THE CARCASS CHARACTERISTICS OF TWO STEER GENOTYPES GRAZED ON IRRIGATED LEUCAENA-PANGOLA PASTURE IN THE ORD RIVER IRRIGATION AREA

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SUMMARY

Africander x Shorthorn(AS) and Brahman x Shorthorn(BS) weaner steers were grazed on irrigated leucaena-pangola pastures at a conservative stocking rate of 4 animals per ha. The AS and BS steers gained weight at 0.66 and 0.72 kg per day respectively, and after 3 11 days were slaughtered.

The liveweight gain of the BS was significantly greater than that of the AS. The dressing percentages, fat thicknesses, fat colour, ultimate pH, meat colour, and shear force values were similar for both genotypes while the adhesion force for the BS steers was significantly and slightly greater than for the AS. Taste panel assessment did not differ significantly between breed types, and both were considered suitable for the table meat trade within Western Australia.

Keywords: leucaena, genotypes, growth, meat quality.

BACKGROUND

The benefits of introducing Brahman cattle to the Kimberley region include parasite resistance, faster growth rates, higher calving percentages and lower mortality compared with the traditional Shorthorn (Pratchett *et al.* 1988). A potential disadvantage of Brahman cattle and their crossbred offspring is that meat from them can be tougher after ageing than that from Shorthorn and other straight bred *Bos taurus* breeds (Ramsey *et al.* 1963; Stiffler *et al.* 1985; McKeith *et al.* 1985; Pratchett *et al.* 1987). Anecdotal evidence in Western Australia from some abattoirs tended to confirm this conclusion.

Africander cattle have been studied in the Kimberley region by the W.A. Dept. of Agriculture. This genotype resulted in increased productivity when introduced into a Kimberley Shorthorn herd (Pratchett *et al.* 1988). The meat quality of groups of Africander x Shorthorn (AS) steers and Brahman x Shorthorn (BS) steers slaughtered at 30 or 42 months of age was evaluated (Pratchett *et al.* 1987). They found the AS steers to be more tender than the BS steers and the younger group to be more tender than the older group.

These findings had the potential to seriously disrupt the new enterprise of fattening steers in the Ord River Irrigation Area on irrigated leucaena-pangola pastures in which Brahman and Brahman cross steers were purchased, if meat from younger steers showed the same tendencies.

The experiment described here was designed to determine if there was any difference in meat quality between Brahman cross and Africander cross steers when they were slaughtered at 18 months of age after grazing leucaena-pangola pastures on the Ord River Irrigation Area.

MATERIALS AND METHODS

The Ord River Irrigation Area is situated in the Kimberley region near Kununurra in the north west of Western Australia and is well suited to growing irrigated tropical pastures for grazing cattle (Pratchett and Triglone 1989). In August 1987, 16 Brahman x Shorthorn (BS) and 16 Africander x Shorthorn (AS) steers were weaned from their dams at Ord River Regeneration Station and moved on to irrigated *Leucaena leucocephala* and *Digitaria decumbens* (pangola) pasture in the Ord River Irrigation Area at the Frank Wise Institute of Tropical Agricultural Research, near Kununurra.

The leucaena was planted in rows 4.5 m apart with a sward of pangola grass established between the leucaena rows. This pasture had been grazed since 1982.

An introductory period of about 20 days was allowed for the steers to pick up the bacteria capable of degrading 3-hydroxy-4(1H)-pyridone (DHP) from 'seeder' cattle. These bacteria are required by the cattle in order to detoxify the mimosine in the leucaena (Jones and Megarrity 1986). These animals were then randomly drafted into 4 replicate groups of 8 animals (4 of each breed type in each group).

Stocking rates were set at 4 steers/ha, with each replicate having access to 2 paddocks of 1 ha. The grazing was rotated between paddocks so that each paddock was grazed for'2 weeks and then spelled for 2 weeks. This rotation allowed for leucaena regrowth and for irrigation to be done at the end of the 2 week grazing period. The steers were weighed every 4 weeks.

