it's not surprising they describe their return on investment as being very good.

This is despite the transition for them being initially 'somewhat costly' and experiencing a short period of an increase in flyblown sheep with the associated treatment and time costs involved with that.

However, the hard work and vision for the future has paid off for David and Susan. This year they collected their sixth 'Vellus Aureum Trophy' for producing the finest Merino fleece in the world, with a 10.6 micron fleece winning entry.

They hold the world record win with a 9.9 micron fleece in 2016.

Advice to growers

With such a long history of breeding plain-bodied Merinos and producing the finest wool in the world, it's not surprising woolgrowers are interested to hear what advice David and Susan can offer, based on their own experience.

The biggest challenge they say is to have the patience to see the transition through.

While it took 20 years to successfully complete the transition, at that time studs weren't breeding for plain-bodied sheep so it took a lot longer than what it might these days, they say.

David believes breeders who stop mulesing and replace it with chemical applications to reduce flystrike are simply transferring from one problem to another and this is definitely not in line with consumer and environmentalists' expectations.

The Rowbottom's ultra fine Merinos

CASE 7

Norman & Pip Smith
'Glenwood'
Central West NSW

Pip, Norm and family *Photo credit: Peter Dowson, Digital Storytellers*

'Australian woolgrowers now have a choice and if you want to produce a highly profitable resilient Merino which does not require mulesing, you can achieve this in a 3 to 5 year transition using SRS® genetics. To meet changing consumer demand around animal welfare concerns world-wide we need to focus on change to ensure the long-term viability of our iconic industry'. Norm Smith

Business profile

LOCATION: Spicers Creek NSW

LAND SIZE: 2,800ha owned; 2,700ha leased

FARM OPERATION: Stud/sheep breeder and Merino wool producer

FARM INCOME FROM WOOL GROWING: 90%

WEBSITE: www.glenwoodmerinos.com.au

Farm and flock

Glenwood is located in Climate Zone 4 in central NSW which experiences hot dry summers and cool winters.

The average annual rainfall in a typical non-drought year on the farm is 650mm however they have received less than half of that in the past three years.

Glenwood has been in the family since the 1890s and has always primarily run Merino sheep.

A stud was set up in the 1920s to supply rams to the commercial flock. In the late 1990s, Norm and Pip took over and started to practice holistic management and to breed SRS sheep under the guidance of Dr. Jim Watts.

Norm and Pip run 1,000 stud ewes, two flocks of commercial ewes (2,800 and 2,000) and 3,000 wethers. The sheep are plain-bodied and thin-skinned and have not required mulesing since 2005.

Sheep are Score 1 body wrinkle, Score 1 breech and Score 2 dag with a 18-18.5 micron fleece. Wool yield is 70% to 78% and sheep are shorn every eight months in February, June and November with 3.5kg to 4kg (greasy) cut being 5kg to 6kg per year.

They crutch before shearing, drench only after doing a worm count and the flock never requires jetting. The wether flock of 3,000 has not required drenching for over 6 years.

The wool is certified with RWS and NATIVA.

So far in 2020 Glenwood has received 380mm which when combined with the heat are ideal conditions for flystrike. However, they have not had to treat any of their sheep in the stud for flystrike and in their flock sheep they have only had to treat a single lamb out of 2,000 ewes and 1,300 ewe lambs.

Benefits of breeding out skin wrinkle

Norm says there are so many benefits to getting rid of the wrinkle on their Merino sheep. First, is that a plain-bodied Merino is just more comfortable in any

Australian environment without the burden of a heavy or wrinkly skin. They are a more resilient animal which is more fertile especially during dry times and tend to bounce back quicker when it does rain.

All of Dr. Jim Watts' research showed that selection for an SRS plain-bodied Merino resulted in a more efficient, easy care and productive animal in terms of its fertility, wool quality, doing ability and how it fitted into the Australian grazing landscape.

Then there is the improved wool quality. Norm and Pip say they produce a fibre that processes well and is valued by their customers and SRS Merinos have been proven to produce a better processing fibre which includes a more even yarn which is elastic, soft against the skin, has a good affinity to dyeing and produces less short fibre or waste.

Staple structure, wool colour, wool character (crimp), and fleece rot have all significantly improved and they rarely see any colour in the wool. There's been no change in scouring and staining.

