STUDY ON CATTLE AND BUFFALO HUSBANDRY IN THE KIRINDI OYA IRRIGATION AND LAND SETTLEMENT PROJECT

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Research Study No.107 August 2000

Hector Kobbekaduwa
Agrarian Research & Training Institute
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FOREWORD

The Kirindi Oya Irrigation and Settlement Project (KOISP) has been one of the lead projects to develop Southern Sri Lanka in the eighties. The phase II of the KOISP was implemented during the period 1987-90 with funds provided by the ADB and the Government of Sri Lanka.

Traditionally animal husbandry has been a major economic activity in this area. However, development also took its toll on it by reducing traditional grazing lands, and thereby increasing crop damage caused by roaming animals.

Authors suggest that a long-term well conceived plan is necessary to remedy this situation and to develop animal husbandry in a sustainable manner. The study also provides basic information required for such an effort. Although the surveys were carried out in the early nineties, the insights provided by the authors remain valid even today.

I wish to thank the authors Messers Rohana Ulluwishewa and Rohan Jayasuriya for their thorough and comprehensive study.

Dr. S.G. Samarasinghe
Director

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Rohana Ulluwishewa
Rohan Jayasuriya

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CHAPTER ONE

Introduction

1.1 The Project

The Kirindi Oya Irrigation and Settlement Project (KOISP) is the largest new irrigation development project in the Southern Province. It was launched in 1979 with a view to achieving some of the government's long and medium term agricultural policy objectives. These objectives are meant to increase agricultural output, employment opportunities and enhance foreign exchange savings. They are to be achieved essentially through the provision of improved irrigation facilities, land settlement, and expanded support services and facilities.

Subsequent to the initial appraisal in 1977, this project was reformulated into two phases in 1982, because of the implementation delays and cost overruns (ADB, 1982). Phase I of the project was scheduled to be implemented during the five year period 1983-1987 and phase II of the project was to be implemented over a four year period 1987-1990. While phase I was funded by the Asian Development Bank (ADB), the International Fund for Agricultural Development (IFAD), the Kredittanstalt fur Weiderraufbau (Kfw) and the Government of Sri Lanka, Phase II was funded by the ADB and the Government of Sri Lanka.

According to the scheduled implementation programme, construction of Lunugamwehera (Kirindi Oya) reservoir, dam and appurtenant structures, construction of irrigation systems for 4200 ha of new land on the right bank (RB) and left Bank (LB) of Kirindi Oya, rehabilitation of 4600 ha of existing systems i.e. Ellegala System and Badagiriya, and related settle-

ment facilities and provision of supporting services for about 4200 settler families were to be completed by end of 1987 under the phase I. Phase II of the KOISP has been described as both geographical and functional extension of the phase I project (ADB, 1986). The phase II mainly covers the new areas in tracts 3,4, 6 and 7 on the right bank and tract 3 and 4 on the left bank of Kirindi Oya (Fig.1). Over the four year period it was expected to develop an additional 4,200 ha of new land with irrigation infrastructure facilities and construction of related settlement facilities for 4,200 settler families. In addition to irrigation and settlement components, phase II project also included several new components such as social forestry, livestock and dairy extension, agricultural extension, strengthening of credit and marketing etc.. However, implementation activities relating to additional components were to be extended to the phase I project area as well. Hence the project area referred to in this report covers both phase I & II.

1.2 Background of the Study

Although animal husbandry (neat cattle and buffalo) was a major economic activity in the project area, it was not incorporated into the phase I project. It was incorporated into the project only in its phase II. However, animal husbandry in the project still remains a grey area. It is widely known as 'the cattle problem' in the project area. The cattle problem has two dimensions : (1) it is stressful to the herdsmen because the grazing lands have been drastically reduced; and (2) it is a nuisance to the farmers as increased crop damages are caused by the roaming animals. A well conceived long-term plan is necessary to solve the problem and to develop animal husbandry as a major income-generating activity in the project area. This study is an attempt to provide basic information required for such a planned development of animal husbandry in the project area.

1.3 Objectives of the Study

The study aims to:

(a) understand the existing situation of animal husbandry in the KOISP;

(b) identify the limitations inherent in animal husbandry;

(c) assess the measures so far adopted to solve the problems of the cattle and buffalo husbandry; and

(d) suggest appropriate measures which can be adopted to solve the problem(s).

1.4 Method of Data Collection

The methodology adopted for data collection for this study involved, a rapid appraisal and a questionnaire survey. The rapid appraisal was undertaken during the period March-May 1991 with a view to identifying different management systems of cattle and buffalo husbandry in the project area and collect background information pertaining to the major characteristics, problems and issues of each management system. Then, the questionnaire survey was undertaken during the period June-October 1991 to collect requisite quantitative data systematically.