The steers were turned off after 311 days when the majority were estimated to have a fat score of 3 (5–12mm of fat at the P8 site) and to have a carcass weight of 180-220 kg. They were trucked south

3500 km to Woorooloo prison farm on the outskirts of Perth. They were rested and grazed here for 7 days and then trucked 20 km to Kamet where they were kept overnight off water and feed before being slaughtered.

Slaughter procedure

After slaughter, each side was electrically stimulated as described by McIntyre and Ryan (1984). Dentition and fat thickness at the P8 rump site were recorded. Visual assessment was made of each carcass for bruising (using the AUS-MEAT standard), fat colour and other possible carcass faults. The fat colour was visually assessed on a score of 1 (white) to 6 (very dark yellow) with the assistance of a standard colour chart as prepared by the W.A. Department of Agriculture.

Carcasses were chilled overnight at 3–4°C, then quartered for weighing and boning. Cold carcass weight was recorded with tail on and kidney and channel fat in. Samples of the longissimus dorsi muscle (LD) were taken from between the 10/11th rib and the 3/4th lumbar vertebrae from 1 side of each carcass, vacuum packed and frozen and stored at −18°C for subsequent quality assessment.

Quality assessment

While still frozen, the LD samples were cut with a band saw into 3 approximately equal portions for meat quality evaluation. The anterior portion was used for shear force measurement, the mid portion for adhesion measurement and the posterior portion for taste panel assessment.

The portion of each sample for shear and adhesion force measurements were thawed at room temperature overnight before being cooked in a thermostatically controlled water bath at 80°C for 90 min. The samples were then cooled in a water bath at room temperature for 30 rnin, drained at room temperature for 30 min, and refrigerated overnight. They were then cut into portions for shear force and adhesion measurements as described by Bouton *et al.* (1973).

The mechanical measurements were done using an Instron Model 1122 machine for determining the shear and adhesion force values on the meat samples. A Warner-Bratzler shear device was used in this machine.

The remaining sample was sliced into steaks 18 mm thick for taste panel evaluation. The steaks were cooked for 3.5 min in a Sunbeam combination grill set on medium. They were cubed and randomly presented to experienced taste panellists for evaluation of flavour and tenderness.

The samples were scored for tenderness on a 6 point scale; with 1 being very tough and 6 very tender. The flavour was judged within 3 categories of like, acceptable or dislike.

A further steak sample was thawed and exposed to the air for approximately 30 min then assessed for meat colour and ultimate pH. Meat colour was ranked on a score ranging from 1 (light) to 6 (very dark), with reference to a standard colour chart as prepared by the W.A. Dept of Agriculture.

RESULTS

The growth of the 2 steer groups whilst grazing the leucaena-pangola pasture over the 31 l-day period is shown in Table 1.

Table 1. Mean values for the growth of Africander cross (AS) and Brahman cross (BS) steers over 311 days

Means followed by a different letter in the same row differ significantly *($P < 0.05$)*

	AS	BS
Starting liveweight (kg), August 1987	141.3	148.7
Final liveweight (kg), June 1988	347.6a	371.5b
Liveweight gain (kg) over 311 days	206.3a	222.8b
Gain per day (kg)	0.662a	0.716b
Liveweight at Woorooloo (kg)	316.9	332.5
Carcass weight (kg)	183.0a	198.0b
Dressing percentage	57.9	59.6
Fat thickness (mm)	7.1	7.8

The AS steers were lighter at the start of the trial and gained weight at a slower rate than the BS steers.

The final liveweight, taken as the steers were removed from the leucaena, shows that the BS steers

were significantly heavier than the AS steers ($P < 0.05$). The pre-slaughter liveweight taken at Wooroolloo showed no significant difference between genotypes. The dressing percentage was calculated using the final liveweight before slaughter and the difference between the breeds was not significant. Fat colour was similar for both breed types and was also within the range acceptable to the market. All the steers had only milk teeth so were within the age requirement for this market.

Meat quality

The meat quality assessments of the 2 steer groups are given in Table 2 and the only significant difference between groups was in the adhesion force.

