

MEAT PRODUCTIVITY OF CATTLE AND BUFFALOES IN SRI LANKA

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ABSTRACT

In beef cattle production in tropical areas, consideration into the genotype-environment interaction is much more important than it is in dairy, swine or poultry production. Investment to improve environmental conditions such as sanitary and nutritional conditions yields a return in most cases in dairy, swine or poultry production with breeds or lines developed in temperate areas, whereas in beef cattle production investment in the improvement of environmental conditions often yields little profit. Thus the local breeds will play an important role in beef cattle production.

A series of experiments and a field survey were carried out to evaluate growth and meat production performance of cattle and buffalo breeds under different environmental conditions in Sri Lanka.

Breed comparisons were made on Dry zone pasture where most of the precipitation occurs during three months in a year and the maximum and minimum temperatures range between 31°C and 26°C. Grass was mainly *Brachiaria brizantha*. Indigenous animals, Lanka cattle and Lanka buffaloes, were found to be good producers of beef, with a reasonable growth rate and good carcass quality. The Friesians showed the poorest performance.

In the Mid-country where the climate is more favorable, breed comparisons were also made under cut-and-feeding regime with some concentrate feeding. Grass was *Panicum maximum* and concentrate was coconut cake. Growth rate of both cattle and buffaloes was much improved compared to the results in the Dry zone experiments, and the largest improvement was seen in the Friesians. In another experiment with two levels of nutrition, the difference of growth rate between the two treatments was largest in Murrah buffaloes, followed by Ayrshire and Jersey breeds. The difference in Zebu breeds, both indigenous and Indian, was smaller. These results indicate that as environments, both climatic and nutritional, improved, growth of temperate breeds improved more than that of Zebu breeds. With limited improvement of the environments, as was the case in the above experiments, indigenous and Indian breeds are still better producers of beef.

Introduction

About 60 % of the total meat consumed in Sri Lanka originates from cattle and buffaloes (de Silva, 1969), and the market prices are adequate. Milk production which is very important as in other tropical countries is rising steadily with the increase in the number of milking cows associated with the promotion of breeding programs. However, the total cattle population has tended to decline in recent years, and the buffalo population maintains the same level (Production Yearbook FAO, 1981), as shown in Table 1. Consequently, the total amount of meat produced and per capita consumption are decreasing, and a shortage in the supply of meat may occur in the near future.

Lower beef price in Sri Lanka is associated with extensive beef production through the utilization of natural pastures. About 60 % of the cattle population is located in the Dry zone (de Silva, 1969), where vast areas of communal land referred to as "Crown land" consist of jungles, a large number of water tanks and other vacant areas. Almost all of these areas are utilized by the animals. The majority of cattle in the Dry zone are indigenous Lanka cattle, which have the smallest size at maturity in the world. This breed is being improved by crossbreeding with Indian Zebu breeds such as Red Sindhi, Sahiwal and Tharpakar for the

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Table 1 Number of livestock and amount of meat produced in Sri Lanka

	1961—65	1974 (1,000 head)	1981	Meat production (1,000 mt, 1981)
Cattle	1,645	1,673	1,644	12
Buffalo	855	716	843	6
Goat	530	549	493	1
Sheep	44	27	29	1
Swine	92	91	71	1
Chickens	5,221	6,521	6,405	11

Production Yearbook, FAO.

purpose of increasing milk production.

About 10% of the total cattle population are found in the Mid- and Hill country, where the climate is favorable for European dairy breeds such as Ayrshire, Jersey and Friesian. In these areas, intensive dairy production systems have been adopted by small holders, i. e. cut-and-carry feeding regime with some concentrate supplement. Grasses for cattle are supplied from vacant areas and roadsides. In the Mid-country, Guinea A grass can be seen commonly as a weed. Calves from dairy breeds in these areas are likely to become important sources of beef with the increase in the number of dairy cattle.

Therefore a series of experiments were carried out to evaluate growth and meat production performance in different breeds of cattle and buffaloes in the framework of the Sri Lanka Japan Beef Research Project (1972-1978).

The results obtained can be summarized as follows.

Growth rate and feed conversion efficiency

Comparisons of body weight gain among some breeds of cattle and buffaloes under different environments are shown in Table 2.

