



Genetic Improvement of Temperament

Temperament (also known as docility) is described as the way that cattle behave when being confined in yards or put in an unusual situation such as being separated from the herd. What we define as poor temperament is a survival trait in the wild – fear of anything unusual and the desire to escape. In domesticated cattle it can be exhibited as flight, or at its extreme fight.

Temperament is an important trait in beef herds with poor temperament having considerable impact on the profitability of the beef enterprise. In general, poor temperament in cattle will:

- ❑ Increase production costs.
- ❑ Make cattle harder to muster and handle.
- ❑ Damage infrastructure e.g. yards and fences.
- ❑ Increase risk of injury and stress to cattle.
- ❑ Increase risk of injury and stress to stock handlers.
- ❑ Increase weight loss during transit.
- ❑ Lower feedlot performance.
- ❑ Increase risk of dark cutters in the chiller. It's estimated that dark cutting beef costs the Australian Beef Industry in excess of \$35 million annually.
- ❑ Lower eating quality (tougher beef).

While different management techniques can be used to improve the overall temperament of a herd (e.g. yard weaning of calves), temperament is a highly heritable trait which can be improved in both the short and long term through genetic selection. There also is no known antagonistic genetic relationship with other traits of importance. That is, temperament can be improved genetically without impacting negatively on other traits.

Improvement of the genetics for temperament through genetic selection is of particular importance to seedstock producers. Talk to any savvy bull buyer and a trait up the top of their bull buying checklist will be good temperament or good docility. This relates to their bull purchase having acceptable temperament themselves, and also to the ability of the bull to sire progeny within their herd with acceptable temperament.

Assessing Genetics for Temperament

While it is common practice to observe animals and assess their temperament when they are being handled, there are several methods of more formally measuring the temperament of animals:



Figure 1. In domesticated cattle poor temperament can be exhibited as flight or fight.



Collection of Docility Scores

Docility scores are recorded on animals at weaning or shortly afterwards. The advantage of scoring at weaning is that all calves should have had minimal handling and so will express variation in temperament. Variation in handling between animals prior to scoring should also be minimised.

Docility scores are collected on animals using either a yard or crush test:

- ❑ Yard Test - The calves are individually put into a small square yard and the handler attempts to hold the animal in one corner for about 30 seconds.
- ❑ Crush Test - The calves are put up a race and held in a crush or weigh scales for about 30 seconds but not head bailed.

When using the crush or yard test, the behaviour of animals is observed and animals scored using the following criteria in listed table 1.

Measurement of Flight Time

Flight time measurements are recorded on animals using specialised flight time equipment. Animals are held individually in the crush for a short period and then the head bail opened. Two light beams are then used to objectively measure the time taken for the animal to travel approximately 2.0 metres at the exit of the crush (Figure 2). Similar to docility scores, flight time measurements are normally recorded early in an animal's life, usually at or around weaning.

While both methods have proven to be useful measures of an animal's temperament, it is currently common practice for the Tropical beef breeds to measure temperament through collection of flight time measurements due to its objectivity when recording large numbers of animals and its genetic relationship with beef tenderness in Tropical breeds. Conversely, British and European breeds more commonly record docility scores due to their being no requirement for specialised equipment through using the subjective scoring system while providing a high heritability for the trait.

Table 1 – Docility Scoring Codes and Descriptions

Score	Code	Description
1	Docile	Mild disposition, gentle and easily handled, stands and moves slowly during handling, undisturbed, settled, somewhat dull, exits crush calmly.
2	Restless	Quiet but slightly restless, may be stubborn during handling, may try to back out of crush, some flicking of tail, exits crush promptly.
3	Nervous	Manageable but nervous and impatient, a moderate amount of struggling, movement and tail flicking, exits crush briskly.
4	Flighty	Jumpy and out of control, continuous tail flicking, defecates and urinates during handling, frantically runs fence line and may jump when penned individually, exhibits long flight distance and exits crush wildly.
5	Aggressive	May be similar to score 4 but with added aggressive behaviour, fearful, extreme agitation, exits crush frantically and may exhibit attack behaviour when handled alone.

