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# **Animal Recording in Smallholder Farming Systems. The Sri Lankan Experience**

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The contribution of Livestock Sector to GDP and to the Sectoral GDP in Sri Lanka have been estimated to be 1.2% and 5.6% respectively. The above ratios have remained constant during the past decade. The livestock population of the country has also remained stagnant over the last two decades and it comprises 1.7 million cattle, 0.9 million buffaloes, 0.5 million goats, 8.7 million poultry and about 86 000 pigs and negligible number of sheep and ducks.

Livestock products account for 25% of the total protein intake of the average Sri Lankan. The annual per capita consumption of livestock products are 32.8 ltrs of milk, 1.52 kgs of beef, 1 kg of chicken, 0.07 kgs of pork, 0.15 kgs of mutton, and 47 eggs.

The present policy of government is to promote the development of the livestock sector with a view to creating the opportunities for rural employment as well as to raise the farmers income. Of the total food import bill, nearly 20% goes to import of milk. The government has provided various incentives such as tax exemptions on capital items, tax holidays, provision of state land on long term lease etc. to potential investors to promote livestock development in the island.

The total area of the agricultural land in Sri Lanka has been estimated be around 2 million hectare or about 30% of the total land area. Almost three quarters of the agricultural land comprises 2 million smallholdings. Of the total smallholdings, 60% have farm size of less than 1 ha, and 25% have farm size of 1 to 2 ha. Seventy five percent of the smallholdings are wholly devoted to cropping and the remaining 670 000 are engaged in mixed crop and livestock farming. In total, the farm population is estimated to be in the region of 10 to 11 million with an average house hold size of 5.3 persons. An estimated 3.5 million persons in the island is involved or dependent upon livestock.

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## **1. Background information**

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### **1.1 Introduction**

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**1.2 Farming system**

Sri Lanka is divided into three agricultural zones, the dry zone covering 4.1 million hectare. With average rainfall of 875 to 1 875 mm, the intermediate zone covering 0.9 million hectare with a rainfall of 1 875 to 2 500 mm per annum and the wet zone covering 1.4 million hectare with an annual rainfall of over 2 500 mm. The wet zone is the most intensively exploited agricultural area, although the irrigation development is providing considerable resettlement and increased production in the dry zone. Rain fall follows a bimodal pattern with North East Monsoon from November to February and the South West Monsoon from May to September.

Cattle and buffalo keeping is generally distributed through out all the regions of the country. In the hill and mid country and in the Jaffna Peninsula cattle is kept primarily for milk. In the Wet zone cattle and buffalo keeping forms an integral part of paddy production, draft power, weed control and manure as well as milk production. In the dry zone these species are regarded as a source of insurance by smallholders as they provide a store of wealth and access to hard cash by way of disposing the animals and sale of milk. Nearly half of the cattle population is located in the dry zone especially in the districts of Pollonnaruwa, Batticaloa, Mannar, and Amparai.

Six milk production systems have been identified in the island depending on the agro-climatic characteristics in the locations. They are (See table 1):

1. The plantation system where animals are owned by the estate labourers and zero grazing is practised.
2. Home garden system in the mid country & up country where bostaur animals are kept and zero or limited grazing practised.
3. Coconut Triangle System covering the coconut plantations of the North Western and Western provinces where cattle are tethered and grazed on the pasture under coconut.
4. Low country, mainly southern area comprising mixed home gardens where mainly *Bos indicus* animals are kept on paddy straw and garden residues.
5. Settlement schemes in the dry zone includes mahaweli and other major irrigation schemes.
6. Dry zone extensive system where herds of cattle and buffaloes are grazed on public lands and forests.

Average farm holding in the hill country and mid country is 2 to 5 cow units, predominantly Friesian and Jersey animals with milk production of 2 to 5 litres per day. In the intermediate zone the average size of the cattle unit is 5 to 10 cows, mainly Jersey and zebu crosses with milk production of 5 to 7 litres per day. The type of cattle kept in the dry zone varies from indigenous breeds to zebu and European crosses with an average milk production of 1 to 2 litres per day.

Table 1. Cattle farming system and their characteristics by agro-climatical zones.

Agro-climatical zones	Production emphasis	Main characteristics of the farming system	
		Herd size, breeds	Keeping, feeding
Hill country zone	Milk	1-3 animals per unit; high share of European breeds (Holstein Friesian, Jersey, Ayrshire) and their crosses.	Intensive Permanent housing, good conditions; Zero grazing, feeding of concentrates
Mid country zone	Milk, meat	2-4 animals per unit. European crossbreeds	Semi-Intensive Fairly good housing conditions; mainly stall feeding, tethered grazing and moderate amount of concentrates; limited possibilities for pasture and fodder production on the farm.
Coconut Triangle zone	Meat, Milk	2-10 animals per unit Mainly European x Indian crossbreeds or Indigenous Zebu type (Sindhi, Sahiwal)	Semi-extensive Night housing; free grazing in coconut plantations, tethered grazing, stall feeding with little concentrates.
Low country wet zone	Meat, Milk	2-10 animals per unit Mainly Indian breeds (Sindhi, Sahiwal) x Indigenous Zebu type	Semi- extensive Night housing; mainly tethered grazing with stall feeding, no concentrates.
Low country dry zone	Meat	a few up to over 160 animals mostly indigenous Zebu type	Extensive system Night paddock; free grazing system with no concentrates.