Both Murrah and Lanka buffalo breeds grew best when grazed on Dry zone pastures. Murrah buffaloes showed the highest growth rate under a high level of nutrition too, but this breed performed poorly when the nutritional level was low and the pasture conditions were unfavorable in the dry season. Red Sindhi showed a very high daily gain under both conditions, i.e. pasture grazing and concentrate feeding. Though Lanka cattle showed the lowest daily gain among all breeds under a high nutritional level, this breed performed comparatively well on the Dry zone pasture or under a low level of nutrition. On the other hand, the growth rate of the European breeds was low under unfavorable conditions of feeding and when grazed on the Dry zone pastures. However, this growth rate potential increased when the climatic and nutritional conditions improved.

Feed conversion efficiency is one of the most important characters for economical livestock production. This trait is affected by the stage of growth, nutritional level, kind or quality of feed, climatic environment, breed and many other factors. Results obtained in one of the experiments are as follows.

Total Digestible Nutrients (TDN) required per 1 kg live body weight gain in four breeds of cattle and Murrah buffalo under two nutritional levels are shown in Fig. 1. Under a high nutritional level, Murrah buffalo showed a high feed conversion efficiency followed by Zebu breeds, and then European breeds. However, under such a high level of nutrition, the differences among the breeds were comparatively small. When the nutritional level was low, remarkable differences were observed among the breeds, with Red Sindhi and Lanka cattle showing the highest feed conversion efficiency. Regarding the differences of feed efficiency

Table 2 Comparison of body weight gain between Zebu and European cattle breeds and buffalo breeds under different feeding conditions

Breed	Average daily gain (kg)	Region	Feeding and management conditions		
Lanka cattle	0.27	Polonnaruwa (Dry zone)	Grazing regime on improved pasture, <i>Brachiaria brizantha</i> . Animals were reared for 48 weeks. (Matsukawa, T. <i>et al.</i> , 1976)		
Red Sindhi	0.30				
Friesian	0.13				
Murrah buffalo	0.36				
Lanka buffalo	0.37				
Lanka cattle	0.26	Polonnaruwa (Dry zone)	Same conditions as above. Animals were reared till 23 months of age. (Katada, A. <i>et al.</i> , 1976)		
Red Sindhi	0.28				
Jersey × Lanka cattle	0.25				
Jersey × Red Sindhi	0.24				
Murrah buffalo	0.26				
Friesian	0.24	Kundasale (Mid-country)	Cut grass (<i>Panicum maximum</i>) was fed <i>ad libitum</i> with concentrate supplement (1.3% of body weight) for 26 weeks. (Tilakaratne, N. <i>et al.</i> , 1976)		
Red Sindhi	0.38				
Murrah buffalo	0.51				
Murrah buffalo	{ H 0.38 L 0.09	Paradeniya (Mid-country)	Concentrates were supplied at the rate of 1.6% (H lots) and 0.7% (L lots) of body weight and roughages mainly consisting of paddy straw were given <i>ad libitum</i> . Animals were fattened till 20 months of age. (Okada, M. <i>et al.</i> , 1979)		
Red sindhi	{ H 0.33 L 0.16				
Lanka cattle	{ H 0.23 L 0.14				
Ayrshire	{ H 0.27 L 0.07				
Jersey	{ H 0.27 L 0.11				
Lanka cattle	0.14			3 districts of Dry zone	Heifers reared by farmers. (Ozawa, S. <i>et al.</i> , 1978)
	~0.17				

between high and low nutritional lots within the same breed, the smallest differences were observed in Lanka cattle followed by the Red Sindhi, while Ayrshire showed the largest differences and the Jersey and Murrah buffalo breeds were in the intermediate range. It seemed that the Zebu breeds showed superior feed conversion efficiency when fed mainly with roughage.

Carcass characteristics

In this report, carcass characteristics refer to the following parameters: carcass dressing percentage, percentage of muscle, bone and fat in the carcass and muscle/bone ratio. The results obtained are shown in Table 3.

