THE AUTUMN 2008 SIMMENTAL TRANS TASMAN GENETIC EVALUATION REPORT

The information contained in this Report was compiled by the Agricultural Business Research Institute (ABRI) from data input to the pedigree and performance databases of Simmental Australia and Simmental New Zealand. The Estimated Breeding Values (EBVs) have been calculated from the raw data as supplied by members. Neither Simmental Australia, Simmental New Zealand, nor the ABRI oversee or audit the collection of this data.

Introduction

Successful animal breeding is based on selecting animals that match breeding objectives – decisions based on economics and genetics. The Autumn 2008 Simmental Trans Tasman Genetic Evaluation gives you much of the information required for objective breeding.

Trans Tasman

This analysis combines the pedigree and performance databases of the Simmental breed in Australia and New Zealand. (Table 1).

GROUP BREEDPLAN estimates the breeding values for individual animals using all the available pedigree and performance information supplied by breeders on the animal, its progeny and its close relatives. The resulting Estimated Breeding Values (EBVs) take into account the influence of herd management, environmental effects and fixed effects (eg. sex, dam age etc).

The Autumn 2008 Simmental GROUP BREEDPLAN EBVs have been calculated using the most recent version of GROUP BREEDPLAN software (version 4.3). **Version 4.3 of GROUP BREEDPLAN software includes**:

- an enhanced procedure for including North American Simmental EPD information ie. information on animals that have been evaluated in other genetic evaluations.
- Improved contemporary grouping strategy for Mature Cow Weights, such that cows are now only included if they have a calf weighed at weaning;
- Revised carcase parameters – reflecting the latest research from the Beef CRC;
- Revised adjustment factor files;
- Increasing the maximum age for submission of scrotal measurements to 700 days of age;
- Reducing the minimum carcase weight from 200 kg to 150 kg.

Table 1: Summary Statistics of the Analysis

Number of Sires	39,646
Number of dams	227,265

TRAITS	RECORDS Australia	New Zealand	Total
Gestation Length	78,695	7,267	85,962
Birth Weight	137,459	93,574	231,033
200 day weight *	79,545	93,830	173,375
400 day weight *	38,668	63,430	102,098
600 day weight *	22,879	38,809	61,688
Mature weight *	802	443	1,245
Days to Calving *	12,432	10,711	23,143
Scrotal Size	3,510	7,514	11,024
Scan *	6,523	13,047	19.570
Carcase *	123	0	123

***** animals with at least one observation

Additional features of the BREEDPLAN software are detailed below.

1. Incorporation of North American EPDs

The American and Canadian Simmental Associations have kindly supplied EPDs on 723 sires and 588 dams for the following traits: birth weight, weaning weight, yearling weight, milk, carcase weight, carcase rib eye area, carcase rib fat and marble score. These North American EPDs are used as "starting points" for the relevant imported animals in the BREEDPLAN analysis, until sufficient local data are collected to adequately reflect the animal's performance in New Zealand and/or Australia.

2. Carcase

BREEDPLAN version 4.3 allows the use of abattoir carcase information as well as live animal scans. Where available, both the scan and abattoir data is utilised to produce a single set of carcase EBVs.

The carcase EBVs reported include:

- Carcase Weight
- Eye Muscle Area (EMA)
- Rib Fat
- Rump Fat
- Retail Beef Yield % (RBY)
- Intramuscular Fat % (IMF)

Carcase weight is reported to a 650 day standard age and is strongly correlated to the weight EBVs.

The other carcase EBVs are reported to a standard carcase <u>weight</u> of 300 kg. This definition reflects market specifications and breeders interpretation of how the EBVs relate to the final product - meat.

The EMA EBV expressed to a standard <u>weight</u> gives a better indication of visual muscling of the animal. Hence, a larger EMA EBV now means more muscling.

Retail Beef Yield (RBY) is expressed as a percentage of the retail cuts compared to total carcase weight. While no direct data was available for this run, RBY is strongly correlated to the EMA, fat and weight EBVs.