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### **1.3 Status of the dairy sector**

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Dairying is a major component of the livestock industry in Sri Lanka and it is estimated that there are 600 000 milking and breeding animals with an annual milk production of 200 to 250 million litres per annum of which 70 to 75% is coming from neat cattle and the rest is from buffaloes. The dairy industry is based predominantly on smallholder system.

The formal milk collection is about 100 million litres per annum. Milk is collected through various channels and a typical system involves a group of farmers/farmer organizations supplying milk to near by chilling centre owned by milk processing companies direct or through a middle men.

The milk processing industry comprises liquid milk processing plants and powder re-packing plants. The milk processing in the island is mainly dominated by two major processors namely, Milk Industries of Lanka Company Ltd. (MILCO) procuring about 55% of the total annual milk collection and Nestle Lanka Ltd., handling about 40% of the total milk collection in the island. The total installed capacity of these plants is around 700 000 litres per day and the current utilization rate is about 30%.

The formal market for milk products dominated by whole milk powder (WMP) which accounts for about 80% of the total consumption on liquid milk equivalent basis.

Farm gate price of milk is very low in comparison with that of other countries of the region and presently it ranges between Rs. 10.00 and 12.50 per litre. The farm gate prices again vary according to the regions depending on the quality and composition, transport cost etc.

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## **2. Animal breeding programme**

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### **2.1 State Livestock Farms**

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The National Livestock Development Board being the only biggest organization involved in managing and breeding livestock by the state sector, operates 31 livestock farms at present with a total land of 17 200 ha. The main objective of these farms is to supply breeding stock to farmers in the island. Some of these farms are maintained as bull mother farms for production of bulls for artificial insemination and/or natural service programmes. Several programmes have been implemented to maintain elite cattle herds of pure bred Holstein Friesian, Jersey and Sahiwal herds in some of the NLDB farms by continuous selection. Similarly, pure bred buffalo herds of Murrah and Nili Ravi are also maintained by the Board. In addition, a cross breeding programme is also in operation to up grade and maintain crosses of Jersey, Sahiwal and Zebu breeds. The present nucleus stock of Holstein Friesian, Jersey, Sahiwal cattle as well as Murrah and Nili Ravi buffaloes have been imported from Australia, New Zealand, The Netherlands, India and Pakistan and the selected herds of this stock and it's followers have been inseminated with imported progeny tested proven semen. The bull calves of the above elite herd have also been selected and used in Natural and Artificial breeding programme.

About a decade back Department of Animal Production and Health had maintained 250 stud centres located through out the country. Several centres were located in the dry zone where the cattle density was high. The required bull calves for these centres were provided by the state farms and the bulls were rotated among the stud centres. The impact of the above centres was negligible.

A programme also was in operation to provide bulls and bull calves as well as necessary technical assistance to farmers through state extension service to establish service centres to potential farmers. This programme was also not so successful, as it's progress was not monitored.

Although the artificial insemination for breeding of cattle has been carried out for last 30 years, only 10% of the total breedable cattle population has been covered so far. Two hundred artificial insemination centres located through out the country perform about 100 000 inseminations annually with the assistance of 300 private and government technicians (See table 2). About 45% of the total AIs performed, have been carried out with Holstein Friesian semen, another 30% with Jersey semen and the rest with European or Zebu crosses.

Sri Lanka has been importing superior genetic quality cattle and buffaloes to up grade the elite herds in the bull mother farms. The imported bulls have been used for production of semen for AI programme. Superior bull calves of top bull mothers are selected at the age of one year and brought to a bull calves rearing centre. Physical, physiological and breeding parameters are closely monitored before bulls are used for semen production.

The Deep Frozen semen is collected, stored and distributed through out the country from the Central Semen Processing Centre located at Kundasale. The quality of the semen used in the field is also monitored by the centre. The imported progeny tested semen is used for breeding bull mothers kept in the bull mother farms.

The female calves born out of the AI programme is supported by a heifer calf rearing scheme with a view to producing healthy animals that reach the breedable age within 30 months and also to reduce the mortality. Fifty percent of the cost of feed is subsidized by the Government under the this scheme, if the calf achieves required weight.

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## 2.2 Natural breeding programmes

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## 2.3 Artificial insemination programme

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Table 2. Government and private technicians ( 1990-1995).

