DOHNE SELECTION INDEXES

Selection Indexes

Selecting animals involves balancing the traits which influence profitability of the commercial flock. To simplify the process, these traits can be combined into a selection index. A selection index combines ASBVs for different traits to give a single value on which animals can be ranked. The relative emphasis given to each trait reflects the breeding objective and production system the index was developed for.

Sheep Genetics reports two standard indexes for the DOHNE analysis. The *Dohne Base* index and the *Dohne Plus* index. Both indexes were developed in conjunction with the Australian Dohne Breeders Association (ADBA), as well as using survey feedback from Dohne breeders to identify an economic breeding objective targeting profitability in commercial Dohne flocks.

Breeding Objective

The Dohne breeding objective developed jointly by Sheep Genetics and ADBA identified the importance of improving both growth and reproduction, while maintaining wool quantity and quality. Reproductive rates are a significant profit driver in Dohne production systems, which is why Number of Lambs Weaned (NLW) is a significant component of the Dohne breeding objective.

Having developed the breeding objective, the production traits identified are then linked to the measurable and reportable ASBVs that are used as selection criteria in the index, see Table 1 below for example.

Table 1: Traits in the Dohne breeding objective and measurable ASBV traits used in indexes

Breeding Objective	Measurable Traits	ASBVs
Wool Quantity	Fleece Weight	YCFW and ACFW
Wool Quality	Fibre Diameter Staple Strength	YFD and AFD YSS and ASS
Growth	Body Weight	PWT and AWT
Carcase	Eye Muscle Depth	PEMD
Reproductive rate	Number of lambs Weaned	NLW

Breeding Program

The traits and ages recorded in a breeding program can be different from one flock to another. This has been accommodated in the breeding program designs used to assess the two Dohne indexes. The breeding program structure and amount of information recorded influences the amount of genetic progress that can be achieved.

Predicted genetic gains for the *Dohne Plus* breeding program shows that the highest rates of progress in reproduction are achieved by measuring reproduction directly and using the NLW ASBV. The NLW ASBV is therefore included directly in the *Dohne Plus* index, along with ASBVs for growth and wool traits. Importantly the relative emphasis placed on each trait in the index is consistent with the breeding objective.

The *Dohne Base* breeding program includes the measurable traits that improve growth, carcase and wool quantity and quality. However this index does not include the NLW ASBV. Improving reproductive rate is still an important part of the breeding objective and can be achieved to an extent by exploiting the genetic relationships between reproduction and the other traits still included in the index (most notably body weight). The rate of improvement towards the breeding objective will be slower because selection for reproduction is indirect compared to *Dohne Plus*. Importantly, the accuracy of the *Dohne Base* index will be lower because accuracy is a measure of how well the index relates to the breeding objective, and leaving an important objective trait out of the index leads to a reduction in trait and index gain.

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DOHNE SELECTION INDEXES

Dohne Base and Dohne Plus

Both Dohne indexes rank animals on their ability to meet the Dohne breeding objective of improving reproductive rates and growth, while maintaining wool quantity and quality. The only difference is that the *Dohne Base* index assumes no recording of NLW and does not include the ASBV for NLW in the index. The *Dohne Plus* index (previously the Dohne index, developed in 2015) does include the NLW ASBV in the index to accelerate the amount of progress that can be made in the trait and the objective overall.

The following information has been developed to aid in the decision of which of the two Dohne indexes to use. Although the breeding objective is the same between the indexes the contribution to economic gain as well as genetic gain in individual traits over ten years is slightly different (see Figure 1 and Table 2). Please note that these trait gains have been calculated assuming 65% of selection emphasis is placed on the respective index.

Figure 1: Economic and trait gain for profit traits in the Dohne breeding objective
(Trait gains have been combined across age stages)

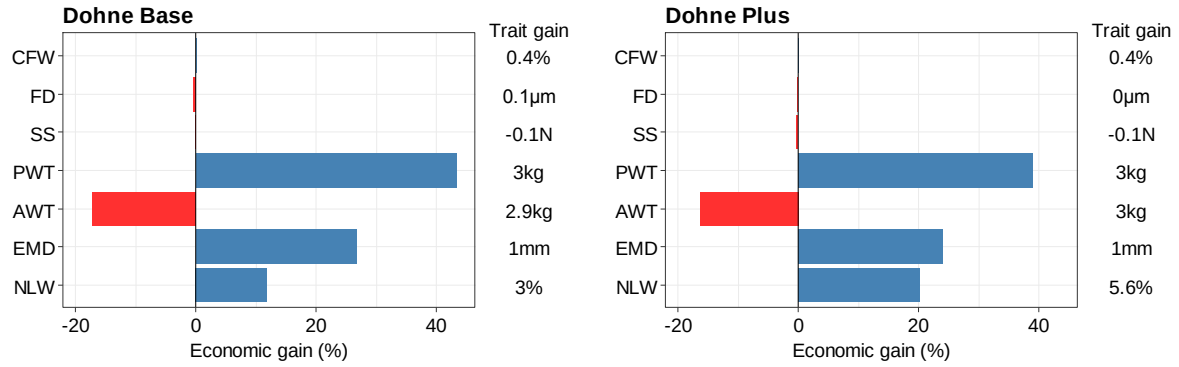

Table 2: Predicted genetic gain over 10 years for major traits for the Dohne breed

		Dohne Base		Dohne Plus	
ASBV	**Unit**	**Part of index**	**Gain**	**Part of index**	**Gain**
YCFW	%	yes	0.8	yes	1.0
ACFW	%	yes	-0.1	yes	-0.1
YFD	µm	yes	0.1	yes	0.1
AFD	µm	yes	0.0	yes	0.0
YSS	N/ktex	yes	0.0	yes	-0.1
ASS	N/ktex	yes	-0.1	yes	-0.2
PWT	kg	yes	3.0	yes	3.0
MWWT	kg	yes	-0.3	yes	-0.3
AWT	kg	yes	2.9	yes	3.0
PEMD	mm	yes	1.0	yes	1.0
PFAT	mm	no	0.3	no	0.3
NLW	%	no	3.0	yes	5.6

It is important to note that because of the way indexes and ASBVs are calculated, it is valid to compare all animals in the Dohne database on either index. This is because the analysis automatically accounts for varying amounts of information between animals and flocks. Sheep Genetics recommends to select using the Dohne Plus index.

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