

Indigenous Cattle Types and Production Systems in Sri Lanka

Introduction

The livestock sector forms an integral part of agriculture in Sri Lanka by providing draught power, transport and manure apart from its direct contribution to the gross domestic production (GDP) of the country. Livestock account for only about 1.2% of the GDP (Ranaweera, 2007) while the country depends largely on imports to fulfill its demand for milk and milk products. The aggregate demand for dairy products has been predicted to be over 1,400,000 MT by the year 2010 (Ibrahim *et al.*, 1999). Given the current domestic production of 189,360 MT of milk and milk products (Department of Census and Statistics (DCS, 2007), the need and opportunities for expansion of domestic production have repeatedly been highlighted.

Indigenous livestock species contributes a major proportion to the total value of Animal Genetic Resources (AnGR) of Sri Lanka. Among them, the role of indigenous cattle is discussed in many instances for its contribution in rural economy and farming systems. As indicated in many investigations, the value of indigenous cattle as a component of rural agriculture is diminishing due to various reasons, which are common to many other countries in the region. Generally, the indigenous cattle are evaluated only in terms of milk production, as it is the main economic product. The tolerance to heat and resistance to many endemic diseases make these indigenous breeds thrive better in local rural environments and production systems than many other breeds of cattle. These characteristics become prominent in the context of small-holder production system, which is the predominant cattle rearing system in the country and where the resource base is low. It has been estimated that there are around 400,000 dairy farmers in Sri Lanka and 2.45 million people (70% of the estimated 3.5 million livestock dependents) are provided with the livelihood in dairy sector (Ranaweera, 2007). Even though estimates are not available, a considerable proportion of these dairy sector dependents rely on indigenous cattle. Based on the proportional distribution of cattle, Ibrahim *et al.* (1999) reported that the indigenous cattle and their crosses represent 60% of the total cattle population in the country. Though they represent more than half of the population, the contribution to milk production has been marginal. The total cattle population of

the country has been fluctuated during the past few decades. At present, cattle population of the country is recorded as 1.2 million (DCS, 2007). Around 0.2 million cattle are slaughtered annually in Sri Lanka, and majority of which is indigenous cattle. (Silva *et al.*, 2005).

Indigenous cattle have long been identified as a separate category of cattle used for several genetic improvement programs in the past (Wijeratne, 1970; Tilakratne *et al.*, 1974). However, no systematic approach has been used to identify and describe their phenotypic or genotypic differences, and as a result, the total indigenous population remains as a nondescript type of animal except for few breeds/types. This article describes types of indigenous cattle found in different regions in Sri Lanka and illustrates the farming systems that they have been reared.

Origin and Distribution of Indigenous Cattle

Archeological evidence reveals that buffaloes, sheep and chicken have been raised by Sri Lankans during the pre-historic era. But no records on cattle and goat farming during this era are available. According to the archives, Sri Lankans started rearing of neat cattle since 543 BC, with the establishment of the first kingdom by Indo Aryans. These cattle have been described as the archaic cattle with little relation to the Indo-Pakistani zebu and the ancestors of the present-day "Lankan cattle" of Sri Lanka (Feliuss, 1995). However, in ancient times, people have concentrated more on buffaloes than on cattle to obtain various products required for their day-to-day life (Chandrasiri, 2004). Later, with the invasion of the Portuguese, Dutch and British, cattle were also used for draught power especially in the coastal areas where they first colonised. After the establishment of tea and coffee plantations by the British, cattle were used

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to transport these products. During 20th A.D., the British brought some European breeds to Sri Lanka.

