FEEDLOT PERFORMANCE AND CARCASE CHARACTERISTICS OF TROPICALLY ADAPTED BEEF CATTLE GENOTYPES

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SUMMARY

Feedlot live weight gains and carcase characteristics were examined in Brahman and tropically adapted crossbred beef cattle genotypes ranging in age from yearlings to 36 months. Progeny of Brahman sires mated to Hereford and Shorthorn dams gained weight 13-43% faster than the other breed types. Straightbred Brahman steers showed least daily live weight gain while crossbred progeny of Boran, Tuli and Belmont Red sires were intermediate. Straightbred Brahman steers produced leaner carcases with little marbling but with a higher estimated saleable meat yield than Brahman, Boran, Tuli and Belmont Red crossbred steers. Eruption of permanent incisor teeth was significantly ($P<0.01$) slower in straightbred Brahman steers than in other breed crosses examined.

INTRODUCTION

Breed differences in biological traits of economic importance are an important genetic resource which can be exploited in formulating breeding programs to improve the efficiency of beef cattle production. Breeds of diverse genetic composition are necessary to fully exploit the potential gains by crossbreeding through heterosis and complementarity. Cattle breeders in northern Australia are under increasing pressure to produce animals suitable for intensive finishing and which will produce meat suitable for the high quality export trade, but which can survive and reproduce when exposed to a range of feed resources and climates. Beef production in tropical Australia relies heavily on the use of Brahman cattle and although environmentally adapted, they are deficient in such traits as reproductive efficiency, growth potential and meat quality (Cundiff et al. 1986, Crouse et al. 1989, Johnson et al. 1990 and Rowan and Taylor 1994).

With the rapid expansion of the feedlot industry in Australia (Tucker et al. 1991) difficulty is being experienced in procuring suitable feeder stock of Bos taurus composition. This has forced lotfeeders into sourcing cattle from northern pastoral zones. However there is concern among lotfeeders that significant changes in genetic composition are necessary to meet the requirements of such a production system. This report presents preliminary results to characterise Brahman and some tropically adapted crossbred genotypes including recently imported Boran and Tuli, for potential feedlot performance and carcase characteristics.

MATERIALS AND METHODS

A germplasm evaluation research breeding program was initiated at the University of Queensland in 1978 and a similar commercial evaluation program on beef cattle properties in northern Australia was commenced in 1987. Genotypes evaluated are shown in Table 1.

Table 1 Genotypes[a] used in the breed evaluation programs

Expt 1 - yearling steers	Expt 2 - yearling steers	Expt 3 - 30 month steers	Expt 4 - 36 month steers
Br X Her	Br X Comp	Br X Sh	Br X Sh
Bo X Her	Bo X Comp	Bo X Br x Sh	Bo X Br x Sh
Tu X Her	Tu X Comp	Tu X Br x Sh	Tu X Br x Sh
		B/R X Br X Sh	B/R X Br x Sh
		Br X Br	Br X Br

[a] Genotypes: Br = Brahman, Her = Hereford, Bo = Boran, Tu = Tuli, Comp = 1/2 Br 1/4 Her 1/4 Simmental, Sh = Shorthorn, BrxSh = F1 Brahman X Shorthorn, B/R = Belmont Red.

Yearling steers in Expts. 1 and 2 were bred at Gatton in south eastern Queensland and run as one group from birth until slaughter. They entered the feedlot at 10 months of age and were fed as one group for 83 days using a diet of 85% concentrate and 15% roughage. Steers in Expts. 3 and 4 were bred on commercial breeding properties in north-west Queensland and the Barkly Tableland of the Northern Territory. After weaning they were transferred to a property near Kynuna in central western Queensland where they remained until they entered a commercial feedlot on the Darling Downs. They were fed for 130 days on a diet similar to that used for the yearling steers. Steers were weighed at the commencement and at the end of the feedlot finishing stage. All animals were slaughtered in a commercial facility and carcases dressed according to AUS-MEAT hot standard carcase specifications, after which hot carcase weights were obtained.

After the carcases had been chilled for 24 hours, AUS-MEAT chiller assessment procedures (Anon 1990) were carried out. Marbling was visually assessed using a 12 point marbling score system (1 nil marbling, 12 heavy marbling) at the 12th rib section of the M. longissimus dorsi. Fat depth was measured at the rump (P8) site. Saleable meat yield was calculated using the equation presented by Johnson and Ball (1988). Dentition was determined as the number of erupted permanent incisor teeth. Data were analysed using analysis of variance and least squares procedures (SAS 1988).

RESULTS

Breed of sire effect over Hereford dams for yearling steers is presented in Expt. 1, Table 2. Progeny of Brahman sires grew significantly faster (13.7%) than those of Boran and Tuli sires ($P<0.05$). Estimated saleable meat yield was significantly less for progeny of Boran sires than for Brahman and Tuli sires ($P<0.05$) and was influenced by the greater fat of Boran offspring. When Brahman, Boran and Tuli sires were mated to composite dams, the only significant ($p<0.05$) difference in offspring performance was in estimated saleable meat yield (Table 2, Experiment 2,) where Brahman progeny outyielded the progeny of Boran and Tuli sires by 3.7 and 2.1% respectively.