Intra Muscular Fat (IMF) is the percentage of fat to muscle in the eye muscle. Direct data can be from either an abattoir measure or a live animal scan done by an accredited technician. While only a few Simmental animals have IMF scans, it is expected that this will increase in the next few years as meat quality issues begin to dominate industry discussions.

3. Sire by Herd

There is potential for a small but significant variation in the way progeny of a particular sire perform in different herds. This variation is called the Sire by Herd effect (SxH). For example, sires used in only one herd may not fully reflect their industry wide EBVs because of the way that particular sire combines with the cows and management in the single herd.

BREEDPLAN v4.3 makes allowance for the SxH with the result that sires with progeny in only one herd may now have EBVs closer to zero than they had last year. While this is only a small effect (usually less than 5%), it is important to allow for it in an across herd genetic evaluation.

4. Heterogeneous Variance

This is a technical term that describes standardising the amount of variation observed in a trait. This enhancement mainly applies to the fat traits where you can get only a small amount of variation on measured animals. The actual difference observed between animals may be magnified to some extent in the EBVs where the calves do not show much variation in the actual fat scans.

5. Mature Weight

The mature weight EBV is based on the cow weight when the calf is weighed for weaning. The mature weight EBV is strongly correlated to the 600 day weight EBV. While waiting for the results of the research on feed efficiency to be finalised, the mature weight EBV can be used as an indicator of potential maintenance costs of the cow in the breeding herd. In the absence of other data, cow maintenance requirements will be roughly proportional to the Mature Weight EBV. Obviously, feed efficiency or feed intake measures should be used when these become available.

The mature weight EBV can also be used by steer breeders wishing to grow animals out to a larger weight.

The Base

EBVs do not describe what a particular animal looks like in the paddock. Rather, EBVs are a method of ranking animals based on the various traits in the analysis. The EBVs have been set to an arbitrary base of zero for the 1990 drop calves.

The Analysis

Developed at the University of New England in Australia, GROUP BREEDPLAN is an advanced implementation of the Best Linear Unbiased Prediction technology (BLUP) for across-herd genetic evaluation of beef cattle. This evaluation is based on a wide range of information including the performance of the individual and its relatives for a number of traits, the genetic relationships between the traits and the pedigree links between animals and between herds. GROUP EBVs can therefore be compared across herds and across years.

The Report

The Sire Summary listing reports GROUP EBVs for sires for up to 17 traits. To be eligible for reporting in this listing a sire must have progeny born in the last three years, at least 10 progeny performance recorded and an accuracy of at least 75% for one of 200-Day growth, 400-Day weight or 600-Day weight.

Sire trait leaders are also highlighted in the Sire Summary list by boxing the EBVs for which the animal is a trait leader. To qualify as a sire trait leader the sire must have at least 80% accuracy for the trait (except for Calving Ease and Days to Calving, which require only 65% accuracy). Having met this criterion, sires are reported as trait leaders if their EBV for the trait is within the top 10% of the breed (top 5% of the breed for birth weight, 200-Day Growth, 400-Day Weight and 600-Day Weight). No trait leaders are reported for Mature Cow Weight, EMA, Rib Fat, Rump Fat, IMF or RBY.

The trait leader listing DOES NOT attempt to identify the best animals for use in YOUR breeding program. You must determine the best possible combination of EBVs an animal should have to fit into your breeding program. Similarly, you don't' need to use all 17 traits to select animals.

To select an animal for your breeding program you should consider the animal's performance overall for the traits that are important to you. Then take all its EBVs into consideration and use these figures to predict how that animal will improve your herd.

You should also use EBVs to monitor your herd – even for traits that you do not feel are relevant to your breeding objectives. For example, you should monitor the calving ease and birth weight EBVs even if you do not have a calving ease problem.

Accuracy (Acc) of EBVs

By definition EBVs are estimated breeding values. It is impossible to predict with 100% certainty the genetic merit of an animal and therefore the genetic merit of the progeny of a particular mating.

