

Milk Yield During the First Four Months of Lactation and Cow Productivity of Brahman and Tuli Beef Cattle in South-East Botswana

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Abstract

The climate of Botswana because of its semi-aridity, is mostly suitable for livestock farming, especially beef cattle production under extensive grazing conditions. The major indigenous cattle breed is the Tswana, while the Tuli (TT) and Brahman (BB) are popular and increasing in numbers to the cattle population of 2.5 million. In the present study, the TT (n=15) and BB (n=24) breeds were compared for cow productivity and milk production using the weigh-suckle-weigh technique. The TT cows produced more milk than BB cows (12.4 vs 9.2 kg/d) during the first four months of lactation. However, BB cows produced heavier ($P < 0.001$) calves at weaning than TT cows (164.8 vs 150.4 kg). Similarly, BB cows produced faster ($P < 0.001$) growing calves than TT cows (.69 vs .64 kg/d). Across breeds, calves born earlier in the season had a higher ($P < 0.01$) average daily gain (ADG) than those born later in the season (.69 vs .64 kg/d). It is an advantage to producers to have the majority of calves born early in the calving season (September/October) so that calves are bigger and heavier at weaning than those calves born late in the season (November/December).

Keywords: Brahman, Tuli, milk production, cow productivity, beef cattle

1 Introduction

The major agricultural activity in Botswana is beef cattle farming. The semi arid climate and erratic rainfall in Botswana favours pastoral rather than arable farming. An estimated 75% of the beef cattle herd is kept under communal grazing system and the rest in fenced commercial ranches. Traditionally, cattle have been kept for their meat and milk, draught power, social events and to some extent for prestige. Up to the present time, cattle have continued to provide the necessary nutrients in the form of milk to the rural community. Cows are usually hand milked after stimulation by the calf and the milk is consumed either fresh or as sour milk. Excess milk is usually sold to generate cash income. The Tswana is the predominant beef cattle breed. Other popular cattle breeds include the Brahman and the Tuli. There is paucity of information on the milking ability of beef cattle breeds found in Botswana including those mentioned above. The object of this study was to estimate milk production of Brahman and Tuli cows raised under commercial ranching conditions using the weigh-suckle-weigh technique during

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the first four months of lactation as well as and to compare the performance of their progeny.

2 Materials and Methods

Data were collected over a one year cycle in 1995/96 breeding season. Sixty-six cows on native pasture comprising of two groups of 33 Brahman (BB) and 33 Tuli (TT) cows were allotted of each breed for a three-month period beginning 1st January to 31 March. The cow groups were allowed to run separately during the breeding season and were then mixed at the end of the season. Twenty four TT and 15 BB cows conceived and weaned a calf. Calves considered for this study were those dropped between 1st September and 31st December respectively.

Milk production was estimated monthly by the weigh-suckle-weight method. Calves were separated from their dams overnight beginning 6:00 p.m for 12 hours. Calves were weighed in groups, allowed to suckle for about 20 minutes and then re-weighed. The positive weight difference before and after suckling was considered as the amount of milk consumed by the calf and the estimated 12-hour milk production by the dam. Milk production data were analysed by analysis of variance using a mixed general linear method with unequal sub-class numbers. The main fixed effects were sire breed (SB), which is similar to breed of dam (DB), age of dam (DA), sex of calf (CS), calving period (CP). Interactions were fitted in the model and dropped when found not significant ($P < 0.05$).

3 Results and Discussion

3.1 Milk production

Table 1 below shows that milk yield was influenced only by breed of sire. Tuli dams produced more ($P < 0.05$) milk than Brahman dams (12.4 vs 9.2 kg) during the first four months of lactation. This is in agreement with REYNOLDS *et al.* (1978) who reported that Brahman cows generally produce less milk than other beef breeds. Age of dam, sex of calf, and calving period did not ($P > 0.05$) influence milk production. Although age of dam did not significantly influence milk production, older dams tended to produce more milk than younger dams as shown on table 1. JEFFERY *et al.* (1971) reported that as cows mature, they become heavier, produce more milk and raise faster gaining calves. Further work on the relationship between cow age and milk production in indigenous breeds of cattle needs to be carried out in Botswana.

