Sheep CRC Practical Wisdom Notes

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Using Australian Sheep Breeding Values

What is an ASBV?

ASBV stands for Australian Sheep Breeding Values. They are the national language for benchmarking sheep based on their genetic merit and are produced by Sheep Genetics. ASBVs describe a sheep's breeding value for a trait, e.g. fleece weight or body weight, and express the relative breeding value of sheep across different breeding flocks of that breed (or across breeds in the case of Terminal breeds). They are equivalent to estimated breeding values (EBVs) used in other livestock industries e.g. BREEDPLAN in the beef cattle industry.

Why are ASBVs more effective than raw measurements when selecting sheep?

ASBVs incorporate all of the available pedigree and performance data of the sheep and its relatives, making the genetic estimate far more accurate than raw measurements alone. The calculation of ASBVs also removes environmental effects that can obscure a sheep's breeding value. Environmental effects removed include birth type, rear type, dam age and differences between management groups. Because management differences between drops of progeny and flocks are removed, ASBVs can be directly compared across age groups and flocks, which is not possible if using raw measurements.

Which traits should I use?

As a ram breeder or a ram buyer there are a large number of traits that can be reported as ASBVs. However it is up to the individual to use the traits relevant to them. Particularly when starting, choose just a few ASBVs to use. These should be the traits you consider most important in your breeding program. More can be incorporated in the future if they are important to you. In the past, ASBVs were only reported for measured traits, however visually assessed traits are now being scored to an Australian standard allowing body structure and conformation traits and wool quality traits to be reported as ASBVs in the near future.

Is a high or low ASBV better?

ASBVs are reported as above and below an industry base of zero. The optimum value for any ASBV depends on the particular trait and your breeding objective. If you consider a high raw measurement better, e.g. higher fleece weight, then a higher ASBV is better. If you consider a lower raw measurement better, e.g. a low worm egg count, then likewise a lower ASBV is better. For some traits you will prefer a value in between, e.g. a fine-medium fibre diameter or a moderate amount of carcase fat, likewise the ASBV should be neither high nor low.

Figure 1. Pen cards with ASBVs

What raw measurement is the average ASBV for a trait?

ASBVs cannot be expressed as a raw measurement because the raw measurement will depend on the age of the sheep and the environment they are experiencing. For instance, if one ram and 50 ewes, all with a body weight ASBV right on average were mated, then the average raw body weight of the lamb progeny, could be very different if they were raised under different management at Cowra or Bendigo or Narrogin. The genetics are the same, but the environmental conditions differ. If another ram was joined to the same average ewes and he had a body weight ASBV of 2 (2 kg heavier than the average) then the progeny will be about 1 kg heavier (as they only get half of) than those from the first ram at the same age, whether raised at Cowra, Bendigo or Narrogin. The progeny of ram 2 are only 1 kg heavier than ram 1 because only half of their genes come from the ram. As you start to use ASBV you will quickly gain an understanding of how a trait's ASBV values relate to raw performance in your environment and at a particular age.

What does the accuracy of an ASBV show?

The accuracy indicates how reliable the ASBV is at predicting the genetic merit of the sheep's progeny. An ASBV with an accuracy of 95% is highly accurate, whereas one that is 55% is moderately accurate. The accuracy of an ASBV increases as a sheep has more data for that trait from itself or its relatives. Sheep Genetics have threshold accuracy levels that vary for each trait and are the level considered accurate enough to report the ASBV. Only ASBVs above the accuracy thresholds are published.

Table 1. Example of ASBVs reported for an animal (Trait Leader values are highlighted)

Animal ID	YWT	AWT	YEMD	YCFW	YFD	YDCV	YSL	YSS	YWEC	NLW	7%DP	7%	10%ss	14%ss
505045-2005-050134	0.5 87%	-0.1 86%	-0.1 59%	-3.0 88%	-3.3 93%	-0.6 89%	-3.5 88%	-0.5 86%	-17 72%	-3% 35%	123	133	148	146

Why do ASBVs change over time?

The initial published ASBV for a sheep may be based on limited data, such as the ASBVs of its parents. As more data is provided for the sheep, from itself and its siblings and later its progeny, then a trait's ASBV may change to reflect that extra data, and will also become more accurate.

In what units are ASBVs shown?

For most ASBVs the unit is the same as the raw value of the underlying trait, such as kilograms for body weight (WT), where a body weight ASBV of 7 indicates a sheep is 2 kg heavier genetically than a sheep with an ASBV of 5. The exceptions are fleece weight, worm egg count and number of lambs weaned, which are shown as a percentage, e.g. an ASBV of 5 for clean fleece weight (CFW) indicates the sheep has a 5% heavier fleece weight than a sheep with a clean fleece weight ASBV of zero.

