Cattle temperaments in extensive beef herds in northern Queensland
1. Factors affecting temperament

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Summary. The temperaments of 170 bullocks and 240 cows from 2 commercial properties in northern Queensland were scored by rating their behaviours, especially movement, while they were handled in a crush and pound. High scores indicate poor temperaments. Brahman cross cattle had higher temperament scores than did Shorthorns ($P<0.05$). The heaviest cattle tended to have the lowest scores, suggesting that selection for high growth rate may not result in poorer temperament. Horned cattle tended to have lower temperament scores than hornless cattle ($P>0.05$), though it is suggested that any advantage to horned cattle may be outweighed by the production and husbandry advantages of the latter. There was no relationship between temperament scores and age, fatness and, in cows, pregnancy status.

Introduction

The temperament of cattle is traditionally defined as their behavioural response to handling by man. This behaviour can generally be ascribed to fearfulness. Cattle with poor temperaments cause serious management problems and extra costs. To control such cattle effectively requires additional and very skilled stock handlers, and stronger fences and yards. Under extensive management systems in Australia, cattle handling is infrequent and, at best, twice per year in most areas. Under these circumstances, the temperaments of cattle are of great significance. Research of factors that influence temperament will lead to more efficient control of the problem.

Under Australian conditions, *Bos indicus* crosses are reported to have poorer temperaments than *B. taurus* cattle (Elder *et al.* 1980; Fordyce *et al.* 1982; Hearnshaw and Morris 1984). Yet, in northern Australia, at least 80% of cattle are now *B. indicus* crosses (Anon. 1985).

Methods of selecting and breeding quiet cattle depend primarily on an understanding of both environmental and genetic factors that regulate temperament. Fordyce (1985) reported that temperament is a moderately heritable trait. Handling experiences early in life, particularly weaner training, appear to have a critical effect on the temperaments of cattle.

This paper is the first of 2 on a study of the temperaments of cattle from 2 extensively managed herds in northern Queensland. The factors that affect temperament scores are reported and in the subsequent paper (Fordyce *et al.* 1988) the temperament scores of these cattle are related to their carcass and meat quality.

Materials and methods

Animals

The cattle are described in Table 1. Each experimental group was typical of the size and type of cattle sold for slaughter from extensive properties in northern Queensland. The bullocks in experiment 1 and cows in experiment 2 were from different properties, though all had been grazing predominantly Mitchell (*Astrebla* spp.) grasslands in north-western Queensland.

Experimental procedure

The studies were conducted concurrently with 2 experiments reported by Wythes *et al.* (1988) in which the effects of rest in transit and before slaughter on carcass and meat traits were examined.

In both experiments, the same procedure was used to score temperament. Weighing and back tagging were carried out within 4 h of the cattle being mustered into a set of yards. Groups of approximately 6 cattle were drafted from the mob in a large holding yard into smaller forcing yards, and then moved through a small circular yard (a pound) into a race. Finally, tagged individuals were let into a weighbridge, weighed and then released into a large yard.

Table 1. Description of experimental cattle

Description	Expt 1	Expt 2
Class	Bullocks	Non-lactating cows
Shorthorn	149	175
Brahman×Shorthorn[A]	21	65
Polled	41	118
Horned	129	122
Initial livewt (kg ± s.d.)		
Shorthorn	557 ± 34	411 ± 50
Brahman cross	556 ± 61	448 ± 55

[A]Approximately 50% Brahman×50% Shorthorn.

At the head of the race before entry to the weighbridge, the temperament of individual animals was scored using the CRUSH test (Fordyce *et al.* 1985) while the scorer handled each animal around the head and shoulders. The movement response (MOV) was rated on a 7-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. In experiment 1 (bullocks), the degree of audible respiration (BLO) was assessed on 4 levels: 0, no audible respiration; 0·5, heavy breathing; 1·0, very heavy breathing; 1·5, snorting. Bellowing, kicking and kneeling down were scored as 1 for each behaviour if they occurred and 0 if they did not occur. If animals lay down a score of 2 was given. These scores for the bullocks were added to produce an overall temperament score (TEM).

For drafting later into rest treatment groups (*per* Wythes *et al.* 1988), the cattle were brought, again in small groups, from the large holding yard through the forcing yards and finally moved individually into the pound. The workers who operated the pound gates stood immediately outside the gates and were easily visible to the animal. While in the pound and before drafting, the rate of movement (SPEED) of the individual was assessed (POUND test: Fordyce *et al.* 1982) using a 5-point scale: 1, stands and walks; 2, walks continuously; 3, walks and trots; 4, trots; 5, trots and gallops.

The order within the mob in which animals were weighed was recorded in both experiments, as well as order within the weighing subgroup in experiment 1. At slaughter, order within treatment group was also recorded.

The genotype and horn status of each animal were recorded at weighing. No animal had been dehorned.