3.2 Birth weight

Table 2 shows that sex of calf and age of dam significantly influenced birth weight of calves from BB and TT dams, respectively. Male calves were heavier ($P < 0.001$) at birth than female ones in the two breeds (35.6 vs 30.4 kg). This is agreement with other studies using similar breeds (HERRING *et al.*, 1996; BROWNING JR. *et al.*, 1995). In general, older dams (10yr and above) produced heavier calves at birth than younger dams (2 to 9 yr) as shown on table 2 below, respectively. As the cow matures, she tends

Table 1: Least squares means and standard errors (kg) for 12-hour milk production of Brahman and Tuli cows in SE-Botswana in 1995/6.

<i>Source of Variation</i>	<i>n</i>	<i>LS Means</i> ¹	<i>SE</i>
Breed of Sire		*	
Brahman	24	9.2 ^a	1.28
Tuli	15	12.4 ^b	0.85
Age of Dam		ns	
2 - 4 years	10	9.6 ^a	1.29
6 - 9 years	19	10.8 ^a	1.05
10 - 12 years	9	11.9 ^a	1.43
Sex of Calf		ns	
Male	18	11.0 ^a	1.12
Female	20	10.6 ^a	1.00
Calving Period		ns	
September/October	9	11.1 ^a	1.53
November/ December	30	10.4 ^a	0.73

¹ : Means within a column in a subgroup with different superscripts differ ($P < 0.05$)

*: $P < 0.05$; ns: not significant ($P > 0.05$)

to increase her body size including uterine capacity and birth canal which eventually will accommodate a bigger calf. Although sire breed did not significantly influence calf birth weight, BB sired calves were slightly heavier than calves sired by TT bulls (33.8 vs 32.2 kg). This is in agreement with results reported in Botswana by TRAIL *et al.* (1977) and by BROWNING JR. *et al.* (1995) in Texas, USA.

3.3 Weaning weight

Weaning weight was adjusted for age of calf at weaning. Table 2 shows that sire breed, sex of calf and calving period significantly affected weaning weight of calves sired by BB and TT bulls. Calves sired by BB bulls were significantly heavier than those sired by TT bulls (164.8 vs 150.4 kg). Similar results were reported in Botswana by Buck *et al.*, 1982 in crossbred Tswana cows and by ANIMAL PRODUCTION RESEARCH UNIT (1981). In many other studies, generally Brahman outperforms Tuli sires in weaning weight of the calf (HERRING *et al.*, 1996; TAWONEZVI *et al.*, 1988; TRAIL *et al.*, 1977).

3.4 Growth rate

Calf growth rate was significantly influenced by breed of sire, sex of calf and calving period. Brahman calves out gained Tuli calves (.69 vs .64 kg/d). These results, are in disagreement with BROWNING JR. *et al.* (1995) who reported that Tuli sired calves had a higher ADG than Brahman sired calves (.81 vs .78 kg/d).

Table 2: Least squares means and standard errors for birth weight, adjusted weaning-weight and average daily gain of Brahman and Tuli calves in South-Eastern Botswana.

Source of Variation	Birth Weight (kg)			Adjusted Weaning Weight (kg)			Average Daily Gain (kg/d)		
	n	LSMean ¹	SE	n	LSMean ¹	SE	n	LSMean ¹	SE
Breed of Sire		NS			***			***	
Brahman	15	33.8 ^a	1.25	15	164.8 ^a	3.12	15	0.69 ^a	0.013
Tuli	24	32.2 ^a	0.82	24	150.4 ^b	2.06	24	0.64 ^b	0.009
Sex of Calf		***			***			***	
Male	19	35.6 ^a	1.04	19	166.3 ^a	2.61	19	0.69 ^a	0.011
Female	20	30.4 ^b	1.00	20	149.2 ^b	2.48	20	0.63 ^b	0.010
Age of Dam		**			ns			ns	
2 to 4 yrs	9	30.6 ^a	1.21	9	154.3 ^a	3.03	9	0.66 ^a	0.013
6 to 9 yrs	20	32.2 ^a	1.04	20	156.0 ^a	2.59	20	0.66 ^a	0.011
10+ yrs	9	36.2 ^b	1.40	9	162.9 ^a	3.51	9	0.68 ^a	0.015
Calving Period		ns			**			**	
September/October	9	33.8 ^a	1.49	9	163.8 ^a	3.71	9	0.69 ^a	0.016
November/December	30	32.3 ^a	0.71	30	151.7 ^b	1.77	30	0.64 ^b	0.008

