

Comparison of indigenous and foreign cattle for beef production at Matopos Research Station in Zimbabwe

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Background

Cattle breeds regarded as indigenous to Zimbabwe include the Mashona, Tuli and Nkone. History of the breeds, their development and promotion, and development of breed societies for each breed is described by Harvey (1987). Since commercial livestock production was introduced in Zimbabwe in the early colonial period, both the breeding policy and beef production have been based on the use of exotic breeds. The reason given was that the indigenous breeds were not productive and could not support commercial beef production. However, exotic breeds brought in from Europe were not well adapted to local production conditions and their performance was generally unsatisfactory when compared with their performance in Europe. In 1933, problems associated with the use of exotic breeds and the necessity to come up with a different breeding policy for the country was pointed out by Harvey (1987). He also pointed out the need to investigate the possibilities of evolving an indigenous or crossbred type of cattle more suited to ranching conditions in Zimbabwe than are the imported breeds. A large experiment was initiated at Matopos Research Station in 1938, the objective being to define a suitable breeding system for the improvement of exotic and indigenous cattle. Since that time, breed evaluation work has continued at the Matopos Research Station.

The problem

The major findings of the early work done at Matopos Research Station were reported by Vorster in 1964. The results indicated the overall superiority of indigenous stock primarily due to their survival rate in spite of low growth rates. Vorster concluded that, improvement in livestock production in the ranching areas would be improved by the use of local breeds. In spite of the evidence of the superiority of indigenous stock, commercial production and research policy continued to favour the use of exotic stock for both beef cattle and other species. This was mainly due to lack of a clear national breeding policy and failure by both farmers and researchers to accept the fact that exotic breeds were not adapted to the local environment. For example, in the late 1980s, Mashona, Tuli and Nkone bulls comprised 6% of the total bulls used in the commercial beef production sector (Kirkman 1987) and the current rate of use of these breeds is unlikely to have changed greatly. The justification given for continued reliance on exotic breeds was that it was the environment, not the exotic stock, which should be changed. Consequently, research continued to concentrate on improved husbandry in order to make the environment suitable for beef production based on continued use of exotic stock. By the mid-1970s, it was believed that sufficient progress had been made in the improvement of the environment for any breed to perform adequately in most areas of Zimbabwe (Ward 1978).

Results from recent evaluation studies

More recent and current breed evaluation work at Matopos Research Station was initiated in 1974. It assesses the productivity of a wide range of straightbred and crossbred cattle for fertility, survival, growth, feed intake and feed conversion, and carcass characteristics under improved management conditions. The animals were raised on natural pastures with some supplementation during the winter months. Disease control measures were taken to comply with veterinary

regulations. The breeds that have been evaluated include the Afrikaner (a breed developed in South Africa), Tuli, Nkone, Mashona, Brahman, Charolais, Hereford, Simmental, Aberdeen Angus and Sussex. Results of work at Matopos are given in several reports written by Ward, Tawonezvi and Moyo between 1980 and 1996 (see list of references).

Fertility

One of the fertility traits measured was the calving rate. Calving rate of the Mashona cows was the highest (74%), followed by that of Tuli cows (69%), Brahman and Nkone cows (67%), Charolais (65%), and Sussex and Afrikaner cows (56%). None of the crossbred cows outperformed the Mashona cattle on calving rates.

Survival

Calf survival from birth to weaning was lowest for Brahman and Charolais calves and was highest among the indigenous breeds, although the differences among all breeds were not significantly different.

Growth

Calves of indigenous cow breeds were the lightest at birth, weaning and 18 months of age. The genotypes giving calves with high birth weights and growth rates were exotic breeds and their crosses. However, even though Charolais and Sussex cows were the heaviest and produced the heaviest calves at birth, subsequent calf growth was poor. Consequently, there was little difference between the mass (body weight) of their progeny and those of the progeny of Afrikaner, Nkone or Tuli.

Cow and herd productivity

Measures of productivity consider fertility, calf survival and growth. Two indices were used. Index 1 was the mass of calf produced per cow exposed to the bull and index 2 is the mass of calf produced per 100 kg of metabolic body mass of cow exposed to bull. Index 2 takes into account the size and therefore maintenance requirements of the different breeds. Indigenous breeds outperformed the exotic breeds when using index 2, while the Brahman breed ranked first followed by the indigenous breeds when using index 1. Indigenous breeds outperformed the exotic breeds because of high survival and calving rates and because exotic breeds were only marginally better than indigenous breeds for calf growth traits.

Feed intake and feed conversion ratio

Tuli, Afrikaner and Mashona were compared with Hereford, Aberdeen Angus and Simmental for feedlot performance. The indigenous breeds performed poorly for feed intake, daily gains and feed conversion ratio when compared with exotic breeds. Nevertheless, experiences during recent drought periods have demonstrated the need to use breeds that are better adapted to stress conditions. Due to economic and unreliable climatic conditions, the future of beef production in Zimbabwe is more likely to be based on the use of breeds better adapted to natural range grazing than to feedlot systems.

