

## Breeding Merinos for less breech strike

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### Introduction

What is the likely rate of genetic gain in breeding for breech strike resistance and what are the trade-offs?

#### Key Points

Genetics is a permanent solution to reducing breech strike

The largest effect when reducing breech wrinkle is a potential loss of fleece weight, but this can be overcome by incorporating wrinkle score into an index with other traits

The maximum change in wrinkle that can be achieved by within-flock selection is one score over ten years

Prior to mulesing, breech strike was the main form of fly strike: 90% of all strikes in a flock. All ages were affected and ewes were especially affected. Studies in the 1930s highlighted that breech conformation had a large impact on susceptibility. Sheep that were very wrinkly around the breech were five to ten times more likely to be fly struck than those with a plain breech.

The mules operation was introduced to reduce the susceptibility of wrinkly breeches to fly strike. Mulesing reduced the number of strikes and gave added protection to plain breeched sheep, but the recommendation from the Joint Blowfly Committee in 1940 was that 'the mules operation must not be regarded as an alternative to the policy of breeding towards plain breeched sheep'.

Breeding to minimise breech wrinkle provides a permanent solution to managing breech strike that is cost effective (since the measurements are not costly and will offset large costs of husbandry and treatment). The questions that arise are how long will it take and what is the impact on other traits?

Selection lines run at Trangie Agricultural Research Station in 1951–1971 selected for more wrinkle (Folds Plus) and less wrinkle (Folds Minus). The lines confirmed that breech wrinkle is highly correlated with body and neck wrinkle. Therefore if sheep have a plain breech they will almost always have a plain body and neck, and vice versa. This trial showed a decrease of approximately one wrinkle score over a period of 10 years. The lines also demonstrated the correlated responses with other traits (Table 1).

Table 1. Correlated responses with wrinkle (10 years)

Age	Trait	Selection lines	
		Folds Plus	Folds Minus
Hogget	GFW	+6%	-13%
	CFW	-1%	-10%
	FD	+0.1 $\mu\text{m}$	+0.3 $\mu\text{m}$
	WT	-1%	+3%
Adult	Lambs weaned per ewe joined	-26%	-2%

As shown in Table 1, the largest antagonism was with greasy fleece weight (GFW) where the flock selected for reduced wrinkle was 13% lighter cutting than the control line (6% heavier for the flock selected for increased wrinkle). Clean fleece weight (CFW) was lower in the reduced wrinkle flock (-10%) but almost unchanged in the increased wrinkle flock (-1%).

There was little influence on fibre diameter (FD) and body weight (WT) in the reduced wrinkle (+0.3  $\mu\text{m}$  and +3%) or increased wrinkle flock (+0.1  $\mu\text{m}$  and -1% respectively).



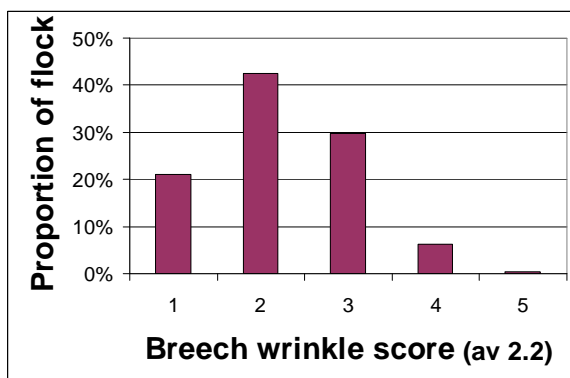
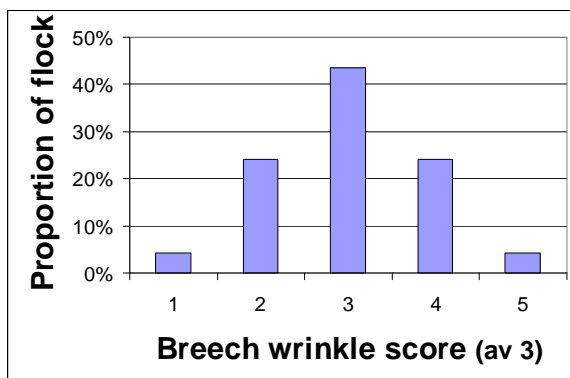
There was only a small change in reproduction for the reduced wrinkle flock (-2%), whereas the high wrinkle flock had a 26% reduction in lambs weaned per ewe joined.

