CARCASS YIELD TRAITS OF GRASS- AND GRAIN-FINISHED BRAHMAN CROSSES FOR DOMESTIC AND EXPORT MARKETS

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SUMMARY

Brahman females were mated to sires of eight breeds (Brahman, Santa Gertrudis, Belmont Red, Angus, Hereford, Shorthorn, Charolais and Limousin) to produce straightbred Brahman and F_1 crossbred calves in 1996. Calves were finished either on pasture in northern Australia or feedlot in northern or southern Australia for the domestic, Korean or Japanese markets. European and British sire breeds over Brahman cows produced carcasses that were consistently heavier at all market weights than progeny of tropically adapted composite (eg. Belmont Red) or Brahman sires. Differences between sire breeds were relatively small for yield traits at domestic market weights, but increased from domestic to Korean to Japanese weights. P8 fat depth in progeny by Large European sires (Charolais and Limousin) was adequate for domestic market specifications and was similar to that of progeny of British breed sires. At Korean and Japanese market weights, [Charolais x Brahman] and [Limousin x Brahman] crossbred progeny were leaner and had greater yield percentages than the remaining crossbreds.

Keywords: *Bos indicus*, *Bos taurus*, crossbreeding, beef cattle, carcass yield

INTRODUCTION

An increasing number of cattle bred in northern Australia are now finished in feedlots located south of the tropics. This presents new challenges for cattle breeders since the cow herd must remain well adapted to their environment while the slaughter offspring meet the requirements of feedlots and their markets. The Northern Crossbreeding Project of the Meat Quality Cooperative Research Centre (CRC) was developed to provide information on a full range of traits affecting growth, carcass and meat quality for tropically adapted genotypes when finished for domestic or export markets on either pasture or feedlot. This paper summarises analyses of carcass yield traits from the first of three calf crops from this study.

MATERIALS AND METHODS

Brahman females were mated to sires of eight breeds representing *Bos indicus* (Brahman), *Bos indicus* x British-derived (Santa Gertrudis), Sanga x British derived (Belmont Red), British (Angus, Hereford, Shorthorn) and European (Charolais and Limousin) to produce straightbred Brahman and F_1 crossbred calves in 1996. Calves were born and raised to weaning on two properties in tropical central Queensland (Brigalow Research Station and "Duckponds") and raised on one property post-weaning (about 180 days). Progeny were assigned to finishing regimes as described by Robinson (1995). Approximately ↓ of animals were transferred to a southern grow-out property shortly after weaning, ↓ to the northern feedlot ("Goonoo") after an initial grow-out period and the remaining ↓ remained on Duckponds to be finished on pasture. Animals were finished for the Australian domestic market (average carcass weight = 220 kg) and the Korean (280 kg) or Japanese (340 kg) export markets. Animals remained on pasture to be finished on grain until weight of the cohort averaged 300 kg (domestic) or 400 kg (export). Heifer progeny were slaughtered at domestic and Korean market weights, whilst steers were also slaughtered at Japanese market weights. One half of all steer progeny grown in northern Australia were implanted with repeated doses of Compudose 100® from about 15 months of age until slaughter. Steers transferred south were not implanted, but in those steers, HGP and finishing treatment were totally confounded. Heifers were not implanted. Protocols for measurement of carcass yield data are described in Robinson *et al* (1998).

Data were analysed separately for each sex. In all models, sire within breed and kill group were fitted as random effects and sire breed, market (domestic, Korean and Japanese) and finishing treatment (feedlot north, feedlot south, pasture north) were fitted as fixed effects. HGP treatment (implant, control, and no treatment) was fitted to the model using steer data. Carcass weight was fitted as a covariate within market endpoint to adjust all data to a common carcass weight according to target market weight. This was done because, under the CRC's experimental design, the only way to validly evaluate sires was to slaughter all animals within a cohort group when the average weight of the group was at market weight. Slaughter of all animals at an average weight of the group allows all sires an equal opportunity to perform to market specifications. However, commercial practice dictates that, to maximise returns, producers must slaughter their cattle when individual animals reach market weights. Adjusting all CRC carcass and meat quality data to a common carcass weight within market allows CRC results to be interpreted from a commercial perspective. No interactions were fitted in the model because of missing sub-classes.

