Selecting temperament to improve beef tenderness, profits and feed efficiency

BEEF CRC Fact Sheet

The Beef Cooperative Research Centre (Beef CRC) has found significant genetic relationships between flight time (an electronic measure of temperament) and beef tenderness, growth rates and feed conversion in tropically adapted cattle breeds. Animals with poor temperaments, measured by fast flight times, produce progeny whose beef is tough and of unacceptable eating quality. A simple test for flight time can now be used to select breeding stock that will indirectly improve the eating quality of their progeny.

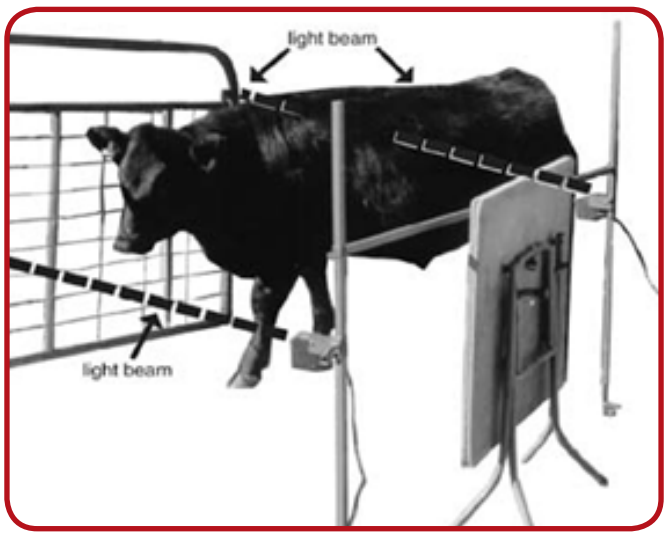
FAST FACTS

- Flight time is a simple and cost effective electronic measure of temperament
- Significant genetic relationships have been found between flight time and beef tenderness, growth rates and feed conversion in tropically adapted cattle breeds
- The flight time measurement is quick, objective, repeatable and heritable, meaning that a single measure of flight time can be effectively used for selection purposes.

An animal's flight time is an electronic measure of the time it takes to cover ~2 m after leaving a weighing crush, with fast times indicating animals with poor temperaments. Flight time is moderately to highly heritable, indicating that good genetic progress can be achieved by selection for the trait. Animals with poor temperaments, measured by fast flight times, produce progeny whose beef is tough and of unacceptable eating quality. The genetic correlations between flight time at weaning and a number of carcase and beef quality attributes are shown in Table 1. Genetic and phenotypic correlations range from -1.0 to +1.0 and indicate the degree of relatedness of two traits at either the genetic (next generation) or phenotypic (current herd) level. A zero relationship indicates the two traits are independent of each other.

Brahman, Belmont Red and Santa Gertrudis animals. [NB. low (fast) flight times indicate poor temperament; low shear force values indicate tender meat; low meat colour values indicate bright (good) colour; and high MSA MQ4 and MSA tenderness scores indicate good overall eating quality and tenderness.]

Phenotypic relationships between flight times and carcase and beef quality attributes were close to zero in CRC studies, indicating the use of best practice processing may overcome problems of beef tenderness associated with poor temperament (i.e. at the phenotypic level).



The good news for beef producers is that flight times are best recorded shortly after weaning, early in life, and therefore eliminate past beef quality measurements which required slaughter. The flight time measurement is quick, simple, objective, repeatable and heritable, meaning that a single measure of flight time can be effectively used for selection purposes.

Ruddweigh Australia Pty Ltd has developed a commercial prototype of the machine to allow breeders to easily measure an animal's flight time on-property (http://www.ruddweigh.com.au/). The measurement has also been added as a new trait to Australia's beef genetic evaluation scheme, BREEDPLAN.

Temperament has also been identified as a good predictor of feedlot and transport performance. CRC results show that docile animals lose less weight during long distance transport and recover this lost weight more rapidly than their more temperamental contemporaries.

Flight time and ...	
Retail beef yield percentage	0.11
Intramuscular fat percentage	-0.05
Striploin shear force	-0.48
Striploin meat colour	-0.18
MSA MQ4 score	0.47
MSA tenderness score	0.41

Table 1. Genetic relationships between flight time at weaning and carcase and beef quality attributes of Brahman, Belmont Red and Santa Gertrudis animals. [NB.low (fast) fl ight timesindicate poor temperament; lowshear force values indicate tender meat; low meat colourvalues indicate bright (good) colour; and high MSA MQ4and MSA tenderness scores indicate good overall eatingquality and tenderness]

In the feedlot, the difference in daily weight gain over the feedlot period between animals with the best and worst temperaments is ~0.4 kg per day, with the differences being similar in British and tropically adapted breeds. Animals with slow flight times (good temperaments) grow faster in feedlots to achieve higher final weights and heavier carcases, with better feed conversion ratios.