Table 2. Mean values for the meat quality assessments of Africander and Brahman cross steers

Means followed by a different letter in the same row differ significantly ($P < 0.05$)

	AS	BS
Fat colour score	2.62	2.71
Meat colour score	3.00	2.93
Ultimate pH	5.53	5.51
Taste panel tenderness	3.71	3.84
Shear force (kg)	4.40	4.33
Adhesion force (kg)	0.64a	0.79b

The taste panellists judged the meat to be of medium flavour with no detectable difference between the breeds. The tenderness rating given to the meat from both groups put them in the 'slightly tough' (rating 3) to 'slightly tender' (rating 4) category. Both would be acceptable to the trade.

DISCUSSION

The results for growth, carcass weight, fat thickness and fat colour show that both these genotypes can produce carcasses suited to the table beef market within W.A. The target carcass weight of 180-220 kg was achieved by both groups. However, the BS steers produced a heavier carcass than the AS steers and may be a more profitable genotype for this production system.

Fat cover on both groups was within the required range for the table market of 5-12 mm at the P8 site. There was no difference between the 2 genotypes.

Bouton and Harris (1972) found that adhesion measurements taken on meat samples correlated strongly with the connective tissue strength and tenderness of the meat. The results from this project have shown that a statistically significant difference ($P < 0.05$) between the 2 adhesion force measurements was not reflected in the tenderness as measured by the shear force and taste panel assessments.

Wythes and Ramsay (1981) stated that muscle should be tender at a pH of about 5.5, with a bright red colour and would have a long shelf life. Both the steer groups in this project produced a uniform product which met these colour and pH specifications.

The tenderness assessment indicated that there was no significant difference between the 2 genotypes in this experiment. Pratchett *et al.* (1988) found that meat from BS steers was inferior to meat from AS steers at 30 and 42 months of age but this was not confirmed with the meat from 18 month old steers of the same genotypes in this experiment. These steers were considerably younger than the steers in the previous experiment which could indicate that the meat from Brahman and Brahman cross steers above a certain age may toughen at a faster rate than that from other genotypes.

The dressing percentage was slightly higher than the usually accepted value of 50–55% and probably reflects the loss of gut fill during the trucking process, even though the cattle were rested for 7 days before slaughter.

CONCLUSION

The results of this experiment show that weaners of both Brahman x Shorthorn cross and Africander x Shorthorn cross steers when grazed on irrigated Leucaena/pangola pastures in the Ord River Irrigation area can produce table quality meat suited to the domestic market within W.A. There was no indication as to whether Brahman x Shorthorn cross steers or Africander x Shorthorn cross steers of this age would be a preferred genotype for this market.

REFERENCES

BOUTON, P. E., FISHER A. L., *HARRIS,* P. V. and BAXTER, R. I. (1973). *J. Food Technol. 8: 39-99.*

BOUTON, P. E. and HARRIS, P. V. (1972). *J. Food Sci. 37: 539-43.*

JONES, R. J. and MEGARRITY, R. *G.* (1986). *Aust. Vet. J.* **63(8):** *259-62.*

McINTYRE, B. L. and RYAN, W. J. (1984). *Proc. Aust. Soc. Anim. Prod.* 15: 468-71.

McKEITH, F. K., SAVELL, J. W., SMITH, G. C., DUTSON, T. R. and CARPENTER, Z. L. (1985). *Meat Science* 15: 37–50.

PRATCHETT, D., McINTYRE, B. L. and CARRICK, M. (1987). *Proc. Aust. Soc. Anim. Prod.* 17: 286-9.

PRATCHETT, D., CARRICK, M. and *YOUNG, S.* (1988). *J. Agric. W.A.* **29(4):** 149-55.

PRATCHETT, D. and TRIGLONE, T. (1989). *J. Agric. WA.* **30(2):** *62-6.*

RAMSEY, C. B., COLE, J. W., MEYER, B. H. and TEMPLE, R. *S.* (1963). *J. Anim. Sci. 22:* 1001-8.

STIFFLER, D. M., GRIFFIN, C. L., MURPHEY, C. E., SMITH, G. C. and SAVELL, J. W. (1985). *Meat Sci.* 13: 167-83.

WYTHES, J. R. and RAMSEY, W. R. (1981). Queensland Dept.of Primary Industries, Technical Bulletin No. 8. W.A.