At present, the native cattle in Sri Lanka (*Bos indicus var ceylonicus*) called "Lankan Cattle" or "Batu Haraka" are the locally-adapted cattle in the country, descending from the ancient cattle introductions. Information on Lankan cattle is scarce. At present, the indigenous cattle are mainly found in the dry zone of the country, and also could be seen in isolated pockets island wide, except in wet zone (Ibrahim *et al.*, 1999). About two thirds of the total cattle population is in the dry zone, 25 per cent in the coconut triangle, and the remaining 8 to 10 per cent in the mid country and hill country areas where there is well-developed dairy management under intensive husbandry systems. In the dry zone, the rice-growing areas, tank beds, dry scrubs and sub humid forests, provide sufficient amount of feedstuff for indigenous cattle that are reared extensively (Table 1). Hence, rearing of indigenous cattle is favoured in those areas compared to other zones of the country. In general, the climatic conditions under which cattle are raised in Sri Lanka vary widely (Table 1).

Table 1
Cattle production zones: topography, climate and animal husbandry

Zone	Elevation (m)	Rainfall (mm)	Temp. Range °C	Animal Types	Husbandry Practices
Up & Mid country	> 450	>2000	10-32	Pure European breeds and crosses; some Zebu crosses	Zero grazing, small herds: some tethering
Coconut triangle	<450	1500-2500	21-38	Crosses of exotic breeds, Zebu cattle types, Indigenous animals and crosses	Limited grazing. Tethered under coconut palms. Medium sized herds
Wet lowlands	<450	1875-2500	24-35	Crosses of exotic breeds, Zebu cattle types, Indigenous animals and crosses	Limited grazing. Medium sized herds
Dry lowlands	<450	1000-1750	21-38	Indigenous cattle , Zebu cattle types and their crosses	Free grazing, large nomadic herds, sedentary small herds in irrigated schemes

Source: Ibrahim *et al.*, 1999.

General Description of Indigenous Cattle

The indigenous cattle in Sri Lanka are similar to the most Zebu type cattle found in the tropics. Few studies carried out on the phenotypic characterisation revealed that the indigenous cattle possess no prominent hump or dewlap (Thilakarathne, 1980), have small body size (Thilakarathne, 1984), with an average adult weight of around 160kg. Morphological characteristics of the indigenous cattle describe the phenotype of a small compact animal (Table 2).

Table 2
Morphological description of indigenous cattle

Character	Information
Coat color	Black, dark brown, light brown, gray, white and shades of the above colors
Type of the Ears	Small, erect or horizontal
Hump and dewlap	Small or medium
Head	Long and narrow
Forehead	Flat
Horn	Small and curved
Tail length	Medium

Source: Silva et al., 2006.

Standard morphometric characteristics of indigenous cattle are given in Table 3. Most of the indigenous cattle have a barrel-shaped body, and hence appear to be a meat type (Goonawardena et al., 1982). Though indigenous cattle are used as triple purpose (milk, draught and meat) animals, they are poor producers. Irrespective of the purpose of keeping, adaptation to the local harsh environment, especially under rural smallholder system, is a significant feature in these cattle types. White cattle or 'Thamankaduwa White' is identified as one of the local breeds limited to eastern part of the country. They are different from the Lankan cattle found in other parts of the country. The white cattle are reared for draught and milk, and found predominantly in the Eastern region of the country. It is believed that these animals have originated from the mixture of cattle that existed in ancient "Lankan cattle" and Indian white cattle breeds (Nadheer, 2005), which were brought by tobacco planters in the north-eastern region of the country (Feliu, 1995).

Table 3
Mean values of body measurements (cm ±SD) of indigenous cattle in Sri Lanka

	Head length	Head width	Heart girth	Height at withers	Width at hips	Body length
Overall	40 ± 4.4	15 ± 2.8	131 ± 19.1	100 ± 12.0	32 ± 5.6	105 ± 15.1
Male	40 ± 4.2	15 ± 2.5	131 ± 19.3	100 ± 11.9	32 ± 5.8	105 ± 15.1
Female	40 ± 4.2	15 ± 2.5	131 ± 19.1	100 ± 11.9	32 ± 5.5	105 ± 15.0

Source: Silva et al. (2006).