One of the features of the Murrah and Lanka buffalo was a higher percentage of fat in the carcass. Though high muscle/bone ratios were observed in Lanka buffalo, the Murrah buffalo had the lowest muscle/bone ratio among all breeds. Indigenous Lanka cattle showed the highest carcass dressing percentage followed by the Red Sindhi, and both zebu breeds showed a higher muscle/bone ratio, too. On the other hand, European dairy breeds showed the lowest carcass dressing percentage and contained the lowest amount of separable fat in the

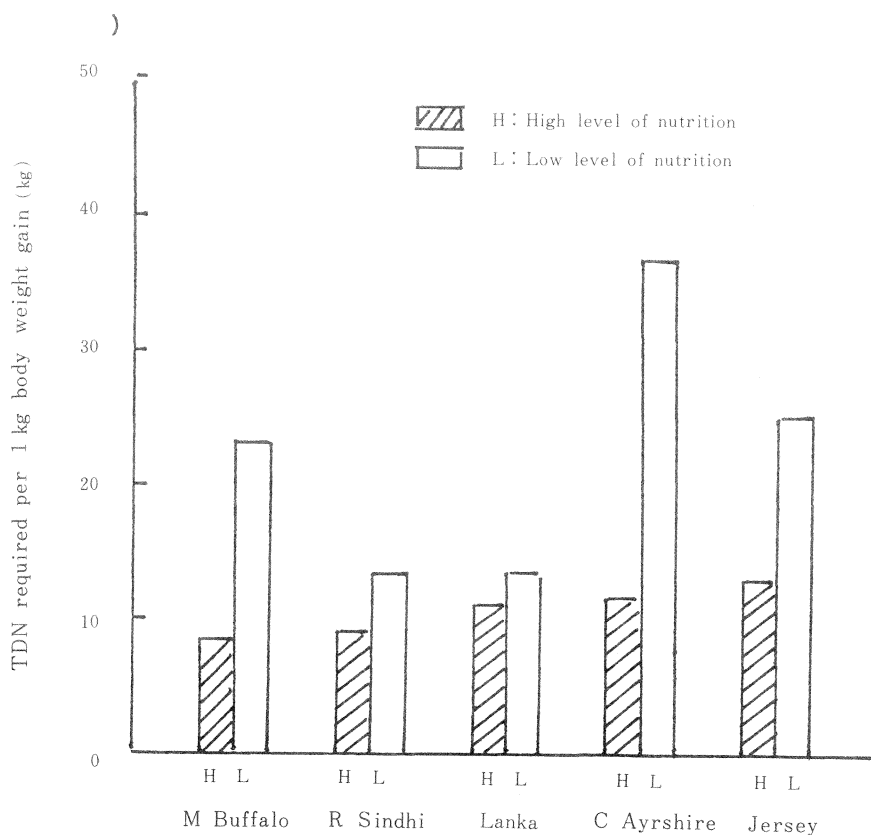


Fig. 1 Feed conversion efficiency.
Okada, M. *et al.*, 1978.

Table 3 Carcass characteristics of three breeds of cattle and two breeds of buffaloes

Breed	No. of animals	Off-feed weight (kg)	Carcass weight (kg)	Dressing percentage	Percentage in half-carcass			Muscle/bone ratio
					Muscle	Bone	Fat	
Lanka cattle	4	155	83	53.6	71.3	22.8	5.9	3.13
Red Sindhi	5	166	86	50.2	69.5	25.3	5.1	2.76
Friesian	5	148	71	47.6	70.7	26.5	2.8	2.73
Murrah buffalo	3	204	101	49.7	67.2	25.8	7.0	2.62
Lanka buffalo	4	263	140	53.4	70.8	23.2	6.1	3.07

Matsukawa, T., *et al.*, 1976.

carcasses. Muscle/bone ratio in European breeds was lower than that in other breeds.

Carcass characteristics are affected by many factors such as breed, growth rate, fattening stage, plane of nutrition, etc. Generally, dressing percentage increases with the development of the fattening phase (Fukuhara *et al.*, 1968). On the other hand, the muscle/bone ratio depends on the stage of maturity, and early-maturing animals usually tend to have

a smaller body size at maturity (Berg and Butterfield, 1976). Therefore, based on these results, it was considered that both indigenous Lanka cattle and buffaloes matured earlier, and had developed the fattening phase for a lighter body weight. In contrast, in the European breeds, muscle and bone tissues were not well developed due to malnutrition.

Blood characteristics

Generally, animal adaptability to a particular environment should show a close relationship with performance. In this report, blood constituents especially hematocrit value and erythrocyte number were examined as a reflection of the level of performance related to adaptability.

Under the Dry zone pasture, both indigenous breeds, Lanka cattle and buffaloes had higher hematocrit values than the Red Sindhi and Murrah buffalo throughout the experiment. Friesians were anemic with the lowest hematocrit values. Relationship between the growth rate and erythrocyte number in several Zebu and European breeds under different feeding methods in different environments is shown in Fig. 2.