1.4.1 Rapid Appraisal

The rapid appraisal involved a series of 'short cut' methods of information collection: (1) rapid review of available documents, (2) guided interviews, group interviews and informal interviews with the identified key informants, and (3) direct observations. The rapid appraisal was undertaken by the senior researcher with the help of a field investigator.

(1) Review of Available Documents: Apart from the books, monographs and research articles on cattle and buffalo husbandry in Sri Lanka, some published reports on KOISP, e.g. appraisal reports, reports pertaining to the benefit monitoring and evaluation programme were reviewed. Official records available in the Hambantota Katchcheri, office of the Hambantota Integrated Rural Development Project, Police Stations, Veterinary Surgeon's offices in Tissamaharama and Hambantota, and records available with

Grama Niladharis, and minutes of the meetings of the Project Management Committee (PMC) and the Central Coordinating Committee (CCC) of the KOISP were reviewed in order to collect latest information relevant to the study. Maps and aerial photographs were also studied with a view to understanding the geographical background of the area.

(2) Interviewing Key Informants: The knowledgeable persons who were identified as key informants were, a) local officers of the institutions related to the agriculture and animal husbandry, b) representatives of the relevant local organizations, c) employees of the local milk collecting centres and chilling centres and d) randomly selected herdsmen, curd producers, cattle buyers, and curd sellers. Guided interviews and informal discussions were held with some selected key informants. In order to cover wider geographical areas and wider subject areas, group interviews were held with the key informants selected from various subjects and different geographical areas of the project.

(3) Direct Observation: In addition to collecting data by reading and listening, direct observations were also made in order to cross check the information given by the key informants, and to identify the issues which were not mentioned in the discussions. Several site visits were made to cow-pens and the herdsmen's temporary lodges (wadiya) in jungles, milk collecting centres, milk chilling centres, and the mini dairy of the Mahaweli Draught Animal and Dairy Development Programme (MDADDP), and activities in each site were observed. At the time of observation, informal discussions were made with the respondents on the identified issues.

1.4.2 Questionnaire Survey

Four types of management systems were identified from the rapid appraisal : (1) traditional system, (2) jungle based system, (3) migrating system and (4) village based system. Purpose of the questionnaire survey was to quantify the information collected from the rapid appraisal rather than to collect more information. It has been decided to limit the sample

size to 65 and to draw the samples from each management system in proportion to the total number of herdsmen in each system. But there was no reliable statistics on the number of herdsmen and the animal population in the project area. In order to collect data on the number of herdsmen in each management system, all Grama Niladharis in the project area were requested to provide such data. But their response was poor, and subsequent cross checking revealed that the provided information was inaccurate. However, this information provided a basis to estimate the approximate percentage values of herdsmen in each type of management practice. It was on this basis that the samples were drawn from the identified types of management systems (Table 1.1).

Table 1.1: Distribution of Sample Households

	Traditional	Jungle Based	Migrating	Village Based
LB	-	-	10	11
RB	03	-	06	12
OA	03	05	1	04

The questionnaire was structured with a view to collecting detailed quantitative data on the following aspects of each management system.

(a) Socio-economic data
(b) Herd characteristics
(c) Feeding practices
(d) Animal health
(e) Labour utilization
(f) Cost and herd income
(g) Use of extension and supporting services

The questionnaire was pretested, revised and finalized. Then it was administered to the selected herdsmen in each management system, by the researchers with the help of a field investigator.

1.4.3 Data Processing and Analysis

Coding and computerizing of data was done by the trained investigators of the Data Processing Unit of the ARTI. Computer data analysis was done by the senior researcher in two stages: (1) simple frequency distribution of each variable, (2) cross tabulation of related variables.