Table 2 Least square means (±SE) of daily live weight gain and carcase composition of cattle genotypes under grain feeding conditions

Genotype[1]	n	Daily Gain (kg)	Dress Pct (%)	Marbling[2] Score	Fat Depth P8 (mm)	Dentition[3]	Estimated Saleable Meat Yield (%)
Expt 1 Lightweight yearling steers with Hereford dams - Local and Korean trade							
Br X Her	7	1.83±.11^{a}	53.6±.93	1.00	12.85±1.53^{b}	0	61.0±0.5^{a}
Bo X Her	6	1.58±.12^{b}	52.9±.99	1.16	16.66±1.66^{a}	0	59.1±0.5^{b}
Tu X Her	7	1.57±.11^{b}	53.9±.93	1.00	11.85±1.53^{b}	0	61.9±0.5^{a}
Expt 2 Lightweight yearling steers with Composite dams - Local and Korean trade							
Br X Comp	8	1.59±.11	55.6±.87	1.00	11.12±1.43	0	61.8±0.5^{a}
Bo X Comp	8	1.37±.11	55.3±.87	1.00	13.37±1.43	0	59.5±0.5^{b}
Tu X Comp	15	1.41±.08	54.5±.64	1.06	14.13±1.05	0	60.5±0.4^{b}
Expt 3 Medium weight (30mth) steers - Jap ox							
Br X Sh	49	1.83±.05^{a}	55.6±.25^{ab}	1.84±.08^{a}	22.71±0.73^{a}	2.53±.12^{a}	61.8±0.4^{c}
Bo X BrxSh	34	1.47±.06^{b}	54.2±.31^{c}	1.84±.10^{a}	20.56±0.87^{a}	2.41±.15^{a}	65.1±0.5^{b}
Tu X BrxSh	46	1.46±.05^{b}	55.3±.26^{ab}	1.55±.09^{b}	17.19±0.75^{b}	2.65±.13^{a}	66.2±0.5^{b}
B/R X BrxSh	47	1.43±.05^{b}	55.1±.26^{b}	1.38±.08^{bc}	17.00±0.74^{b}	2.25±.13^{a}	66.5±0.5^{b}
Br X Br	45	1.04±.05^{c}	55.9±.26^{a}	1.24±.09^{c}	16.46±0.76^{b}	1.73±.13^{b}	67.9±0.5^{a}
Expt 4 Heavy weight (36mth) steers - Jap ox							
Br X Sh	51	1.82±.04^{a}	56.7±.23	1.43±.07^{a}	18.69±0.79^{a}	4.35±.16^{a}	62.2±0.4^{b}
Bo X BrxSh	7	1.47±.13^{bc}	56.3±.63	1.29±.20^{ab}	17.57±2.14^{ab}	4.57±.43^{a}	64.7±1.1^{ab}
Tu X BrxSh	36	1.69±.05^{ab}	56.4±.28	1.26±.09^{ab}	19.63±0.96^{a}	4.63±.19^{a}	62.4±0.5^{b}
B/R X BrxSh	59	1.56±.04^{b}	56.9±.22	1.36±.07^{ab}	20.15±0.74^{a}	4.44±.15^{a}	62.7±0.4^{b}
Br X Br	47	1.35±.04^{c}	57.3±.24	1.21±.08^{b}	15.91±0.82^{b}	3.23±.17^{b}	66.2±0.5^{a}

[1] Genotype: Br = Brahman, Her = Hereford, Bo = Boran, Tu = Tuli, Comp = 1/2 Br 1/4 Her 1/4 Simmental, Sh = Shorthorn, BrxSh = F1 Brahman X Shorthorn, B/R = Belmont Red

[2] Marbling score ranged from 1 (nil) to 12 (heavy)

[3] Dentition was the number of erupted permanent incisor teeth

Mean feedlot daily live weight gain in steers 30 and 36 months of age (Table 2, Experiments 3 and 4,) showed a definite trend with purebred Brahman steers gaining significantly less ($P<0.05$) than all other genotypes. F1 Brahman X Shorthorn steers significantly outperformed ($P<0.05$) all other breed types except for the 36 month progeny of Tuli sires. There was no significant difference in growth rates of Boran, Belmont Red and Tuli sired offspring . Marbling scores were consistently greater in F1 Brahman X Shorthorn steers while Brahman steers displayed low levels of marbling. Subcutaneous fat depth as

measured at the P8 site was consistently less in Brahman steers, while saleable meat yield was significantly greater ($P<0.05$) in Brahman steers than in all other genotypes except in the 36 month Boran sired steers. Eruption of permanent incisor teeth was significantly slower in Brahman steers than in all other genotypes ($P<0.01$).

Means in the same column within each experiment followed by a different superscript letter differ significantly ($P<0.05$)

DISCUSSION

These results indicate that while Brahman steers have a high yield of retail product, they are generally unsuitable for lotfeeding purposes as growth rates were relatively poor and marbling scores were very low. Brahmans however were suitable for use as sires when used over British breeds because their progeny perform exceptionally well in the feedlot environment, marble satisfactorily but their estimated saleable meat yield was lower than that of straightbred Brahman when all cattle were fed for 130 days.

Preliminary results indicate that the Boran and Tuli when mated to a range of cow genotypes produced progeny whose growth characteristics under feedlot conditions were slightly inferior to crossbred progeny sired by Brahmans, but substantially greater than straight Brahmans. Their growth and carcase characteristics were very similar to the progeny sired by Belmont Red. While Cundiff et al. (1994) showed that Tuli crossbred offspring from British breed dams produced carcase and meat characteristics more similar to those by Bos taurus British breeds than to progeny sired by Bos indicus breeds, this was not evident in this study.

Meat processing establishments use dentition as the major method to age cattle. As many premium export market categories are age dependant, early maturing genotypes where permanent incisor eruption is enhanced may be disadvantaged. In this experiment there was a marked genotype effect with Brahman cattle showing permanent incisor eruption at an older age than other breeds.

ACKNOWLEDGMENTS

Sincere thanks are due to a number of beef section staff who helped during the feedlot operations.

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