

EVALUATION OF INDIGENOUS, EXOTIC AND CROSSBRED CATTLE FOR BEEF PRODUCTION IN A SEMI-ARID ENVIRONMENT: REPRODUCTIVE PERFORMANCE AND COW PRODUCTIVITY

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SUMMARY

The relative fertility and cow efficiency (kg calf weaned per 100 kg metabolic body weight of cow exposed to the bull) of the indigenous Mashona, Nkone, Tuli and Afrikaner, all of them being Sanga type, Charolais, Sussex (*Bos taurus*), Brahman (Zebu/ *Bos indicus*) and several resultant crosses under range conditions in a semi arid environment of Zimbabwe was evaluated. The results showed that the indigenous Sanga breeds are considerably more productive than exotic types, mainly due to their high calving rates (Mashona 74%, Nkone 67% and Tuli 70%) compared to the Sussex (56%). The Afrikaner, although also an indigenous Sanga, was the least fertile (56%), but in agreement with results from other studies. The indigenous cows are well adapted to harsh environmental conditions, with relatively low maintenance requirements and can therefore make an important contribution towards increased efficiency under African conditions.

Keywords: fertility, cow efficiency, indigenous Sanga, *Bos taurus*, *Bos indicus*

INTRODUCTION

The breeds used for beef production in Zimbabwe comprise *Bos taurus*, *Bos indicus* and indigenous Sanga types. Africa is fortunate to be well-endowed with a diversity of breeds and genotypes which have proved suited to survive and produce under the prevailing environmental conditions. It is estimated that there are over 80 different breeds of cattle in Africa. Sustainable livestock production in most of Africa is dependent on the utilisation of the adaptive traits of these indigenous livestock breeds. The importance of selecting a breed or genotype which is adapted to a specific environment in order to maximise efficiency and profitability has been stressed (Moyo *et al.* 1994). Furthermore, the adaptability of a genotype to a specific environment can be an important factor influencing the fertility and milk production potential of the dam (Swanepoel and Hoogenboezem 1994), which in turn is the single most important component affecting weaning weight (Rutledge *et al.* 1971). Fertility and calf weaning weight are also the most important factors contributing to the efficiency of the beef cow. The objective of this paper is to present results on fertility and cow efficiency of a breed evaluation study established in the mid 70s in Zimbabwe, using a diversity of genetic material.

MATERIALS AND METHODS

The environment of the research station has been described in detail by Ward *et al.* (1979). Briefly the average annual rainfall is 609 mm and most of it falls between October and March but both amount and distribution are highly variable. The project began in 1974 (Tawonezwi *et al.* 1988) with the purchase of foundation heifers and bulls throughout the country. Pure-bred and crossbred females born from these matings were subsequently evaluated as breeding cows. The cow genotypes in this study comprised Mashona, Nkone, Tuli, Afrikaner, Brahman, Sussex, Charolais and various crosses amongst them. These were mated annually from 1979 to the following seven terminal sire breeds; Afrikaner, Tuli, Brahman, Aberdeen Angus, Hereford, Simmental and Holstein-Friesian.

The females were maintained in 2 herds under similar management practices. Single sire breeding in a fixed season starting mid-December to mid-March was practised. No selection of females on reproductive performance or other traits was practised. All calves were weighted, ear tagged and recorded and cows weighed within 24 hours of giving birth. Thereafter animals were weighed at monthly intervals. Calves were weaned at an average age of 8 months, after which they grazed on rangeland, grouped in separate sexes, until 18 months of age when they entered a feedlot for fattening prior to slaughter at 22 months.

Animals were rotationally grazed on rangeland paddocks at a stocking rate of approximately 5 hectares per livestock unit (500 kg). In the dry season, cows were offered 250 g of a winter supplement protein block

providing 100 to 150 g of crude protein (CP) per day. This was systematically increased to 500 g per animal per day by the end of the season, which lasted for 120 to 150 days depending on the onset of the rains. From 1987 to 1989 the protein supplement was made up of cotton seed meal. From calving until regrowth of grass started individual cows were also given 2 kg per day of maize grain. A phosphate salt lick was available at all times together with bone meal.