The number of erythrocytes was higher in the Zebu breeds than in the European breeds. These values in Zebu breeds were in the normal range, but those in the European cattle were below the normal ranges observed in temperate countries. The crossbreds of the two different types of cattle were in the intermediate zone. Both Zebu and European breeds showed a higher correlation between the growth rate and erythrocyte number. These results suggest that the Zebu breeds can tolerate adverse conditions such as infectious diseases, certain

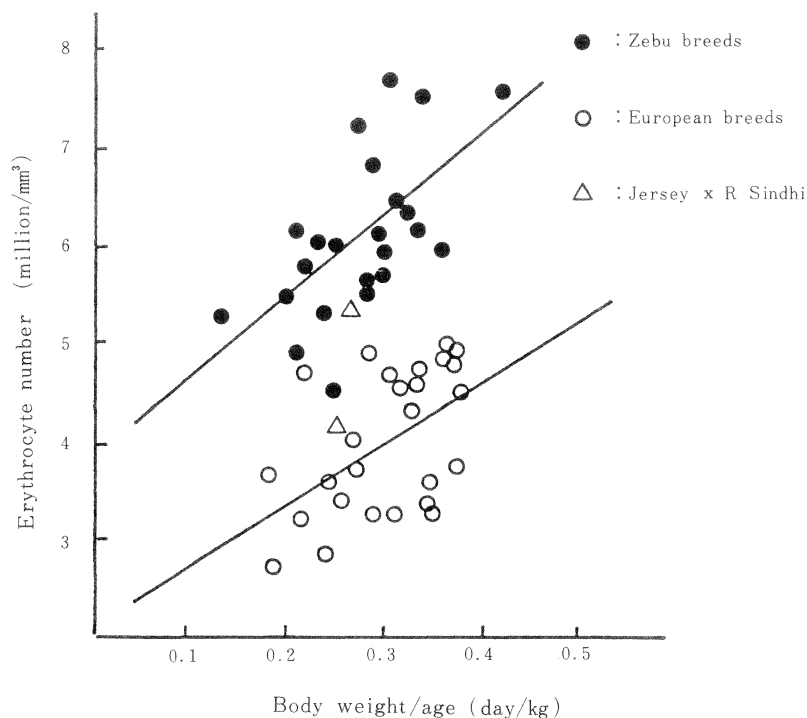


Fig. 2 Relationship between erythrocyte number and body weight gain in Zebu and European breeds.

Ozawa, S. *et al.*, 1978.

parasites, high ambient temperature and nutritional stress. Therefore, for the development of efficient livestock production, particularly beef production in tropical areas, it is very important to take the genotype-environment interaction into consideration.

Conclusion

Growth rate and feed conversion efficiency of European breeds improved only under a high nutritional level. Furthermore, in these breeds, the maturity of the carcass was low under these conditions. Both buffalo breeds, Lanka and Murrah showed the highest growth rate when grazed on the Dry zone pastures. But the growth of Murrah buffaloes was restricted considerably under a low level of nutrition. Lanka cattle and Red Sindhi performed comparatively well when grazed on pastures or when subjected to low nutritional conditions, and showed a higher feed conversion efficiency. Superior carcass conformations were detected in both indigenous cattle and buffalo breeds.

Supply of the local concentrate resources, such as coconut meal, rice bran and rubber seed meal is limited to poultry industries and intensive dairy production. Therefore, the amount of concentrates will be insufficient for beef production, and this system is not always economical.

Further comparative studies on the growth rate and carcass characteristics as well as on the reproductive performance and adaptability to harsh environments should be carried out in other Zebu breeds and various crossbreds.

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Discussion

Jayawardana, A. B. P. (Sri Lanka), **Comment:** The research results presented by Dr. Ozawa are very important and confirm that the native Lanka cattle have good characteristics.

Since beef production is not being promoted by the government for religious reasons, beef available is derived from animals which are not utilized for dairy purposes. Dr. Ozawa also showed that the quality of buffalo meat can be high. This contrasts with the general assumption that buffalo meat is of low quality, which is based on the fact that only unproductive buffaloes that cannot work the fields are being slaughtered.

Siregar, M. E. (Indonesia): 1. Do the grasslands belong to the farmers or are they communal grazing lands? 2. Do the cattle grazing *Brachiaria brizantha* show any symptoms of intoxication?

Answer: 1. All the grassland are communal grazing lands where animals are grazed free of charge. 2. We have not encountered any problems.