At slaughter, 5–7 days after mustering, the carcass measurements for each animal included: (i) the number of permanent incisors, (ii) fat thickness over the 12–13th rib of both carcass sides after 24 h chilling using the method of Yeates (1952), and (iii) stage of pregnancy of the cows in experiment 2.

Statistical analyses

For both experiments, correlation coefficients between temperament scores were calculated after initially adjusting scores for genotype effects using analyses of variance.

Temperament scores were analysed by least squares analyses of variance using a model which included genotype, age, fat thickness, horn status and liveweight. Age was defined as the number of permanent incisors with 4 levels. Fat thickness and liveweight were transformed into factors with 5 levels. Pregnancy status, transformed with 3 levels, was included in the analyses of temperament scores from experiment 2.

Weighing order within the mob and order at slaughter were analysed by least squares analyses of variance using a model which included genotype and temperament score.

Order within the weighing subgroup was added as a factor to models that were used in least squares analyses of variance of temperament scores. This was to correct for factors that may affect dominance, which may also influence order.

No interactions were significant in any least squares analysis. Interactions were therefore deleted from all models. Pairwise comparisons were carried out between the means of the levels of any factors that were significant.

Results

The correlations between the various temperament scores within each experiment were all positive ($P<0·01$), but only moderate between movement (MOV and SPEED) scores (Table 2).

The least squares means for the variables included in the analyses of temperament scores are given in Table 3 for the bullocks (experiment 1) and in Table 4 for the cows (experiment 2). All temperament scores for Brahman

Table 2. Correlations between temperament scores
All correlations were significant at $P=0·01$

	Expt 1			Expt 2
	MOV	BLO	TEM	MOV
BLO	0·75			
TEM	0·96	0·83		
SPEED	0·51	0·32	0·47	0·42

Table 3. Least squares means for animal factors included in the analyses of bullock temperament scores
Within each column, factor levels followed by a different letter differ significantly ($P<0.05$)

Factor	*n*	MOV	BLO	TEM	SPEED
Genotype					
Shorthorn	149	3·11	0·76a	4·44a	2·29a
Brahman×Shorthorn	21	3·64	1·02b	5·54b	2·89b
Age (permanent incisors)					
2	1	4·88	1·53	8·12	2·30
4	5	3·02	0·79	4·50	2·48
6	15	2·90	0·74	3·76	2·72
8	149	2·71	0·50	3·56	2·87
Fat thickness (mm)					
<5·1	20	3·00	0·75	4·45	2·73a
5·1–7·5	43	3·60	0·96	5·28	2·78a
7·6–10·0	44	3·44	0·93	5·16	2·70a
10·1–12·5	34	3·44	0·87	5·02	2·67a
>12·5	27	3·39	0·93	5·01	2·09b
Horn status					
Horned	129	3·31	0·89	4·86	2·47
Hornless	41	3·44	0·88	5·12	2·71
Initial liveweight (kg)					
<511	37	3·55	0·87	5·22	2·73
511–540	23	3·72	0·94	5·30	2·78
541–570	43	3·15	0·89	4·67	2·48
571–600	27	3·37	0·97	5·19	2·51
>600	39	3·09	0·78	4·56	2·47
Error s.d.		1·18	0·47	1·86	0·90

cross bullocks and cows were significantly ($P<0.05$) higher than for Shorthorns, except the MOV score for bullocks, although the trend was evident ($P<0.10$). There was no apparent effect of age on temperament score for cows, but full-mouth bullocks tended to have lower CRUSH test scores than younger ones. There was no clear relationship between fat thickness and temperament score, except that the fattest bullocks had the lowest ($P<0.05$) SPEED score. There was no relationship between pregnancy status and temperament score for cows. For all scores, hornless animals tended to have slightly higher scores than horned animals, but the difference was significant ($P<0.05$) only for the SPEED score of the cows. The heaviest animals tended to have the lowest scores in both experiments.

There was no relationship between temperament score and weighing order within mob or order at slaughter. However, temperament score had a significant effect on order within weighing subgroup for the bullocks ($P<0.05$; Table 5). The bullocks with the poorest temperaments were generally first into the race from the pound. There was generally no trend among the other animals in each group except for the 5 (out of 28) weighing groups with 7 animals, where the seventh bullock tended to have the lowest score.