Carcass characteristics

Indigenous breeds and their crosses have shorter and lighter carcasses when compared with Brahman and Charolais breeds and their crosses. Carcass length and weight are used to calculate a fleshing index, which is used to grade animals in Zimbabwe. Because of their low fleshing index, indigenous breeds were not popular with commercial breeders. However, the indigenous breeds produced leaner carcasses than the exotic breeds.

Tawonezvi (1993) discussed the weaknesses of the fleshing index as a measure of meat production. He concluded that it promoted the production of large, old and fat animals. Besides discouraging the use of small indigenous breeds, it promoted less efficient beef production and worked against the beef industry's objectives of increasing carcass lean yield and production turnover. He recommended that the grading system be changed.

These results indicate the superiority of adapted indigenous cattle and the inferiority of exotic cattle for fitness characters (reproductive performance and survival), which are known to suffer when adaptability is poor. Progeny growth, feedlot performance and carcass characteristics of European breeds and the Brahman breed have generally been superior to those of indigenous sires, although the progeny of exotic cows failed to grow as rapidly as expected. Exotic breeds can be used as sire lines and indigenous breeds as dam lines in crossbreeding systems. The results also show that, in spite of significant improvements over years in management and veterinary hygiene practices, performance of more adapted indigenous breeds is still superior to that of exotic cattle. Based on the recent results at Matopos, the same recommendation as made by Vorster (1964) can be made—i.e. for sustainable beef production, indigenous cattle should form the basis of beef production, with exotic cattle used to enhance productivity in indigenous-exotic crossbreeding systems designed to exploit breed complementarity and heterosis.

Similar results and conclusions have been reported in Botswana (APRU 1990), Mozambique (Dionisio and Syrstad 1990), Namibia (Els 1997), South Africa (Scholtz 1988), Swaziland (Vilakati 1990) and Zambia (Thorpe et al. 1981), resulting in the initiation of indigenous breed conservation work in some of these countries (e.g. Mpofu 1996).

Conclusions

The low popularity of indigenous cattle breeds has been largely due to the assumption that they were poor performers when compared with exotic breeds. Zimbabwean indigenous breeds have been evaluated and evaluations are still going on. To date, the evaluations have shown that the indigenous Zimbabwean breeds perform well for economically important traits. They can, therefore, contribute to a sustainable increase in food production from livestock.

Even if the initial breed evaluation work done at Matopos Research Station and other livestock stations and ranches did not result in wide acceptance of indigenous breeds, it led to the recognition of these breeds. For example, the Rhodesia Indigenous Cattle Society was formed in 1950 and it later fragmented into breed societies for the three breeds. Performance testing of the Mashona breed was developed in 1968 at Makoholi Experimental Station (Tiffin 1984). Moreover, indigenous breeds were included in breed evaluation research that continued at Matopos and other research stations. Upon realising that the use of indigenous breeds in breeding programmes is partly limited by lack of proven bulls with a high genetic merit for growth, a project to identify Mashona bulls of high genetic merit for growth from smallholder and commercial farms was initiated at Makoholi Experimental Station. In addition, a private company, Indibreed Private Limited, was formed in 1990. It runs a group breeding scheme in association with the Mashona Breed Society and is a source of Mashona animals of high genetic merit. Tuli and Nkone pure breed herds are kept at Matopos Research Station and breed societies for the Tuli and Nkone breed promote the use of these breeds. The Tuli breed is now popular both in the southern African region and internationally (e.g. in Australia and the USA). All these activities will contribute to the conservation of the breeds through utilisation.

Knowledge gaps

Although quite a lot is known, there is still more work to be done to collect information on Zimbabwe's indigenous breeds. Examples include the following.

- Most experiments evaluating breeds have been set up under controlled environments at research stations. On-farm evaluations and breed comparisons have been limited by lack of field records, particularly records from the smallholder and communal production systems. A number of smallholder and communal farmers keep both local breeds and their crosses alongside foreign breeds. If data were available from such sectors, which use lower inputs than research stations, on-farm breed comparisons would be possible.
- Breed comparisons have tended to concentrate on biological traits. The traits chosen were, of course, of economic importance. However, evaluations should also focus on economic possibilities of indigenous livestock taking into account both biological and economic data.
- It is not known whether there are subtypes within each breed or whether the breeds differ genetically. Molecular genetics techniques can be used to determine relationships among the breeds and to identify some of their special attributes. This information can be used to work out breed conservation and promotion strategies.
- The distribution of the breeds, particularly in the communal farming sector, is not known.

Discussion questions

- The farmers in Zimbabwe realised that the use of indigenous breeds is partly limited by lack of proven bulls with high genetic merit for growth. Describe programmes that should be set up to identify indigenous bulls of high genetic merit?
- Work done at Matopos Research Station and other stations on indigenous breeds did not result in wide acceptance of indigenous breeds, but it led to the recognition of these breeds. One of the outcomes was the formation of breed societies. What role can breed societies play in improvement, promotion and conservation of their breed?
- There is still more work to be done on the indigenous breeds, e.g. collecting information needed to develop breed conservation and promotion strategies. What information is needed and how can it be used in planning breed conservation programmes?
- What is sustainable food production and what would be the role of indigenous breeds in sustainable food production?

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