RESULTS AND DISCUSSION

In general, sires within breed, kill group, market endpoint and finishing treatment were not significant sources of variation ($P > 0.05$) for any of the carcass attributes in either steers or heifers. Steers were slaughtered at an average carcass weight of 231, 290 and 328 kg for domestic, Korean and Japanese markets respectively, while heifers were slaughtered at an average carcass weight of 220 and 284 kg for domestic and Korean markets respectively. Breed of sire was significant for all carcass attributes. Table 1 shows the effects of sire breed on age at slaughter and carcass and meat yield attributes in steer and heifer progeny. In both steers and heifers, European breed sires (Charolais and Limousin) produced progeny that had heavier, leaner, higher-yielding carcasses than the remaining crosses. In steers, progeny of Santa Gertrudis and Angus sires had the highest subcutaneous fat cover and lowest yields. In heifers, progeny of Hereford sires had highest P8 fat depths and lowest yields, whilst progeny of Limousin sires had the lowest fat cover and highest yield of all the crosses. Over all steers, progeny of Charolais sires produced carcasses that were 21 % heavier than purebred Brahman controls. There was a similar margin in carcass weights of heifer progeny of both Hereford and Charolais sires relative to Brahman heifers. Differences between breeds in age at slaughter at younger ages partly reflect differences between AI and natural mate sires, as not all breeds were able to provide bulls for natural and backup mating following AI. Differences in age at slaughter at different market endpoints also reflect differences in growth rate between for example, progeny of different sire breeds.

Table 2 shows the effects of market endpoint and finishing regime on age at slaughter and carcass and meat yield attributes in steer and heifer progeny. As expected, age at slaughter, carcass weight and P8 fat depth increased from domestic to Korean to Japanese markets. However, when adjusted to a common carcass weight within market endpoint, retail beef yield percentage decreased.

Table 1. Effects of sire breed on age at slaughter and carcass and meat yield attributes in steers and heifers

Sire Breed	No.	AGE[A] (days)	HCWT[B] (kg)	P8 (mm)	EMA (cm^2)	RBY (%)	RTPM (kg)
Steer Progeny							
Angus	23	714	295	11.8	75.3	66.1	66.5
Belmont Red	77	696	262	11.6	76.7	66.5	67.5
Brahman	78	705	250	10.8	76.3	66.6	67.2
Charolais	17	698	302	9.3	80.8	67.3	68.7
Hereford	20	717	290	10.5	76.2	66.8	67.8
Limousin	39	698	300	9.3	82.1	68.5	69.6
Santa Gertrudis	33	720	274	12.9	75.4	65.9	66.6
Shorthorn	15	702	289	10.8	79.3	66.0	66.5
Heifer Progeny							
Angus	22	671	266	15.7	71.0	65.3	58.2
Belmont Red	75	652	236	14.3	69.5	65.7	59.1
Brahman	93	670	214	14.5	68.6	65.7	59.3
Charolais	23	664	268	12.6	70.8	66.5	60.3
Hereford	26	658	271	15.9	65.7	64.6	58.0
Limousin	40	670	259	11.5	74.6	67.7	61.0
Santa Gertrudis	50	670	245	15.4	68.9	65.6	58.9
Shorthorn	18	671	260	15.6	69.2	65.5	58.6

[A]AGE = slaughter age, HCWT = hot carcass weight, P8 = P8 fat depth, EMA = eye muscle area, RBY = retail beef yield and RTPM = retail primals

[B]Except for hot carcass weight, which is unadjusted, all means are adjusted to a common carcass weight within market endpoint (domestic, Korean or Japanese)

Steers and heifers finished in the southern feedlot environment were slightly younger at slaughter than steers and heifers finished in the northern environment. Animals finished at pasture in the north were considerably older and leaner than those finished in either feedlot environment and had larger eye muscle areas, higher retail beef yield percentages and the greatest weight of retail primals.

Table 2. Effects of market endpoint and finishing regime on age at slaughter and carcass and meat yield attributes in steers and heifers

Market or Finishing Regime	No.	AGE[A] (days)	HCWT[B] (kg)	P8 (mm)	EMA (cm^2)	RBY (%)	RTPM (kg)
Steer Progeny							
Domestic	115	607	231	9.4			
Korean	113	742	290	11.0			
Japanese	74	770	328	12.3			
Feedlot north	113	673	301	12.9	75.4	66.1	67.3
Feedlot south	113	641	271	11.7	74.8	66.2	66.2
Pasture north	76	805	276	8.0	83.0	67.9	69.1
Heifer Progeny							
Domestic	168	607	220	12.2			
Korean	178	725	284	16.7			
Feedlot north	117	633	252	15.8	68.0	65.9	59.2
Feedlot south	111	626	258	13.9	65.4	64.5	58.1
Pasture north	119	739	247	13.6	76.0	67.0	60.2

[A]See Table 1 for meaning of acronyms

[B]Except for hot carcass weight, which is unadjusted, all means are adjusted to a common carcass weight within market endpoint (domestic, Korean or Japanese)

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