Discussion

Our finding that Brahman cross cattle had higher temperament scores (poorer temperaments) than Shorthorn cattle in large extensively managed commercial herds, agrees with other reports (e.g. Hearnshaw and Morris 1984), but causes a dilemma in management strategies. Production from *B. indicus* cross cattle is greater than from *B. taurus* cattle in tropical environments because they are better adapted (Seifert 1971; Frisch 1973; Winks 1984) and are more alert and agile. On the other hand, cattle with poor temperaments are difficult to control and handle, particularly in extensive herds. The preferred strategy is the breeding of *B. indicus* cross cattle, and to use training and selection to produce cattle with good temperaments. Reported heritability estimates of temperament for *B. indicus* cross cattle in Australia are 0·25 (Fordyce 1985) and 0·46 (Hearnshaw and Morris 1984), indicating that selection responses will occur. Training at weaning (Binstead 1977; Fordyce 1987) appears to profoundly affect cattle temperaments

Table 4. Least squares means of factors affecting temperament scores for cows

Within each column, factor levels followed by a different letter differ significantly ($P<0.05$)

Factor	*n*	MOV	SPEED
Genotype			
Shorthorn	175	1·72a	2·62a
Brahman×Shorthorn	65	2·36b	3·13b
Pregnancy status			
Not pregnant	89	2·11	2·85
1–5 months	107	2·07	2·88
6–9 months	44	1·94	2·90
Age (permanent incisors)[A]			
2	11	1·97	3·06
4	18	2·09	2·71
6	29	2·00	2·89
8	141	2·10	2·85
Fat thickness (mm)			
<5·1	48	1·96	2·91bc
5·1–10·0	62	2·05	2·86b
10·1–12·5	41	1·82	2·48a
12·6–15·0	41	2·24	3·28c
>15·0	48	2·14	2·86b
Horn status			
Horned	122	1·99	2·77a
Hornless	118	2·09	2·99b
Initial liveweight (kg)			
<376	49	2·14	2·98
376–425	76	2·15	2·96
426–450	39	2·02	2·98
451–475	35	2·15	2·69
>475	41	1·76	2·77
Error s.d.		0·88	0·72

[A]Not recorded for 1 treatment group.

Table 5. Effect of mean temperament scores on order within weighing group for bullocks

Within each column, factor levels followed by a different letter differ significantly ($P<0.05$)

Order within weighing group	*n*	MOV	BLO	TEM	SPEED
1	28	4·36a	1·30a	6·70a	2·74a
2	28	3·62b	0·97b	5·34b	2·67a
3	28	3·35b	0·94b	4·91b	2·83a
4	28	3·09b	0·81b	4·56b	2·32ab
5	28	3·27b	0·94b	4·96b	2·31ab
6	25	3·25b	0·75b	4·80b	2·70a
7	5	2·79b	0·64b	3·96b	1·44b
Error s.d.		1·18	0·43	1·86	0·91

(Hassall 1974; Fordyce *et al.* 1985). This is particularly important in populations with little genetic variation in temperament; for example, Hearnshaw and Morris (1984) reported that the heritability of temperament in *B. taurus* cattle was close to zero.

Tulloh (1961) and Fordyce *et al.* (1985) reported negative phenotypic correlations between growth rate and temperament scores for steers. The relationship between liveweight and temperament scores was not significant in our experiments, though there was a slight trend for heavier animals to have lower temperament scores, especially in the bullocks.

The reports that temperament improves with increasing age (Dickson *et al.* 1970; Fordyce and Goddard 1984) probably reflect the confounding of greater handling experience with age. We found no significant effect of age on temperament scores, though this result may have been partially due to the small number of young animals in both experiments. The absence of an age effect may have also been because the cattle were rarely handled more than twice in any year.

Fordyce and Goddard (1984) reported that polled and dehorned cows had higher temperament scores than horned cows. Our data also showed that horned cattle have better temperaments than polled cattle. The advantages of polled or dehorned cattle override any advantages in temperament as hornless cattle have less carcass bruising (Meischke *et al.* 1974; Shaw *et al.* 1976). They may also be easier to handle in groups because of reduced intraspecific physical agonistic behaviour Cicogna (1976).

Fordyce (1985) also reported no relationship between pregnancy status of cows and temperament scores as was found in experiment 2.

Our study shows that order within large groups of cattle (a function of dominance) has no relationship with temperament. This confirms the report by Fordyce (1985). However, Fordyce (1985) found that the handling order for a small group of calves, as they were 'randomly' drafted from a pound, was related to temperament. We also found this in experiment 1, where the most fearful (highest temperament scores) bullocks in a small group were those that most readily left the pound when given the opportunity.

Previous studies have examined relationships between the scores from several different temperament scoring methods (Fordyce 1985). All tests measured the same basic behavioural trait (i.e. temperament) but some interactions do occur because of the variation in movement restriction between test situations. This partially explains why the correlations between the MOV score in the CRUSH test and the SPEED score in the POUND test are not high in our experiments.

Conclusions

In our experiments, *B. indicus* cross cattle had higher temperament scores than did *B. taurus* cattle, and horned cattle tended to have lower scores than did hornless cattle. Nevertheless, use of *B. indicus* cross cattle is recommended in northern Australia and they are already widespread throughout the region because of significant production advantages. Our results emphasise the importance of improving temperament through selection and training to produce quiet and manageable cattle. It appears that selection of breeding animals for fast growth will most probably not lead to poorer temperament. Weaner training programs are very important as the typically infrequent handling of cattle beyond this age in this region does not appear to significantly improve temperament.

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