What is a selection index and how can it be used?

A selection index combines the ASBV performance for a number of traits into one value. There are many different indexes, each reflecting different breeding objectives or different emphasis on different traits. The higher the index value a sheep has, the more suitable it is for the objective defined by the index. Index values are very easy to use and are a good starting point. They provide a summary of the sheep's performance for the traits in the index—they are like a headline in a newspaper. But just like a headline you need to look at the detail—in this case the ASBVs, before finalising selection. It is critical you use an index that matches your breeding objective and you also account for traits that are not in the index when making selections.

How do I use a percentile chart?

Percentile charts show the range of each ASBV value for the drop that is approximately 1 year old. The table allows you to benchmark ASBV and index performance to the current range in industry standards. The left column in the table shows the percentile band. The 50% band is average performance for the drop. The 10% band shows "trait leaders" and is the performance of the 10% most extreme performers in the drop for that trait or index.

Table 2. ASBV and Percentile band table (MERINOSELECT)

ASBV and Index Percentile Band Table
Analysis **Merino** Run date 21/02/2009

Animals born in 2007

Band	Yfd	Yclw	Yfdcv	Ysl	Yss	NLW	Ysc	Ywec	Ywt	Yfat	Yemd	7%DP	7%	10%SS	14%SS
0	-7.1	38.8	-4.2	22.6	13.1	25	5.3	-99	20.5	-3.2	3.8	225	200	202	179
1	-5.1	26.6	-2.7	14.2	7.1	11	3.4	-97	11.1	-1.9	2.1	178	173	178	163
2	-4.5	24.4	-2.5	13.1	6.2	10	3.0	-94	9.9	-1.7	1.9	170	168	173	159
3	-4.2	23.2	-2.4	12.4	5.7	9	2.6	-78	9.2	-1.5	1.8	166	165	170	157
4	-3.9	22.1	-2.3	11.8	5.2	8	2.6	-62	8.7	-1.3	1.6	163	162	168	155
5	-3.7	21.2	-2.2	11.3	4.9	8	2.5	-59	8.3	-1.2	1.6	161	160	166	154
10	-3.2	18.2	-1.9	9.6	3.7	6	2.0	-46	6.8	-0.9	1.3	153	153	159	148
15	-2.8	16.3	-1.7	8.3	3.0	5	1.7	-40	5.9	-0.7	1.1	148	149	154	145
20	-2.5	14.6	-1.6	7.5	2.5	4	1.5	-35	5.1	-0.5	1.0	144	145	150	141
25	-2.3	13.0	-1.4	6.6	2.1	4	1.3	-31	4.5	-0.4	0.8	141	141	146	139
30	-2.1	11.6	-1.3	5.9	1.6	3	1.1	-27	3.9	-0.3	0.7	138	138	143	136
35	-1.9	10.3	-1.2	5.1	1.3	3	0.9	-24	3.3	-0.2	0.6	135	135	139	134
40	-1.7	9.0	-1.1	4.5	0.9	2	0.8	-21	2.7	-0.1	0.5	133	132	137	132
45	-1.6	7.7	-0.9	3.8	0.6	2	0.6	-17	2.1	0.0	0.4	131	129	134	129
50	-1.4	6.3	-0.8	3.1	0.2	1	0.5	-14	1.6	0.1	0.2	128	127	131	127
55	-1.2	4.9	-0.7	2.5	-0.1	1	0.4	-11	1.0	0.2	0.1	126	125	128	125
60	-1.1	3.4	-0.6	1.8	-0.5	1	0.2	-7	0.5	0.3	0.0	123	123	126	123
65	-0.9	1.7	-0.5	1.1	-0.8	0	0.0	-3	-0.1	0.4	-0.1	121	121	123	120
70	-0.7	-0.2	-0.3	0.3	-1.2	-1	-0.1	1	-0.6	0.5	-0.2	118	119	121	118
75	-0.5	-2.1	-0.2	-0.5	-1.7	-1	-0.3	5	-1.1	0.6	-0.3	115	117	118	116
80	-0.3	-4.3	0.0	-1.4	-2.2	-2	-0.5	10	-1.7	0.7	-0.4	111	114	115	114
85	0.0	-6.8	0.2	-2.6	-2.8	-3	-0.8	15	-2.4	0.8	-0.6	108	111	112	111
90	0.4	-9.4	0.5	-4.0	-3.7	-4	-1.0	23	-3.2	1.0	-0.7	103	107	109	108
95	0.9	-13.1	0.9	-6.7	-5.1	-5	-1.4	34	-4.4	1.3	-1.0	96	100	102	103
100	5.4	-33.2	4.4	-22.2	-14.6	-19	-5.2	127	-12.5	3.7	-2.9	54	45	41	53