# Temperament and bruising of *Bos indicus* cross cattle

*G. Fordyce*[A], *M. E. Goddard*[B], *R. Tyler*[A], *G. Williams*[C] *and M. A. Toleman*[D]

[A]Department of Primary Industries, Swan's Lagoon Beef Cattle Research Station, Millaroo, Qld 4807.
[B]Graduate School of Tropical Veterinary Science, James Cook University of North Queensland, Townsville, Qld 4811. Present address: Department of Agriculture and Rural Affairs, P.O. Box 500, East Melbourne, Vic. 3002.
[C]Department of Primary Industries, P.O. Box 395 Gympie, Qld 4570.
[D]Department of Primary Industries, P.O. Box 1085, Townsville, Qld 4810. Present address: Darling Downs Institute of Advanced Education, P.O. Darling Heights, Toowoomba, Qld 4350.

**Summary.** This experiment investigated the temperaments of 232 *Bos indicus* cross steers and the relationship between temperament and bruising in bovine carcasses. The temperament of each animal was assessed while held in a race by rating the vigour of movement and the degree of audible respiration when handled about the head and shoulders. These scores and scores for other behaviours were combined to form a temperament score for each animal. The five groups of steers used varied significantly in temperament ($P<0{\cdot}01$); this was considered to be primarily a function of their previous handling experience. There was a significant negative correlation between temperament score and liveweight ($P<0{\cdot}01$). In this group of relatively quiet steers no significant relationship between temperament and carcass bruising at slaughter was found.

## Introduction

The word temperament is traditionally used to describe the response of cattle to man. The descriptions nervous, flighty or poor temperament indicate cattle which take flight when approached by man, react violently when confined near man, and are aggressive towards man or sulk during handling. These behaviours make them more difficult to handle than docile or quiet cattle. Temperament has not been related to intraspecific aggression.

The vigorous avoidance responses of cattle with poor temperaments in confined areas during handling on the property, in transport and pre-slaughter increases the likelihood of falling and of collision with yard or stock crate structures and with other cattle, thus possibly enhancing the chance of bruising.

Despite the serious management problems posed by cattle with nervous temperaments (Elder *et al.* 1980), temperament has received little scientific study. The possible relationship between temperament, as reflected in behaviour in confined situations, and bruising is of particular importance in northern Australia as a large and increasing proportion of cattle are *Bos indicus* crosses. These cattle are generally considered to have more nervous temperaments than *B. taurus* cattle (Hearnshaw *et al.* 1979; Elder *et al.* 1980; Fordyce *et al.* 1982). The problem appears to be exacerbated by the extensive management practices of the region. However, Tyler *et al.* (1982) considered that the temperament of the individual, whatever its genotype, had a more significant influence on bruising than genotype *per se*.

This paper reports a study of the temperaments of five groups of *Bos indicus* cross cattle and of the effects of temperament on the bruising of these cattle.

## Materials and methods

### *Animals*

The study was carried out in June, 1981 at 'Swan's Lagoon' Beef Cattle Research Station in North Queensland.

We used a group of 220, 42-month-old and 12, 30-month-old, 1/2 to 3/4 *Bos indicus* cross steers drawn from five different groups (designated A, B, C, D and E) on the station (Table 1). All animals within each group had received, as far as possible, the same previous handling. Groups A, C, D, and E were made up of all animals within these respective station groups, while steers from group B had been culled from a larger station group because they were difficult to handle. All were hornless, being polled, dehorned at weaning for homebred steers, or dehorned at the time of introduction on to 'Swan's Lagoon'. The foundation breed for all crossbred animals bred on the station is the Shorthorn, while for introduced cattle it would be principally Shorthorn with some influence from Hereford and Angus. Most of the steers were Brahman crosses, the balance being Sahiwal crosses.