1.5 Limitations of the Study

The prevailing dearth of literature on the subject somewhat constrained this study. Accurate statistics on cattle and buffalo population were not readily available. Whatever available statistics proved to be underestimations and estimates of different sources also varied from one another significantly. The report of the baseline study of cattle and buffalo husbandry in the KOISP which was conducted in 1987 by the Livestock Centre of the MDADDP was not available either in the Livestock Centre of the project or in its Head Office in Colombo. The CCC of the KOISP was also requested to take action to make it available to the research team, but it was also not successful. Very often the herdsmen were either reluctant or unable to provide accurate statistics on the herd size because there is no tradition of keeping accounts as it is done in industrial societies. It was realized that they never count their animals, and also they do not like outsiders counting the heads. When they are asked the number of animals in their herds, they very often give heavily underestimated numbers. This is because they are unwilling to give the exact numbers in their herds for fear of evil eye. Therefore, in order to get correct herd numbers the researchers had to spend much time and to make much effort to cross check the given information. The same was the case when information on income and expenses were asked. The herdsmen were either too busy or unwilling to talk to the researchers. While in the mornings they are busy with milking and milk transportation, in the evenings they were busy with assembling the herds for animal protection. During the mid-day when they are little free, they are often involved in various other household tasks. Therefore, several visits had to be made to meet any single herdsman. It was felt that at the time of this study most of the herdsmen in the area were fed up with talking to officers of various ranks

about their grievances. Most of the herdsmen interviewed were frustrated and pessimistic about the future of their livelihood. Hence, it was very difficult for the researchers to get them involved in fruitful discussions. Data collection from site visits and direct observations were severely constrained by the poor access to the jungle based herdsmen. In some cases, the researchers had to walk several miles in jungles to get access to the milking sites.

1.6 The Study Area

The project area is in the southeastern dry zone of the island, about 260 km by road from Colombo. Although the command area of the KOISP is located in the district of Hambantota, the dam and the reservoir are located in the Monaragala district. A tropical monsoon climate prevails in the area with mean monthly temperature ranging from 26 c to 28 c. The mean annual rainfall is about 1,000 mm and has a distinct bimodel pattern. About 75 per cent of this animal rainfall is received during the wet season (*Maha*) which extends approximately from October to January. The dry season (*Yala*) extends from April to September.

The topography of the project area is somewhat undulating with slopes up to 8 percent. Based on the potential for crop production, the soils in the area have been broadly classified into three categories (1) Upland:well drained reddish brown earth (RBE) soils which cover about 40 per cent of the area, (2) Intermediate mixture of RBEs and low humic gley (LHG) soils which covers about 10 percent of the area, (3) Lowland : poorly drained Low Humic Gley soils (LHGs) which cover about 50 per cent of the area. Soil pH of the project area ranges from slightly acidic to neutral. The natural soil fertility is generally low except for the alluvial soils of the lowlands.

The project area with its surroundings has traditionally been an important cattle and buffalo raising area. Hambantota curd more precisely the 'Ruhunu Curd' (cultured from buffalo milk) is particularly famous. Neither poultry nor swine are of importance, principally for cultural reasons, although small number poultry are present. Large ruminants continue to

play an important role in the area. The cattle are of unimproved *Bos indicus* type, (*batuharak*), small, brown in colour and of low productivity. Mature body weight is typically under 200 kg and cows rarely present their first calf in less than four years. Milk production is low, generally 250 liters per lactation. The indigenous buffaloes, *Bubalus bubalis*, is smaller than those found in other Asian countries and rarely exceeds a mature live weight of 350 kg. Milk yield ranges from 300-400 liters per lactation. Both are, however, well adapted to survival within a relatively harsh environment and a low level of feed regime. The Census of Agriculture (1982) indicates that some 12 per cent of agricultural holdings in the district have either cattle or buffaloes. But ownership is heavily skewed with the vast majority of animals being owned by a very small number of persons. Generally these livestock owners do not have land to support their large herds, and cost free feed is obtained by ranging the herds in jungles and in the fallow paddy fields. The actual number of animals is not known with certainty, there being discrepancies in the census figures. The Census Dept. suggests that 50 per cent of cattle and 19 per cent of buffaloes in the Hambantota District confine to the Tissamaharama AGA division which is located within the project area. Returns from Revenue Officers show that from 75,000 cattle and 82,000 buffaloes in the Hambantota, 11,250 cattle and 15,600 buffaloes confine to the environs of Tissamaharama. However, discussions with key informants prompt to conclude that actual figures are considerably higher than these official figures.

CHAPTER TWO

Present Status of Cattle and Buffalo Husbandry in the KOISP

2.1 Historical Background

The KOISP area is located in the ancient Ruhuna kingdom which was very prosperous once in the history. Ruhuna established itself as a kingdom only after King Mahanaga (brother of King Devanampiyatissa) who left Anuradhapura and took up residence at Ruhuna. He laid the foundation for the progress of this region by building a network of irrigation system. He used the Kirindi Oya to build Tissa Wewa, Yodha Wewa, and Debara Wewa and transformed the surrounding area into a fertile fields. Consequently, a number of kings such as Dutugemunu (161-37 B.C.), Walagambahu (103 - 89 B.C.), Vassbha (76 - 111 A.D.), Gajabahu (114 - 36 A.D.) and Parakramabahu I (1153 - 86 A.D.) contributed their services to the prosperity of Ruhuna by building a vast network of irrigation reservoirs. Apart from the large-scale irrigation tanks which were built up by constructing embankments across the rivers, hundreds of small-scale village irrigation tanks were also built up in order to store rain water. When Ruhuna began to decline in prosperity by end of 12th century due to internal instability and foreign invasions, these irrigation systems too started to ruin.