¹ : Means within a column in a subgroup with different superscripts differ ($P < 0.05$)

, $P < 0.01$; *, $P < 0.001$; ns: not significant

Male calves across breeds were heavier ($P < 0.001$) than female calves. Table 2 shows that calves born earlier (September/October) during the calving season were heavier ($P < 0.01$) than those born in the last part (November/December) of the season (.69 vs .64 kg/d). SWAYER *et al.* (1993) reported that time of calving had a significant effect on calf growth. This is in agreement with the present study.

4 Conclusions and Recommendations

Further research is required to compare the two beef breeds of Brahman and Tuli for a longer period of time before any concrete recommendations could be made to producers. Preliminary results so far indicate that the two breeds have different milking ability with Tuli cows having a higher milk yield than the Brahman during the first four months of lactation. However, Brahman cows weaned heavier and faster growing calves than Tuli cows. Under the traditional cattle management in Botswana, where cow milk is shared between humans and the calves, the Tuli beef cow will provide such milk according to results of the present study. Farmers should try to have cows to calve earlier in the season (September/October) so that calves are bigger and heavier at weaning.

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References

- ANIMAL PRODUCTION RESEARCH UNIT; Ten years of animal production and range research in Botswana; Ministry of Agriculture, Gaborone, Botswana; 1981.
- BROWNING JR., R., LEITE-BROWNING, M. L., NEUENDORFF, D. A. and RANDEL, R. D.; Preweaning growth of Angus- (*Bos taurus*), Brahman- (*Bos indicus*), and Tuli- (Sanga) sired calves and reproductive performance of their Brahman dams; *J. Anim. Sci.*; 73:2558–2563; 1995.
- HERRING, A. D., SANDERS, J. O., KNUTSON, R. E. and LUNT, D. K.; Evaluation of F1 calves sired by Brahman, Boran, and Tuli bulls for birth, growth, size and carcass characteristics; *J. Anim. Sci.*; 74:955–964; 1996.
- JEFFERY, H. B., BERG, R. T. and HARDIN, R. T.; Factors influencing milk yield in beef cows and affecting the preweaning performance of their calves; *Can. J. Anim. Sci.*; 51:551–560; 1971.
- REYNOLDS, W. L., DE ROUEN, T. M. and BELLOWES, R. A.; Relationship of milk yield of dam to early growth rate of straightbred and crossbred calves; *J. Anim. Sci.*; 47:584–594; 1978.
- SWAYER, G. J., MILLIGAN, J. and BARKER, D. J.; Time of joining affects the performance of young Angus and Angus \times Friesian cattle in the south-west of Western Australia. 2. Calf productivity and its relationship with milk production and reproduction in first calvers.; *Aust. J. Exp. Agric.*; 33:523–529; 1993.
- TAWONEZVI, H. P. R., WARD, H. K., TRAIL, J. C. M. and LIGHT, D.; Evaluation of beef breeds for rangeland weaner production in Zimbabwe. I. Productivity of purebred

cows; *Anim. Prod.*; 47:351–359; 1988.

TRAIL, J. C. M., BUCK, N. G., LIGHT, D. L., RENNIE, T. W., RUTHERFORD, A., MILLER, M., PRATCHETT, D. and CAPPER, B. S.; Productivity of Africander, Tswana, Tuli and crossbred beef cattle in Botswana; *Anim. Prod.*; 24:57–62; 1977.