**Table 1. Details of experimental animals in each group**

| Group | A | B | C | D | E |
|---|---|---|---|---|---|
| Number | 78 | 12 | 64 | 28 | 50 |
| Age (months) | 42 | 30 | 42 | 42 | 42 |
| Origin[A] | I | I | H | H | H |
| Prevous handling[B] | | | | | |
| Up to 18 months | U | U | F | F | F |
| Beyond 18 months | F | F | R | F | R |
| Previous year | F | F | R | R | R |
| Pre-trial temperament rating[C] | N | FL | N | N | N |

[A] I, introduced; H, homebred.
[B] U, unknown; F, frequent (every 4–8 weeks); R, rarely (≤twice yearly).
[C] N, not rated; FL, flighty.

*Experimental procedure*

All groups were mustered at daybreak on day 1. Before weighing, and as part of another study (Loxton *et al.* 1982), each animal was individually held in a race for approximately 1 minute to assess subcutaneous fat thickness by manual palpation. During this time the temperament of each animal was scored (CRUSH test) simultaneously by two observers. They assessed several behaviours. The vigour of movement (MOV) was assessed on a seven-point scale as follows: 1, no movement; 2, slightly restless with minor movement; 3, almost continuous but non-vigorous movement; 4, continuous mildly vigorous movement; 5, quite vigorous movement; 6, very disturbed and continuous very vigorous movement; 7, struggling violently and attempting to jump out.

The degree of audible respiration (BLO) was assessed on four levels: 0, no audible respiration; 0·5, heavy breathing; 1·0, very heavy breathing; 1·5, snorting.

Other behavioural features assessed were whether an animal knelt or laid down, bellowed, or kicked. Each of these behaviours was infrequent and not analysed individually. Bellowing, kicking, and kneeling were scored as 1 if they occurred and 0 if they did not. A score of 2 was given for lying down.

For each animal, scores for all behaviours were added together to form the temperament score (TEM). We considered that the values of the scores given within each behaviour category were such that, when all scores were added (movement + audible respiration + bellowing + kicking + going down), the total ranked animals more accurately on temperament.

In the afternoon of day 1 all animals from groups D and E were transported 160 km by road to an abattoir. Where each individual travelled — in the front or rear sections of the upper or lower decks of the semitrailers — was recorded.

The remaining steers (groups A, B, and C) were allocated on day 2 to two groups, using the TEM score. Animals with a TEM score greater than 2·0 formed a nervous temperament group and the balance constituted a docile group. After drafting into their respective groups they were transported to the abattoir and kept separate until slaughter. Subgroups were allocated to truck sections so that both nervous and docile temperament groups travelled on the same deck of each truck.

The docile and nervous temperament groups were each randomly divided on day 3 at 0600 hours. Half of the docile temperament group was slaughtered first, followed by the two nervous temperament subgroups, then the second docile temperament subgroup, and finally the mixed temperament group (D and E). The first half of the docile and the first half of the nervous temperament groups were designated as early kills (0800–0900 hours) and all others as late kills (0900–1100 hours).

The abattoir's stockmen were asked to note any differences in handling between the nervous and docile temperament groups, but were not told that the allocation criterion for these groups was temperament score.

Immediately after the hide was removed from each animal, carcass bruising was visually assessed (Anderson and Horder 1979).

*Statistical analysis*

Paired *t*-tests were used to identify any significant differences between the scores of the two temperament scorers. Correlations between their scores were also calculated. Further analyses of temperament scores used average scores. Correlations between MOV, BLO, and TEM scores were calculated.

MOV, BLO and TEM scores and liveweight were each used as dependent variables in one-way analyses of variance of station group and temperament group. Least squares analysis of bruise scores using a model which included station group, temperament group, truck position, time of killing, and day of transport showed no significant effects of any factor. Therefore one-way analyses of variance were used to test station group and temperament group effects on bruising.

Within station group, partial correlations between bruise scores, temperament scores and liveweight were calculated.

## Results

*Temperament*

Mean temperament scores differed between observers only for TEM score, scorer 1 giving slightly higher scores (2·47 *v.* 2·37; $P<0·01$). The correlation between scorers was very high ($P<0·01$) for all temperament scores, being 0·90 for MOV, 0·81 for BLO and 0·94 for TEM.