Year	Number of government technicians	Artificial inseminations	Number of private technicians	Artificial inseminations	Total artificial inseminations
1990	266	32 599	48	14 398	46 997
1991	266	37 217	58	15 573	52 790
1992	218	49 800	57	17 101	66 901
1993	248	56 063	67	17 453	73 516
1994	260	62 881	81	19 414	82 295
1995	248	81 021	67	20 481	101 502
1996	258	85 521	99	22 817	108 338

All the 31 State farms keep the individual animal record as well as the herd record in respect of production as well as reproductive parameters. Presently all the farms are using the software Dairy Champ which is a comprehensive computerized record keeping system for monitoring production, reproduction and health of animals. In addition, a continuous genetic evaluation is also carried out by the genetists of the Department of Animal Production & Health.

The smallholders having one or two cows very rarely keeps individual production records. Especially for the cattle herds in the dry zone where extensive management system is practised no records are kept. The only record that the farmers keep is the receipt issued by the milk collecting centre for the supply of milk.

In 1980 a pilot milk recording programme was initiated with the assistance of Swedish Government under CIDA artificial Insemination project with the objectives of providing a better extension service and ascertaining the impact of the AI programme. Under this programme both breeding as well as production parameters were recorded and maintained for the farms covered under AI. This programme was closely monitored by field officers visiting the farms regularly. The biggest constraint faced by the programme was movement of animals. Many farmers sold their animals due to limitation of land, inability to feed etc.

Artificial insemination recording system was initiated in 1980s with the implementation of CIDA artificial insemination project. The whole recording system is centrally computerised with a view to monitoring the performance and the efficiency of the AI programme, and evaluating the performance of bulls, quality of semen and performance of the technicians. The impact of the programme is also being analysed.

A system has been developed to record the details of herd structure and other parameters and of inseminations carried out using farm card called GVS 51. Over 50 000 farms have been registered through out Sri Lanka for this purpose. Feed backs are provided to farmers giving details of farmer, date of birth of cow, last calving date, AI date with code number of the AI centre, breed, bull number etc. as well as details of follow up actions to be carried out. A copy of the above receipt is sent to the Animal Breeding Head Quarters regularly. In addition, every follow up action taken is communicated to the Animal Breeding Head Quarters immediately in order to monitor whole breeding programme.

In order to make the project attractive to the technicians, an incentive programme is in operation under which technicians are rewarded financially on the basis of results achieved.

### 3. Animal recording

#### 3.1 Large state farms

#### 3.2 Record keeping

##### 3.2.1 Milk recording

##### 3.2.2 Artificial breeding programme

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#### **4. Past experience in animal recording**

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Since the colonial period, Sri Lanka has been importing cattle both *bos-indicus* and *bos-taurus*. The bulls produced from these cows have been distributed to farmers. However, neither any records have been kept in this connection nor attempts have been made to evaluate the programme. As a result of the land reform in 1970s the land owners were compelled to sell the high productive cows as well as bulls for slaughter as the available land for dairying became limited. Superior and well grown bulls were sold off by the farmers as they fetched better price from butchers leaving the inferior quality bulls for natural breeding. This resulted in deterioration of quality of animals.

Even though, artificial insemination programme was carried out, no systematic efforts have been made to put in place a genetic improvement programme. Farmers have also not been involved and motivated to keep records.

Convincing small farmers to keep records on the performance of their in a situation where animals are not giving them adequate returns is very difficult. Even though, there were several constraints decade with regards to animal recording, attempts have been made to record milk yield of animals with the purpose to identify high yielding crossbred cows and to inseminate them with progeny tested semen to salvage resulting bull calves and select them for breeding. Unfortunately this programme was off the ground due to the fact that the government could not organize a scheme to purchase bull calves produced under the programme.

However, some progress have been made to keep records of the animals involved in heifer calf rearing scheme initiated in 1993 and so far more than 5 000 heifer calves and their mothers have been covered. It has been observed that proper records in respect of milk production cannot be maintained as a result of suckling habits of the calves.

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#### **5. Conclusion**

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The genetic potential of the Sri Lankan herds in various agro-climatic regions at present is unknown. In addition, due to inadequate record keeping, monitoring of the performance of the herds cannot be done and the genetic evaluation of the bulls produced in these herds also can not be done.

Attempts have been made to carry out selection on subjective basis by giving emphasis on milk production and reproductive characteristics. It is realised that a genetic progress is not possible until a comprehensive scheme for animal recording is in place.

Priority must be given to initiate performance recording of the herds with a view to monitoring production as well as achieving genetic progress in the population. Such a programme could be implemented through the existing AI programme. For this purpose, AI technicians can be requested to collect the relevant information when they are visiting farms.

It is imperative to know the genetic quality of local and crossbred animals in order to achieve genetic improvement of the dairy herds. Sri Lanka Government has also recognised the importance of record keeping to increase the productivity of the animals and it has been decided to seek an international assistance to plan and to implement a long term programme of animal recording and genetic evaluation of animals.