The accuracy of an EBV depends on two major factors:

1. The heritability of the trait, this being the proportion of an animal's superiority that is passed on to its progeny; and
2. The amount of performance information available on an animal and its relatives.

The accuracy of an EBV increases as more performance information on an animal and its relatives becomes available. The following examples indicate how accuracy is related to progeny numbers and relatives. If the only information available is a bull's own performance for one trait with a heritability of 30%, the accuracy will be 55%. If information is also known on about 10 paternal half sibs and 2 maternal half sibs, then accuracy increases to 61%. Animals with parents of high accuracy could have higher accuracy than those shown in Table 2.

Table 2: Accuracy of EBVs for a trait with heritability of 30% (400-Day weight).

Information Available	Accuracy
Individual	55
Individual + 10 PHS* + 2 MHS**	61
Individual + 20 PHS* + 4 MHS**	64
10 Progeny	67
Individual + 10 PHS + 2 MHS + 10 Progeny	77

* PHS = Effective paternal half sibs.
** MHS = Effective maternal half sibs.

Accuracy for a particular trait and heritability for that trait can be used to calculate confidence intervals for EBVs. For various accuracy levels the possible changes in EBVs (standard errors) for each trait are shown in Table 3.

Highly accurate EBVs are very reliable; there is little risk that the progeny performance of an individual with high accuracy will, on average, be much different than the EBVs indicate. For example, the possible change in a 200-Day growth EBV reported with 99% accuracy is only 1.7kg. Lower accuracy EBVs may change more with the addition of new performance compared to higher accuracy EBVs.

Comparing animals on performance using EBVs

EBVs are a tool that will help you to make more "educated" decisions when you are choosing breeding stock. In this Report you have access to EBVs for up to 17 important traits. The best way to make use of this information is first of all to decide on YOUR breeding goals and secondly to select animals with EBVs that match those criteria. Try to combine the EBVs for all of the important traits for YOUR breeding program into your selection AND always remember to consider the many other important traits such as structural soundness and breeding soundness.

1. Use the EBVs of a sire and dam to predict the outcome of the mating

It is easy to do. Take a bull with an EBV of +30kg for 600-Day weight for example. On average he will pass half of his genes for 600-Day weight (equivalent to +15kg) on to his progeny. The dam will also contribute to half of the calf's genetics. If the dam's EBV for 600-Day weight is +10kg then the calf will get +5kg from her. In this example, the calf would be expected to be: (15+5)= +20kg above the fixed base for the Simmental breed at 600 days of age.

2. Compare EBVs to estimate the difference in output from two sires

Sire 1 has an EBV for 600-Day weight (the age of selling your cattle) of +40kg and Sire 2 an EBV of +10kg for the same trait. The difference is 30kg. Half of this is passed on to the progeny. That is, calves from Sire 1 would be expected to be +15kg on average heavier than those from Sire 2 if used on dams of similar genetic value, run under similar conditions. Over a single year's drop of 30 calves this amounts to a production difference of 400kg live weight.

Table 3: Possible Change in EBVs at different levels of Accuracy.

	Accuracy (%)					
EBV	**50%**	**60%**	**75%**	**85%**	**90%**	**99%**
Gestation Length	2.0	1.9	1.5	1.2	1.0	0.3
Birth Weight	2.4	2.2	1.9	1.5	1.2	0.4
200-Day Growth	10.4	9.6	8.0	6.3	5.2	1.7
400-Day Growth	16.0	14.7	12.2	9.7	8.0	2.6
600-Day Weight	18.6	17.2	14.2	11.3	9.4	3.0
Mature Weight	30.0	27.7	22.9	18.2	15.1	4.9
200-Day Milk	7.8	7.2	6.0	4.7	3.9	1.3
Scrotal Size	1.1	1.0	0.8	0.7	0.5	0.2
Days to Calving	4.9	4.5	3.7	3.0	2.5	0.8
Carcase Weight	13.8	12.8	10.6	8.4	7.0	2.3
Eye Muscle Area	2.1	2.0	1.6	1.3	1.1	0.3
Rib Fat	1.3	1.2	1.0	0.8	0.6	0.2
Rump fat	1.7	1.6	1.3	1.1	0.9	0.3
IMF%	0.8	0.8	0.6	0.5	0.4	0.1
RBY%	1.3	1.2	1.0	0.8	0.7	0.2