Means for station group and temperament group effects on MOV, BLO and TEM scores, bruise scores and liveweight are given in Table 2. Simple correlations between temperament scores and partial correlations between temperament scores, bruise scores and liveweight are given in Table 3.

Correlations between MOV, BLO, and TEM scores were high. The general order of groups (highest to lowest mean temperament scores) was B, C, A, E and D. The mixed temperament group had mean scores only slightly above those of the docile group as it was made up of the two station groups with the lowest scores.

The correlations between temperament scores and liveweight were significant and negative; that is, heavier animals had lower scores.

The handlers of the cattle at the abattoir indicated that the two nervous temperament subgroups were much more difficult to handle.

*Bruising*

The effects of truck position, time of killing, and day of transport on bruising were all non-significant. Similarly, liveweight bore no relationship to bruising.

No significant relationship between bruising and temperament was found. However, the nervous

**Table 2. Means for factors affecting temperament, bruise scores and liveweight**

Means within columns not followed by a common letter differ significantly ($P<0·05$).

| Factor: | No. | MOV[A] | BLO | TEM | Liveweight | Bruise score[B] |
|---|---|---|---|---|---|---|
| | | | *Group* | | | |
| A | 78 | 1·99a | 0·28de | 2·37a | 498·5a | 3·26 |
| B | 12 | 3·42b | 0·67c | 4·37b | 419·4b | 5·25 |
| C | 64 | 2·48c | 0·32be | 2·91c | 420·4b | 2·91 |
| D | 28 | 1·16d | 0·07a | 1·23d | 487·0a | 3·93 |
| E | 50 | 1·73a | 0·21ae | 2·07a | 457·6c | 3·26 |
| Error m.s. | | 1·08 | 0·16 | 2·09 | 1479·9 | 10·74 |
| | | | *Temperament* | | | |
| Docile | 80 | 1·41a | 0·03a | 1·45a | 480·0a | 3·03 |
| Mixed | 78 | 1·53a | 0·16b | 1·77a | 467·9a | 3·50 |
| Nervous | 74 | 3·27b | 0·65c | 4·16b | 440·1b | 3·53 |
| Error m.s. | | 0·62 | 0·10 | 1·09 | 2289·8 | 10·88 |

[A]Temperament scores: MOV, movement; BLO, audible respiration; TEM, total score.
[B]8 points = 1 kg of bruise trim.

**Table 3. Correlations between temperament and bruise scores and liveweight**
$^{**}P<0.01$; $^{***}P<0.001$

| Measurement | MOV[A] | BLO | TEM | Bruise score |
|---|---|---|---|---|
| BLO | 0·67*** | – | – | – |
| TEM | 0·96*** | 0·79*** | – | – |
| Bruise score[B] | 0·06 | 0·05 | 0·08 | – |
| Liveweight[B] | −0·35*** | −0·22** | −0·34*** | −0·04 |

[A] Temperament scores: MOV, movement; BLO, audible respiration; TEM, total score.
[B] Partial correlation coefficients in these rows.

temperament group had the highest mean bruise score and the docile temperament group the lowest. The trends between station groups in mean temperament score do not match that for mean bruise score except that group B was the highest in both cases. Though not significant, all correlations between bruising and temperament score were positive.

Temperament score was added as a covariate to the model which tested the difference in bruising between temperament groups. The mean for bruise score of the nervous temperament group then became slightly less (0·15 points less) than that of the docile group. This indicates that the bruise score of an animal may be more a function of its own temperament than that of its herd mates.