The "Cape cattle" or "Hatton cow" was an excellent locally-adapted dairy cattle, which has been listed as an endangered breed in 2000 (Food and Agriculture Organisation (FAO), 2000), and now may have become extinct, as a recent survey failed to find any Cape cattle. This is a synthetic breed established during the colonial regime, by crossing the male calves born to the European cows with the indigenous breeds. 'Lena-iri' cattle is another indigenous cattle type (Chandrasiri, 2004) and known in few selected communities. It is not an established breed and no proper investigations or documentation is available on this breed. The "Lena iri" cattle are well adapted to harsh environmental conditions and males are used as cart bulls. These animals can be seen in the Western and Southern parts of Sri Lanka.

Pack animals or 'Thawalam cattle' is another category of indigenous animals. Though they are basically representing the nondescript type indigenous cattle, breeding and rearing of these cattle is being done in isolated pockets in Central and Uva provinces of Sri Lanka. Generations of breeding in isolation has made them to emerge as a separate type of cattle that now possess different body conformation to rest of the indigenous cattle found in Sri Lanka (Table 4).

Table 4
Mean values of body measurements (cm ±SD) of 'Thawalam' cattle in Sri Lanka

	Head length	Head width	Heart girth	Height at withers	Width at hips	Body length
Mean ± SD	43.5 ± 4.0	14 ± 2.7	140 ± 12.9	111.5 ± 9.6	31 ± 4.6	115.5 ± 10.2

Source: Silva et al. (2006).

Low production is a characteristic feature of the indigenous livestock in most parts of the tropics. Genetic selection of these to equate the high performance of temperate animals would be a slow process, because the average production of these indigenous animals is far below that of its temperate counterparts.

A program of systematic cross breeding of "Lanka cattle" with Friesian and Jersey breeds was initiated in Sri Lanka about 35 years ago. The objective of these attempts was to combine the high potential of European breeds with the adaptability of the nature strain to develop a dairy breed suitable for the country. However, this program was not continued as it was reported that upgrading beyond 50% exotic blood level had

lead to poor performance of cross breeds (Buvanendran and Mahadevan, 1975). Upgrading of the national cattle herd through Artificial Insemination (AI),

which was started around 50 years ago is in operation in the country today. However, there is no herd improvement program in place for the improvement of pure indigenous cattle types of the country.

Reproductive traits

Indigenous cattle show a wide variation in most of the important reproductive characteristics (Table 5). The mean 305-day lactation milk yield of indigenous cattle has been documented as 450 kg (Thilakarathne, 1984). The age at first calving in indigenous cows is high compared to most other cattle types in Sri Lanka. High variation and low standards of reproductive features could be attributable to the variation existing among animals and differences in their feeding, and management regimes in indigenous cattle production systems.

Table 5
Reproduction performance of indigenous cattle

Characteristic	Information
Gestation period (days)	250 to 290
Milk yield (L/cow/day)	0.5 to 4.5
Lactation Length (Months)	1 to 7
Dry period (Months)	4 to 7
Age at 1st calving (Months)	30

Source: Silva et al. (2006).

Indigenous Cattle Rearing Systems

The purpose of rearing of indigenous cattle

The main objective of rearing indigenous cattle in Sri Lanka is for milk production, milk-based dual purpose activities and meat production. Figure 1 illustrates the variation of purpose of rearing of indigenous cattle based on a recent survey conducted in area where indigenous cattle is being reared. The results revealed that keeping indigenous cattle for draught purpose is relatively common.

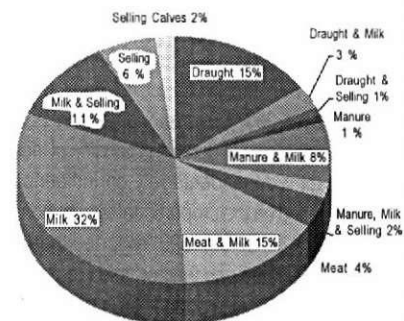


Figure 1: Purposes of rearing of indigenous animals

Source: Silva et al. (2006).