3. Compare Sires with the Current Simmental Genetic Level

The current genetic level for the breed can be determined from the average EBVs for all calves born in 2006 (Table 4). If you are interested in using a sire with a 200-Day Growth EBV of +20 then comparison to the averages in Table 4 will show you that the sire is above the current average genetic level for the breed for 200-Day Growth. By then comparing the sire's EBVs to the full set of percentile bands, you can determine where that sire ranks in relation to the genetic level of the 2006 drop calves.

Herd Linkage

Pedigree links between herds allow across-herd comparisons. Linkage can occur through both sires and dams although sires generally contribute most (usually by AI). Linkage is calculated during the GROUP BREEDPLAN analysis and is dependent upon the information available at that time.

Table 4: Average GROUP EBVs for the 2006 drop calves analysed in the AUTUMN 2008 Simmental Trans Tasman GROUP BREEDPLAN

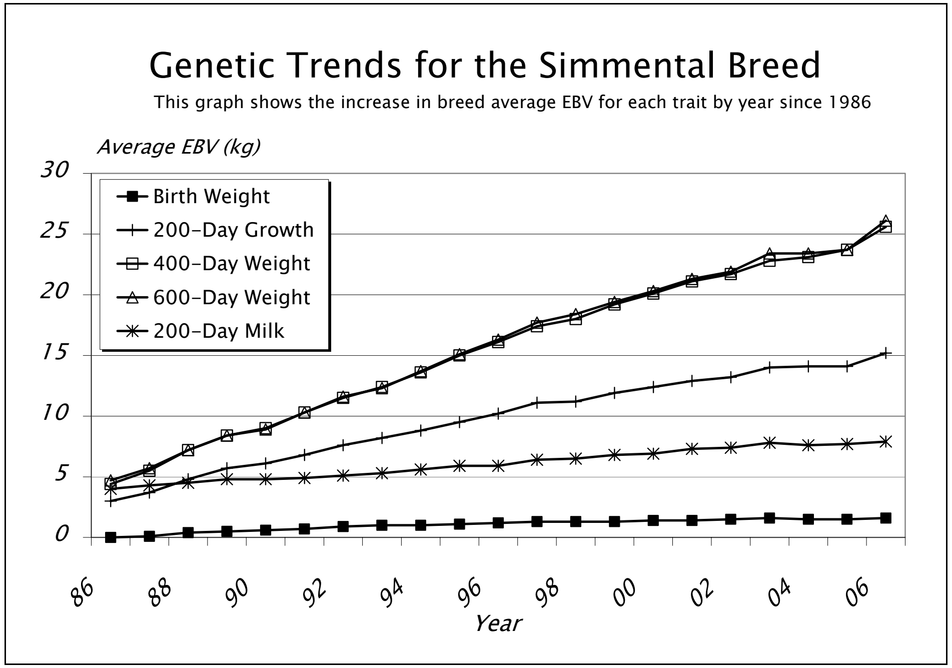
CE Dir.	CE Dtrs	Gestation Length	Birth Weight	200-Day Growth	400-Day Weight	600-Day Weight	Mat.ure Weight	200-day Milk
-0.2	-0.3	-0.3	+1.6	+15	+26	+26	+26	+8

Scrotal Size	Days to Calving	Carcase Weight	EMA	Rib Fat	Rump Fat	Retail Beef Yield	IMF%
+0.3	-0.6	+17	+1.0	0.0	0.0	+0.3	+0.1

Genetic Trends

The average Estimated Breeding Value for calves in each year is shown in Figure 1 as an estimate of genetic trends for the breed.

Figure 1: Average EBVs for Calves (1986-2006)



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