Harvey's (1987) least squares maximum likelihood computer programme was used in the analysis.

RESULTS

The least squares means for the comparative maternal productivity traits of indigenous, exotic and crossbred cows are presented in Table 1.

Table 1. Comparative maternal productivity of indigenous and exotic cattle (For crossbred cows, sire breed listed first)

Cow genotype	No. of cows	Calving rate, %	Weaning weight (kg)	Cow weight at weaning (kg)	Annual weaner production per 100 kg ⁷³ cow weight
Mashona (M)	253	73.6	176	368	206
Nkone (N)	147	66.7	188	402	203
Tuli (T)	349	69.5	187	423	193
Afrikaner (A)	447	56.1	189	420	169
Brahman (B)	106	67.0	207	444	197
Sussex (S)	134	56.3	180	440	162
Charolais (C)	116	65.5	188	503	172
AM, MA	249	65.8	184	395	196
AB,BA	257	62.4	205	441	192
AS, SA	470	63.1	199	456	189
AN, NA	216	62.4	192	406	195
CA	119	69.9	208	499	187
SB	147	66.5	202	450	196
CB	197	71.9	209	496	200
CS	140	64.7	193	476	181

DISCUSSION

It is generally agreed that improved reproductive performance improves overall production efficiency in beef cattle (Bourdan and Brinks 1987; Hoogenboezem and Swanepoel 1995). A notable exception is the paper by Lishman *et al.* (1984) who stated the need to optimise, rather than maximise rates of reproduction since, under ranching conditions, gross margins increased parallel with calving rate. However, the margin per cow did not always follow this trend. Fertility, along with growth performance and lactational stress, offers a reliable measure of the degree to which an animal is adapted to a particular environment. Among the pure-breds the calving rate of the indigenous Mashona cows was the highest, followed by the Tuli, Brahman and Nkone. The Sussex and Afrikaner had the poorest calving rates. The present study demonstrates the superior fertility of the indigenous **Sanga-breeds**, namely the Mashona, Nkone and Tuli. However, the poor fertility of the Afrikaner is in agreement with results of several other studies in Africa, as reviewed by Hetzel(1988). It is clear from the table that the indigenous Mashona and Nkone cows are the smallest with the Mashona calves also the lightest at weaning. Small body size is an adaptive attribute and Seifert and Rudder (1975) considered that smaller cows tended to have lighter progeny due to reduced milk production. Reduced lactational performance has also been suggested as a contributing factor to improved fertility (Hetzel *et al.* 1989), which might therefore also be considered a contributing factor in the case of the Mashona in the present study.

Among the crossbreeds, Charolais x Brahman cows had the highest calving percentage and also the highest weaning weight. The high fertility of the Brahman in this study is in contrast with most studies in

Southern Africa, in which the Brahman showed poor fertility in comparison with other breeds (Scholtz 1988; Vilakati 1990).

This study demonstrates significant differences in cow efficiency between dam genotypes, which is substantiated by the literature (Venter *et al.* 1980; Bailey *et al.* 1990). The highest efficiency, expressed per 100 kg of metabolic body weight of cow exposed to the bull per year, was in the Mashona and Nkone cows, while the Charolais x Brahman performed the best within the crossbreeds. The high fertility of the Mashona and the Nkone clearly contributes significantly to their superior efficiency. The exceptional performance of the Charolais x Brahman cows is consistent with the theoretical expectation of greater heterosis in more genetically diverse breed types (*Bos taurus* x *Bos indicus*) than in Sanga x Sanga breeds, which are indigenous to Southern Africa and therefore more closely related to one another.

The important contribution of indigenous, adapted genotypes to beef production in southern Africa and their potential role in industry are clearly demonstrated through this study. There is a need to further evaluate some of these breeds under different environmental conditions and production systems.

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