Systems of rearing of indigenous cattle

There are large variations in the systems of rearing indigenous cattle according to the resource availability in and around the area where cattle rearing is practised. The Crop-ruminant integrated system in smallholdings is the most suitable description for the indigenous cattle rearing system in the country. Crop-ruminant production is carried out under both rain-fed and irrigated conditions. The system shows a greater diversity and complexity in the crops grown, the cropping patterns used and in the livestock species/breed raised. Playing a key role in the system, indigenous cattle contribute to sustain the system by balancing the nutrient flow and contributing to the biodiversity. Agricultural biodiversity, a key component in traditional farming system, safeguards the natural potential of farming systems to changes in environment, or ecosystem, or changing patterns of demand for food (Sri Lanka Council for Agricultural Research Policy (CARP), 2007).

Almost all the indigenous cattle rearing systems fall under extensive system, where cattle are allowed to graze in common pasture lands and nearby crop/paddy lands after harvesting. Occasionally, these cattle are also fed by the cut-and-feed system. Thus, production systems vary between extensive and semi-intensive systems. Feeding indigenous cattle with concentrate feed is rare.

Feeding and other management practices of indigenous cattle are not expensive and hence their contribution to total cost of production is marginal. Expenses are limited to veterinary care and health management. However, in almost all cases of rearing indigenous cattle, money is not spent on their medicine unless it is very essential, and indigenous medicine is the common practice in most of the cases. In this context, rearing of indigenous cattle is a profitable enterprise.

In some areas of Sri Lanka, especially in the eastern region, transhumance type management system could be seen in rearing indigenous cattle. The herds maintained in harvested paddy lands for grazing are transferred to the jungle and scrub-jungle areas or other non-arable land, once the cultivation begins. Animals are brought back again during crop harvesting or at the end of harvesting season. These animals are fed with paddy straw and agricultural refuses as pasture and fodder availability is limited in the area. In general, animals are kept in open

paddocks without any housing facility. The suckling calves are separately paddocked. In some instances, these open paddocks are located away from the farm land, leaving animals without any protection, especially from animal theft.

The noteworthy fact is that these farming systems have evolved through ages to respond to various aspects of the production system. Hence, the whole farming system sustains with indigenous cattle as an integral component in it.

Herd size and other resource availability

Herd size of indigenous cattle varies widely among and within cattle rearing regions. High correlation between the land availability (own and common) and the size of the herd could be observed in relation to indigenous cattle rearing systems. Accordingly, in the central part of the country, including Uva and Sabaragamuwa regions, herd size varies between 1-15, whereas 20-150 herd sizes could be observed in North Central, North Western, Eastern and Southern

provinces. Majority of white cattle are kept in large herds and in some occasions herd size could be as large as 300+ heads (Nadheer, 2005). Pack animals and Lena-iris cattle are reared in small numbers in isolated pockets.

Land availability

Farm size varies according to the farming region. In general, majority of indigenous cattle rearing farms is less than 1.2 hectares in extent. However, there are instances where the farm size might extend up to 1.6 – 2.0 hectares. For example, a large number of farms found in the North Central province of Sri Lanka are even more than 2.0 hectares in extent. Land availability is the major limiting factor in rearing indigenous cattle as they are generally kept in large numbers and under extensive system of rearing.

The ownership of farming land varies widely and essentially correlated to herd size. When the herd size is small, cattle are kept in the farmers' own land. Use of common lands (tank beds, forest boundaries, shrub jungle areas) is the general practice when the herd size is large. In this situation, animals are kept in open paddocks as described above.

Integration with other agricultural activities

According to a recent study done on indigenous cattle rearing systems, it was revealed that most of the indigenous cattle farmers are paddy growers. Integration of cattle with other crops, such as

vegetable and field crops also could be seen, but at extents less than 20%. Keeping indigenous cattle in subsistence level is a common feature in most rural communities. Draught cattle are frequently used for both agricultural work and transportation in many isolated pockets in central part of the country. These animals are mainly used to transport farm outputs to the market, especially from areas where the infrastructure is poor.