In a single experiment in British cattle, no calm (good temperament) animal was pulled, whereas 42% of nervous animals were taken to the hospital pen at some time during the feedlot period.

To achieve maximum performance under intensive production systems such as feedlots, cattle should not only be culled for bad temperament but also selected for good temperament. To do this, it is necessary to distinguish cattle with poor, average and good temperaments. This can be done simply and effectively by recording animal flight times.

Selecting temperament to improve beef tenderness, profits and feed efficiency

BEEF CRC Fact Sheet

In feedlots, differences in feedlot performance due to relationships with temperament are remarkably consistent across British and tropically adapted breeds. In Brahman-derived steers, steers with slow flight times (good temperaments) grew faster and hence had heavier carcases than steers with poor temperaments (see Figures 2 and 3). This was because more docile animals had higher feed intakes and consequently better feed conversion ratios (kg feed eaten per kg weight gain) than their more temperamental contemporaries. Differences in performance between animals with the best and worst flight times were 0.38 kg per day and 70 kg live weight at the end of the feedlot period.

Other CRC experiments used groups of cattle selected divergently (high and low) for temperament prior to feedlot entry. Nervous British breed (Angus x Hereford cross and Hereford) steers had significantly lower average daily gains and significantly higher morbidity over the 85 days in the feedlot. After 78 days on feed, nervous animals had grown at 1.04 kg per day relative to the 1.46 kg/day of the calm animals, a difference of 0.42 kg per day between the groups. None of the calm animals were pulled during the feedlot period, whereas 42% of the nervous animals were taken to the hospital pen at some time during the feedlot period. Clinical examination revealed that only one of the nervous animals was demonstrably affected by infectious respiratory disease.

Other CRC studies also show the best way to improve temperament of beef cattle (and hence feedlot performance) is to select stock for improved temperament.

Figure 1. Relationship with feedlot daily gain
(Linear relationship P<0.001; quadratic relationship n.s.)

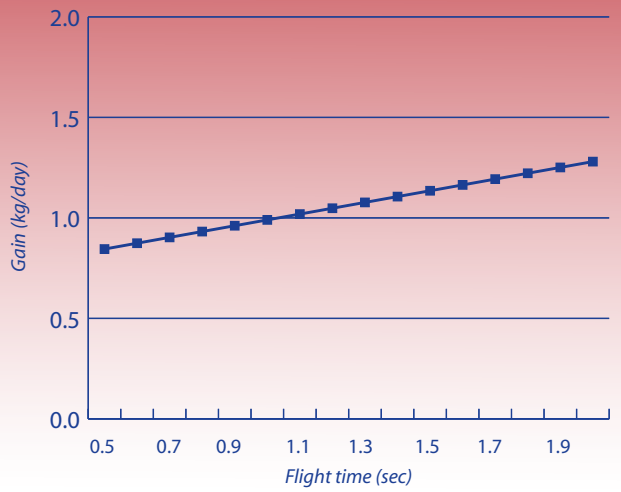
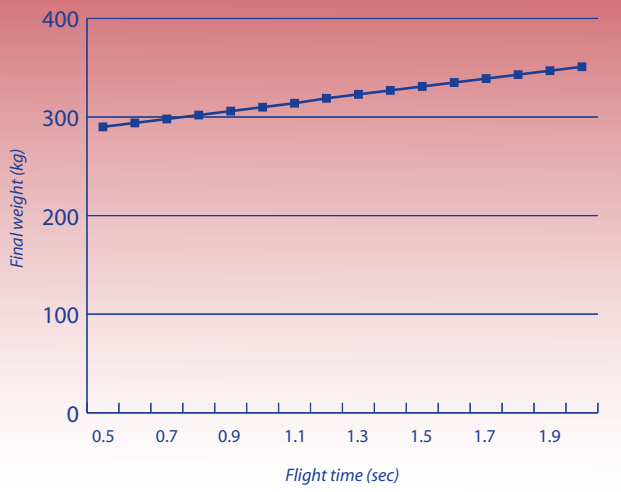


Figure 2. Relationship with final live weight
(Linear relationship P<0.01; quadratic relationship n.s.)



Below: Measuring flight time to determine animal temperament

For more information or to become involved, contact: Beef CRC • Ph: +61 2 6773 3512 • beefcrc@une.edu.au