If a ram breeder places all their selection emphasis on reducing breech wrinkle (Figure 3) the expected change that could be achieved over 10 years is 0.8 wrinkle score (when based on a standard within-flock selection program). This will affect the distribution of scores within a flock by increasing the proportion of plainer sheep (1 and 2 score) and also reducing the proportion of wrinkly sheep (4 and 5 score).

Figure 1 shows this change in distribution of scores that would be made over ten years when starting from an average wrinkle score 3 flock and moving to a 2.2 flock. As shown in Table 1 there would be a trade off in other traits to achieve this response.

Figure 2 shows that if a ram breeder had an objective that placed equal emphasis on reducing fibre diameter and increasing fleece weight (Merino 7% index) it is estimated that over ten years while the wrinkle score would be reduced by 0.8 the opportunity cost to other traits would be approximately 70%. That is, of the total genetic gain possible in index traits, 70% would be forfeited in reducing wrinkle.

Figure 1: Flock wrinkle score distribution when reducing wrinkle score by 0.8 over 10 years. The top graph shows the distribution at the start of the 10 years and the bottom graph at the end of the 10 years.



A breeder with an objective to maximise their flock's reduction in fibre diameter while at the same time maintaining fleece weight (Merino 14% index) would see a 60% loss in the potential gain that could have been achieved in the index traits. A breeder with an objective to maximise the flock's increase in fleece weight while maintaining fibre diameter (Merino 3.5%) would see an 80% loss in the potential gain.

The main source of loss is due to the antagonism between fleece weight and breech wrinkle as shown in Figure 1.

If the aim is to reduce wrinkle score by only 0.5 of a score in 10 years, opportunity costs are reduced to only 20%, 25% and 30% for Merino 14%, Merino 7% and Merino 3.5% respectively.

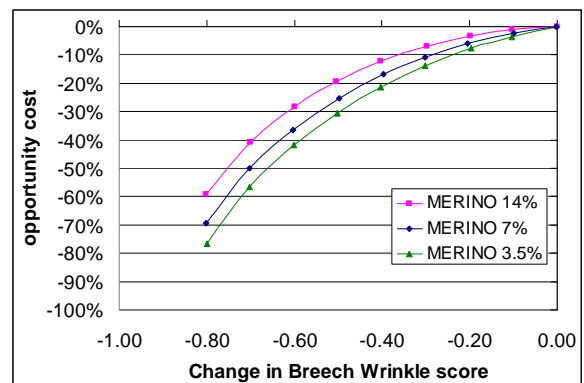
### What are my options for a more rapid response?

#### Ram breeder

Ram breeders have several opportunities to improve the response described in Figure 2.

As well as selecting for breech wrinkle, ram breeders can also record neck and body wrinkle. These traits are highly correlated with breech wrinkle and therefore will give a breeder improved accuracy when selecting for wrinkle.

Figure 2: Opportunity cost of selecting for reduced wrinkle over 10 years



Relative to making selections based on the degree of wrinkle, making selections based on wrinkle breeding values will increase the rate of change. Breeding values can account for the environmental effects that distort the relative wrinkle scores between sheep. Breeding values will also improve the accuracy of selection by including relative performance in deciding the breeding value of both rams and ewes. Breeding values will be able to be used for selection by the ram breeder as well as being presented for clients at ram sales.

Sourcing low wrinkle rams from other ram breeding flocks that are also high performers for other

relevant traits may also increase the rate of progress. This can soon be accurately achieved because Central Test Sire Evaluation and Sheep Genetics will soon report across-flock breeding values for wrinkle as well as the many other traits they currently report.

**Commercial breeder**

Options for a commercial breeder include purchasing rams with lower wrinkle scores, or lower wrinkle breeding values (as they become available). If breech wrinkle scores or breeding values are not provided by the ram breeder, ram buyers can assess neck wrinkle as a quick and easy way to identify low breech wrinkle rams. This is particularly valuable when sale rams have long wool which makes evaluating breech wrinkle very difficult.