Indigenous cattle could be identified as the main component in crop-livestock integration in the dry zone of the country. Crop-ruminant integration produces a range of products, provide farmers with opportunities to diversify to minimise risk from a single commodity and use labour efficiently, allow access to manure, add value to crops and their residues/by-products, and have the potential to maintain ecosystem health and functions. Crop-ruminant systems offer positive incentives to farmers to compensate for adverse environmental effects, making them less damaging or more beneficial to the natural resources base (CARP, 2007).

Sale of products

The sale of indigenous cattle products is formally limited to milk in most instances. As stated above, a considerable proportion of farmers are engaged in subsistence-level farming and thus, sale of milk is limited. Milk from indigenous cattle has high demand in cottage milk processing areas like Hambantota, where processors believe that curd made out of milk from indigenous cattle are firm and of good quality. Farmers use various paths in selling their milk as given in Table 6, and the most common path is through private sales outlets in the market.

Table 6
Type of sale of milk

Type of sale	Percentage sales
Through village trader	18.3
Through village collector	27.5
Through village fair	08.1
To the market	43.6
To neighbors	02.5

Source: Farm survey (2005-2007 unpublished)

Indigenous cattle rearing systems produce a range of products. Apart from milk production, the sale of animals, manure and draught power are other commodities and services that draw/save money for the household. According to

the farmers' perception, the number of cattle owned would exhibit the social status and financial security in rural communities. This encourages the farmers to keep cattle in large numbers.

The proportional contribution to the total income by livestock and crop components in three indigenous cattle rearing areas of the country is given in Table 7. In main paddy-growing areas, two thirds of the income of the farm is from the indigenous cattle whereas, vegetable cultivation drew more money in one of the study areas.

Table 7
Income generation of crop-indigenous cattle production system

Area	Percentage contribution to the total income	
	Indigenous cattle ¹	Crop ²
Anuradhapura	72.25	27.72
Hambantota	74.24	25.76
Badulla	11.63	88.37

¹Sale of milk, animals and manure

²Mainly paddy in Anuradhapura and Hambantota, and vegetable in Badulla.

Source: Farm survey (2005-2007 unpublished)

Constraints in Indigenous Cattle Rearing Systems

The indigenous cattle rearing is a traditional practice and hence, herd improvement is not considered as an important component in their management. Nevertheless, the extensive system of rearing limits any planned breeding programs being practiced in the present management regime. Lack of herd improvement programs could be considered as a primary constraint in below:

- Diminishing availability of common lands is the main problem indicated by the farmers. This is one of the most frequent problems mentioned by farmers in almost all the areas of the country.
- Constraints in marketing of products, especially due to lapses in collecting network and poor infrastructure facilities have been highlighted.
- In certain areas of the country, animal theft has been one of the major constraints in indigenous cattle rearing. Cattle theft is a serious and a common problem in areas where large herds are kept in paddocks located away from farm lands.

- Lapses in accessibility to veterinary services have also observed in some areas, where infrastructure facilities are lacking.

Concluding Remarks

Indigenous cattle rearing are a traditional practice in most parts of the country. The low level of production is the main barrier for it to emerge as a considerable contributor to the dairy sector. The unique adaptation of indigenous cattle to limited inputs and harsh environments, where they have evolved, is unparalleled to any other cattle type. Hence, despite low productivity, indigenous cattle play an important role in rural economy, especially by providing a critical component of livelihood to a sizable number of rural populations and also by providing variety of products and services to the community. Lack of systematic herd improvement programs is the major drawback in indigenous cattle production and utilisation. However, it is worth realising that the investment on indigenous cattle will be an investment for the future as it automatically helps protect the whole agriculture system for the rural livelihood.

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