## Discussion

The test used in this experiment to score temperament, the CRUSH test, appears to successfully identify cattle with poor temperaments. The test relates to behaviour in paddocks as the group B steers, which had been culled because they had been difficult to handle in paddocks, had high scores. The relationship between temperament score in this experiment and ease of handling in a confined situation is reinforced by the fact that stockmen at the abattoir had greater difficulty in handling the nervous temperament groups. In another study using 1-year-old bulls the correlations between scores in the CRUSH test and speed of movement in a small yard and flight distance in a large yard were both approximately 0·5 (Fordyce *et al.* 1982). This is most probably because the three tests measure behaviours influenced by a common underlying trait. In a study using cows 2 years of age and older, behaviours scored six times using the CRUSH test were found to be a function of the same trait (Fordyce and Goddard 1984). It is reasonable to assume that the trait, which the CRUSH test is measuring, is temperament.

The observation and recording of behaviour in the CRUSH test are simple and easily learned. A high correlation existed between the scores of the two independent observers despite the fact that one of the observers had scored fewer than 30 animals prior to this experiment. However, both observers were experienced stock handlers.

The differences in temperament between station groups are most likely due to differences in past handling experience. The cattle bred on 'Swan's Lagoon' (groups C, D and E) had been handled on two or fewer occasions in the previous year. Despite this, groups A and B, which had experienced frequent handling since 18 months of age, were not as quiet as group D and no quieter than group E.

This suggests that the more intensive handling that the homebred bullocks received prior to 18 months of age was still affecting their temperament. Cattlemen generally believe that the effects of early handling are long-lasting (Hassal 1974). Our results reinforce the importance of careful and intensive handling of *Bos indicus* cross cattle at a young age.

An increase in the frequency of handling is likely to improve the ease of handling cattle. This trend is apparent even among the relatively quiet steers used in this experiment. Amongst the homebred groups, group D had received the most intensive handling, being regularly palpated for ticks, and they had the lowest mean temperament scores, whereas group C, which had received the least frequent handling, had the highest mean scores. That the steers used in this experiment were relatively quiet, is almost certainly due to the much greater amount of handling that

they received on the research station than would be the case on commercial properties.

The significant negative correlation we found within group between temperament scores and liveweight agrees with the findings of Tulloh (1961) in 1-year-old and 2-year-old cattle and with the tendencies we have found in younger cattle (G. Fordyce, unpublished data). However, in this experiment, group was confounded with weight, age and experience and we suggest that further study of phenotypic and genetic correlations between growth rate and temperament are required before we will have a real indicator of whether selection for growth rate will increase the docility of cattle.

The average bruise trim of 0·42 kg in our steers was well below estimates of the Queensland average of about 1·0 kg (J. R. Wythes, personal communication). Their docile temperaments may have contributed to this low level of bruising. That the steers were hornless may also have contributed (Shaw *et al.* 1976). To establish the relationship between bruising and temperament requires large numbers of cattle because the many possible factors that can affect either or both of these parameters create large variances. We did find a tendency for those animals with the highest temperament scores to have more bruising. We suggest that further work is warranted with large groups of more temperamental cattle to define the relationship between these two parameters.

That the degree of bruising appeared more dependent on an individual's temperament than that of its herd mates is as was suggested by Tyler *et al.* (1982). That is, bruising appears more closely related to fear responses of cattle to handling by man than to intraspecific aggression.

During temperament testing and trucking several animals were noted to collide heavily with yard or stock crate structures. Most of these were nervous animals that had vigorously attempted to force their way through the yards. Many of these showed no evidence of bruising when slaughtered. It is unlikely that there was resolution of contusions that may have resulted from collision (McCausland and Dougherty 1978). Traumatic blows whilst being handled at the abattoir or in an alien environment may be a more important cause of bruising than those received during handling in a more familiar environment. As suggested by Wythes *et al.* (1979*b*), there may also be a variation in susceptibility of cattle to bruising. This variation may be a function of the micro-anatomy and physiology of muscle and the physiology of the response to stress. A more extreme example of this variation is the difference in susceptibility to bruising between males and females (Yea *et al.* 1978; Wythes *et al.* 1979*a*).

In conclusion, in this preliminary study using a herd of relatively quiet cattle with a low level of bruising, temperament did not significantly affect bruising. However, this may not be true for more nervous cattle. Two important factors that correlated with temperament in *Bos indicus* cross steers were weight and previous handling experience.

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