In addition, lambing percentage is now 121% - 130%. Previously it was 90%. Lambs are sold for around $200.00.

They also now shear every 8 months due mostly to the extra length being grown and they aim to produce 80mm-90mm for this interval.

A good financial decision

Transitioning to SRS Merinos was a good financial decision for Glenwood, says Norm, as they have seen a significant return on investment.

Although they have not calculated a gross margin recently, their commercial flock was involved in a MLA study of over 100 mixed farms from southern Australia and had the highest gross margin ($89/dse), including highest revenue per dse, and one of the highest wool and meat values per dse.

They say making the transition was not a particularly costly move.

They only use chemical treatment on the tails of lambs at lamb marking or sometimes on the tails of adult sheep if they cannot crutch because of a joining period, so there are cost savings there.

Advice to growers

Norm and Pip say the only change needed is the mindset of the woolgrower and a change to where the genetics are sourced and importantly how the sheep are classed.

It is easy to breed a plain-bodied Merino but you need expertise and knowledge to breed an SRS Merino which is productive and profitable.

Everybody needs to make their own judgements on their genetic direction however don't be influenced by conservative leadership and look beyond just cutting wool to include a more balanced and profitable animal.

There are premiums for unmulesed wool as this is what the market is demanding.

Plain-bodied Merinos at Glenwood

5
CONCLUSIONS

This report has presented the findings of a survey of the transition process for woolgrowers, the transition outcomes for sheep, the financial benefits and costs of transitioning, and the future farm plans of woolgrowers and observations following the transition from wrinkly breed types to plain-bodied Merinos. The report also included seven case studies.

The main findings of the survey are summarised as follows:

1. The transition process for woolgrowers

The vast majority of woolgrowers completed the transition to plain-bodied Merinos within five years and say transitioning to plain-bodied Merinos is not costly. Just under half of growers received selective breeding assistance to undertake the transition.

The main reason growers stopped mulesing and transitioned to plain-bodied sheep was for animal welfare considerations and believing it was an unnecessary procedure. They also found plain-bodied Merinos easier to manage.

2. The transition outcomes for sheep

There are three main welfare outcomes for plain-bodied sheep.

First, as lambs, they do not experience the pain and suffering associated with the mulesing operation where skin folds are removed around the breech area (tail end) typically using mulesing shears. This is sometimes done without providing pain relief medication to the animal and it can experience pain for many days after the procedure.

Second, lamb survival rates are improved and stress is decreased.

Third, plain-bodied sheep have very low rates of breech strike and body strike. Nearly three-quarters of growers' flocks experience 0.5 per cent or less breech strike and nine in ten flocks experience 0.5 per cent or less body strike.

3. The financial benefits and costs of transitioning

In financial terms, it was found that more than eight in ten woolgrowers have experienced an increased return on investment since transitioning. Nearly nine in ten growers realise a price premium for their unmulesed wool and more than eight in ten have seen increased lamb growth rates. Lambing percentage has also increased.

4. Future farm plans of woolgrowers and observations

All woolgrowers participating in the survey plan to continue with plain-bodied Merinos, with just over half of them also planning to expand their business.

Nine in ten woolgrowers would recommend to other woolgrowers to undertake the transition to plain-bodied Merinos and almost all say not mulesing is important for their farm's future profitability.

Most growers considered their plain-bodied sheep to be more drought tolerant than wrinkly sheep.

Case Studies

Four main points emerged from the data about how the seven woolgrowers successfully transitioned away from wrinkly type Merinos to plain-bodied types.

1. The 'mind shift' to make it happen is the number one hurdle to making the change. When in doubt talk to producers who have already made the transition to plain-bodied sheep as they have the practical knowledge.

2. Be totally committed to the transition process. There can be an initial increase in fly pressure when mulesing is stopped and the wrinkle is bred out. This pressure is a manageable short-term part of the transition that will rapidly reduce as the last of the skin wrinkle disappears. The challenge is to have the patience to see the transition through.

3. Education is key. Attend workshops or other information sessions. An understanding of basic wool biology is essential to avoid a relapse to wrinkly sheep.

4. Buy rams from a stud that has stopped mulesing. Find the studs that align with your breeding direction and those that carefully consider skin and wool qualities. Aim for easier to manage sheep and better 'do-ability'.

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