Improving the Carcase Attributes of your Herd Through Selection

During the 1990’s, the beef industry experienced a shift in emphasis from selection purely on growth and adaptation to concentrate more on the genetics of carcase and beef quality. Selection for increased carcase yield and carcase value have now become an important objective for breeders of cattle.

Initially, selection for the carcase and beef quality concentrated primarily on selection for increased muscling and carcase yield. More recently, many cattle breeders have continued to select for muscling but have placed more emphasis on the fat traits (ie. IMF, rib fat, rump fat). This has occurred for two main reasons. Firstly, marbling has emerged as an economically important trait in some markets, while secondly carcase specifications for most markets now require a minimum subcutaneous fat level. It is important to note that selecting for increased muscling alone will lead to decreased subcutaneous fat levels. Subcutaneous fat levels have also been shown to impact on the fertility of the cow herd (i.e. higher condition scores equates to more cycling cows).

So how do cattle producers evaluate and identify animals for use within their breeding program that have desirable genetics for the important carcase attributes?? In answering this question, let’s consider the merits of three alternatives – visual appraisal, raw scanning information and BREEDPLAN carcase EBVs.

Visual appraisal is challenging as it is difficult to “see” many of the carcase traits. For example, how do you tell what level of marbling a bull’s progeny will have compared to another bull by looking at them?? In reality, visual selection only allows you to select animals on what you think is there. Even if you do manage to get it right, there is no guarantee that what you see will be passed on to the progeny of that animal.

Ultrasound scanning information provides you with a better alternative but selection on raw scans alone is still limited. While ultrasound scans provide an accurate measure an animal’s carcase attributes, it is important to consider whether the differences identified between two animals by scanning will be reflected in the progeny from those animals.

To explain this further, the carcase attributes expressed by an animal are a result of both the animal’s genetics and environmental factors (eg. age, nutrition, disease status). If the difference identified between two animals is primarily a result of environmental considerations, then you are comparing different environments rather than different genetics and any selection decisions will be compromised. Consequently, selection of animals for breeding on raw scans is limited as no account is made for non-genetic factors such as age and nutrition. Raw scans only allow you to accurately compare animals that are within the one herd, are of similar age, are of the same sex and have received similar nutrition.

So how do you compare animals that may be from different herds, are of a different age and have been reared under different nutritional regimes. The answer is BREEDPLAN EBVs. BREEDPLAN Carcase EBVs consider all the abattoir and scanning information available on an animal (and its relatives), take account of any non-genetic effects and provide an estimate of an animal’s genetics for each carcase trait. Consequently, BREEDPLAN Carcase EBVs are the best tool currently available to Murray Grey cattlemen when trying to identify animals for use within their breeding program.

There are currently six different Carcase EBVs produced by BREEDPLAN which can be considered when selecting animals.
**Carcase Weight EBVs** provide an estimate of the genetic differences between animals in hot standard carcase weight at 650 days of age. Carcase Weight EBVs are expressed in kilograms (kg).

Larger, more positive, Carcase Weight EBVs are generally more favourable. For example an animal with a Carcase Weight EBV of +40 kg would be expected to produce progeny with heavier slaughtered carcases at 650 days of age than an animal with a Carcase Weight EBV of +30 kg.

Carcase Weight should not be confused with yield. The Carcase Weight EBV is an indication of the animal’s carcase weight and not an indication of the animal’s yield percentage.

**Eye Muscle Area (EMA) EBVs** provide an estimate of the genetic differences between animals in eye muscle area at 12/13th rib site in a 300kg steer carcase. EMA EBVs are expressed in square centimetres (cm²).

Larger, more positive, EMA EBVs are generally more favourable. For example, a bull with an EMA EBV of +4 cm² would be expected to produce steer progeny with a greater degree of muscle expression than a bull with an EMA EBV of +1 cm².

**Rib & Rump Fat EBVs** provide an estimate of the genetic differences between animals in fat depth at the 12/13th rib site & P8 rump site respectively in a 300kg steer carcase. Rib & Rump Fat EBVs are expressed in millimetres (mm).

More positive or more negative Rib & Rump Fat EBVs may be more favourable, depending on your breeding goals relating to the finishing ability of your animals. A bull with a Rib Fat EBV of -0.4 mm would be expected to produce leaner calves than a bull with a Rib Fat EBV of +0.4 mm.

Stock with positive fat EBVs are likely to produce progeny that are fatter, or more earlier maturing, on average than stock with lower or negative fat EBVs. Increasing fat depth leads to a decrease in retail beef yield, however most market specifications require a minimum fat depth. Breeders aiming to breed leaner, higher yielding cattle may select for lower fat EBVs. Breeders wishing to finish their animals earlier may tend to select animals with moderate fat EBVs. Caution should be placed on selecting for extremely low fat EBVs for replacement females as this may indicate females that are also more difficult to get in calf.

**Retail Beef Yield (RBY) EBVs** provide an estimate of genetic differences between animals in boned out retail beef yield in a 300kg steer carcase. RBY EBVs are reported as differences in percentage (%) yield.

Larger, more positive, RBY% EBVs are generally more favourable. For example an animal with a RBY% EBV of +0.9% would be expected to produce progeny that would yield higher percentages of saleable beef in a 300 kg carcase than an animal with a RBY% EBV of +0.1%.
**Intramuscular Fat (IMF) EBVs** provide an estimate of genetic differences between animals in intramuscular fat (marbling) at the 12/13 rib site in a 300kg carcase. IMF EBVs are reported as differences in percentage (%) IMF.

Larger, more positive, IMF% EBVs are generally more favourable. For example an animal with an IMF% EBV of +0.8% would be expected to produce progeny that would express more marbling in a 300 kg carcase than an animal with an IMF% EBV of +0.1%.

For markets where marbling is important (eg. Japanese B2/B3 market, restaurant trade, etc.), higher IMF EBVs can contribute significantly to carcase value. Recent research would suggest that 1 marble score is equivalent to approximately 1.5% intra-muscular fat so the variation shown between sires is not that large. This relationship still needs more data to confirm the conversion from marble score to intra-muscular fat.

By using the above carcase EBVs in conjunction with standard selection for structural soundness, temperament, fertility and EBVs for other important traits, Murray Grey producers will be in the best position to select animals that will improve the genetics of their herd for the different carcase attributes.

For further information, please consult the SBTS website (http://sbts.une.edu.au) or contact Andrew Byrne at SBTS on (02) 6773 3357 or andrew@sbts.une.edu.au.

*Article compiled by Andrew Byrne for The MGBCS Annual 2007*