It is important for a commercial breeder to talk to their ram breeder to ensure that they have a

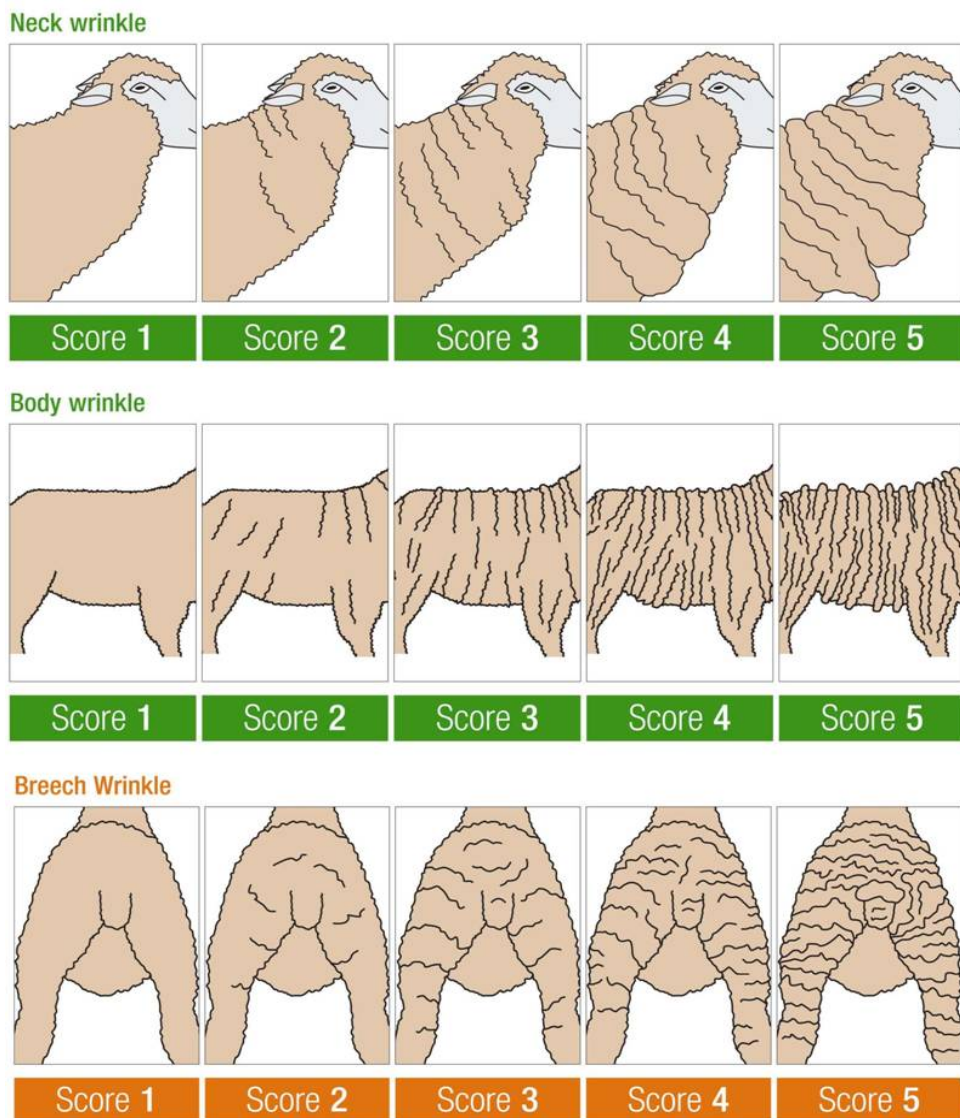
similar breeding objective. If the ram breeder's performance and objective don't measure up alternatives sources need to be considered, but it is critical that other sources performance for all relevant traits measure up.

Selecting replacement ewes on wrinkle score and breeding the plainer ewes with your plainest Merino rams will significantly accelerate the rate of progress towards less wrinkly sheep.

Ewes with a higher wrinkle score may be used to breed sale sheep, for example joined to a terminal sire with all progeny sold. In this instance, the progeny are not going to be retained for breeding in the self-replacing flock therefore the flock's 'wrinkly' genes are less likely to be passed on to Merino progeny.

It is possible to stage a reduction in mulesing by implementing different management strategies for sheep more at risk of being struck. For these sheep, you may choose to use breech clips, schedule a second crutching and/or carry out preventative chemical treatment.

Figure 3: Neck, body and breech wrinkle scores



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