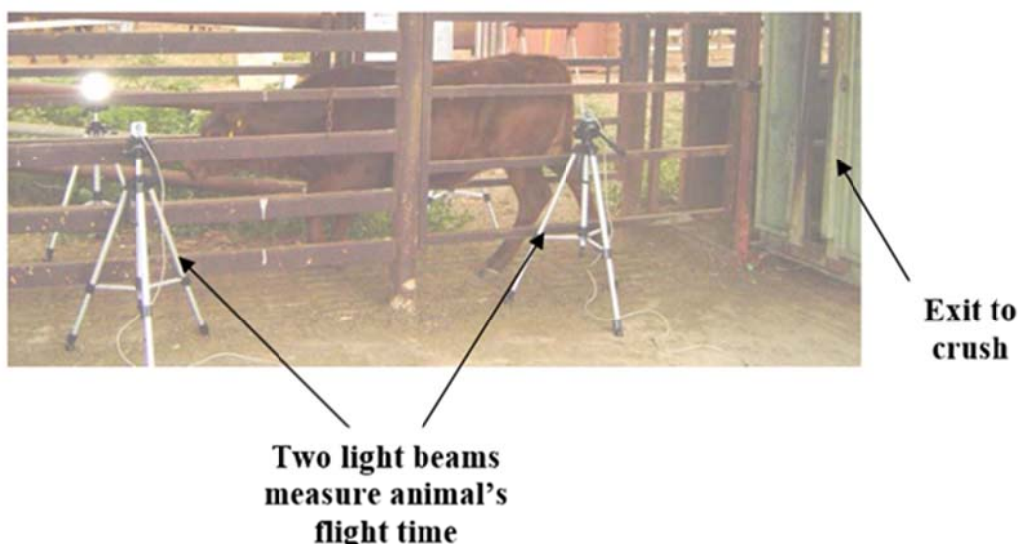


Figure 2 – Special equipment is required to record for Flight Time EBVs

The “raw” values can assist by adding some objectivity to the assessment and better identify those animals that are at the superior end of the mob for temperament. They should only be considered on a within herd basis but will still be greatly limited by the influence of the environment and previous management. Some seedstock herds also include the “raw” values in their bull sale catalogues (figure 3) for the benefit of their bull buying clients and to show that only bulls with an acceptable temperament have been listed. This is generally done in the absence of EBVs (see next section) for the temperament traits.

Docility EBVs are expressed as differences in the percentage of progeny that will be scored with acceptable temperament (ie. either “docile” or “restless”). Higher, more positive, Docility EBVs are more favourable. For example, a bull with an EBV of +20 would be expected to on average produce 15% more progeny with acceptable temperament than a bull with an EBV of -10.

Flight Time EBVs are expressed as differences in the number of seconds taken for an animal to travel approximately 2.0 metres after leaving the crush. Higher (ie. Longer or slower) Flight Time EBVs are more favourable. That is, higher EBVs indicate a longer time taken to exit the crush and hence better temperament. For example, a bull with an EBV of +0.40 would be expected to on average produce progeny that took 0.25 of a second longer to exit the crush than a bull with an EBV of -0.10.

Calculation of Estimated Breeding Values (EBVs)

Additional to the collection of docility score or flight time information, several breeds now produce BREEDPLAN EBVs for temperament related traits based on this information.

+2.7	-	+48	+2.6	+1.5	+2.0	-0.8	+1.7	B-
77%		59%	51%	55%	60%	53%	54%	
STRUCTURAL ASSESSMENT								
Front	Back	Front	Back				18 Dec-1	Temp
6	5	6	6	5	5	4	4	2
INDEX VALUE				Polled Gene	Maturity	EYES		
Supermarket	Onan Fed	Onan Fed	EU Index	(48% PP)	Mid	Eye Pigment		
595	95	516	5	??				

Figure 3 –Docility Scores are Included in some Bull Sale Catalogues

The EBVs that are calculated by BREEDPLAN for different breeds are outlined in the table below.

Table 2. Breeds with Temperament related EBVs (March 2014)

Breed	EBV available*
Angus	Trial Docility EBV
Brahman	Trial Flight Time EBV
Hereford	Trial Docility EBV
Limousin	Docility EBV
Simmental	Trial Docility EBV
Santa Gertrudis	Flight Time EBV

* The "Trial" status on the Docility or Flight Time EBV indicates that the EBV should be considered preliminary and may change as further data is submitted by breeders. This advises that breeders are also encouraged to provide feedback on the EBV to the breed society or BREEDPLAN

Calculation of EBVs for temperament has several major advantages over simply selecting animals based on their docility score or flight time measurement.

- Like all production traits of economic importance, the observed temperament of an animal is a combination of the genetics inherited from the sire and dam, and the environment and management from which the animal has been run under. While it should not be overlooked, selection of animals simply based on their own observed temperament may have limited value in identifying animals with the most superior genetics for temperament due to the influence of the environment and/or management factors.
- EBVs for temperament related traits (as with other traits) focus on the genetic differences between animals for temperament by accounting for any environment and management influences.
- EBVs for temperament take into consideration not only the temperament of the individual animal, but also the temperament of all the animal's relatives. In this manner, the EBVs provide a better indication of an animal's genetics for temperament than an assessment of the animal's temperament alone.
- EBVs allow for genetic differences in temperament to be identified between animals who themselves may have acceptable temperament. Animals who may have acceptable temperament but are

likely to produce a high percentage of progeny with poor temperament can be removed from the breeding herd, or conversely, if two animals of similar genetic merit for other traits are being considered for use within a breeding program, the animal that is likely to produce a higher percentage of progeny with superior temperament can be selected

Management of Genetics for Temperament

Beef producers aiming to improve the genetics of their herd for temperament can achieve this through several methods:

Culling for Poor Temperament – It is common practice for beef breeding enterprises to cull animals from the breeding herd that show unacceptable temperament. Any or all of the temperament assessing methods listed above can assist with this.

Selection for Improved Temperament – Selecting animals that have superior genetics for temperament is paramount to genetically improving this trait in a beef breeding enterprise. Like other production traits, it is also important to select animals for breeding this year that are genetically superior to those used last year. This is particularly important when selecting sires due to their overall influence of the genetics in a herd both short term and long term through daughters if retained.

The most effective information for selecting animals with superior genetics for temperament is the Estimated Breeding Value (EBV) for Docility or Flight Time.

If EBVs are not available then selection using the raw docility scores or flight time records should be considered. This is with the knowledge that they will have limited scope to drive genetic progress for temperament in comparison to selection with an EBV.

Who do I contact for further information?

For further advice on the genetic improvement of temperament including recording docility scores or flight time information for the calculation of Docility EBVs or Flight Time EBVs contact staff at Southern Beef Technology Services (SBTS) or Tropical Beef Technology Services (TBTS).