The present progress of this area commenced in the early 19th century with the restoration of ancient large-scale irrigation tanks and the establishment of colonization schemes. But the hundreds of small-scale village irrigation tanks continued to remain dilapidated in the

jungle. Resettlement of the jungle-clad small-scale villages under minor irrigation tanks was accompanied with cattle and buffalo husbandry and chena cultivation. Without irrigation, this area offers very limited prospects for crop cultivation. The more sustainable forms of human activities were therefore, animal husbandry and chena cultivation. It is believed that the pioneer settlers of the 20th century here were herdsmen who left the Wet Zone due to the increased pressure of human activities limitating grazing lands.

They settled in the vicinities of the irrigation tanks to facilitate easy access of animals to drinking water and wallowing sites in these tanks. While animal husbandry was the major occupation of these new settlers, they also cultivated chenas in the jungles near by to supplement their income and secure food during a good part of the year. Paddy was cultivated only if sufficient rainfall is received retaining some amounts of water in the dilapidated tanks. Buffalo and cattle were mainly used for draught and milk. The herdsmen hired the available animal power to the seasonal paddy cultivators. Whenever the settlers in a particular village found that the resources available within the village were insufficient to support its human and animal population, some of them left that village for re-settlement near another ruined tank in the jungle. So the process continued slowly until the settlements spread into the interior jungle areas. There are evidence to prove that many of the villages in this area were founded by herdsmen.

2.2 Pre-KOISP Cattle and Buffalo Husbandry

The traditional system of cattle breeding was an extensive, minimum input and low output system. While the non-lactating cows and adult male animals were allowed to stay in jungles adjacent to the village, the lactating cows and calves were kept closer to the dwellings. To protect calves from adversities normally at night, cow-pens were maintained behind the village irrigation tank minimizing the distance to the tank-water, to the jungle and to the settlement (*gangoda*). Every evening, lactating cows were released into the jungle, keeping the calves in the cow-pen. Milking was done every morning when the cows returned to their

calves. The non-lactating cows and adult males which brouse mostly in the jungle, leave their seasonal jungle habitat to spend time in grazing in the fallow paddy lands in the village. The animals when necessary are used for land preparation and to meet power required in other agricultural performances and then they were released again to the jungles. The main aims of rearing cattle and buffaloes were using them for animal power and to obtain milk. However, ownership of large herds is a prestige in rural life. It represents one's wealth, power and social status. Ownership of animals was confined to a few who maintained large herds ranging from 400-1500.

Labour was the major input that went for the rearing of cattle and buffaloes under the traditional management system. While the management of animals and milking was done by men, curd production and marketing was done mainly by women. Market for the fresh milk was very limited. As the demand for beef in the urban market increased, brokers of the urban-based butchers began to operate in this area. They purchased excess animals and transported them to the urban areas. There was no conflict between the herdsmen and the crop cultivators, because both groups were mutually benefited. Service of cattle and buffaloes was an essential requirement for the farmers since the animal draught power was the only source of power for paddy land preparation and threshing. The farming system was a crop-livestock integrated system. In many cases, the owners of animals and the owners of farms were the same. All cultivated lands were encircled by strong fences in order to protect crops from the roaming cattle and buffaloes as well as from the wild animals. Dates for the erection of fences were decided at the *Kanna* meetings which were held at the beginning of every cultivation season, and the cultivation headman (*Wel Vidane*) strictly enforced the decision. Therefore, there was harmony between crop and livestock sectors.

2.3 Modern Development and the Cattle and Buffalo Husbandry

2.3.1 Tractorization

Introduction of tractor ploughing into the area in mid-20th century was

a critical event which brought major changes. After the introduction of tractors the demand for animal draught power in land preparation and threshing declined steadily. Consequently, male animals became an unnecessary burden which prompted the sale of male animals for meat. The touts and brokers of unscrupulous urban based butchers who were already in active operation in the area accelerated the trade. The cattle owners were tempted in numerous ways to sell their male calves when they are just 2-3years old, causing a rapid depletion of adult males in the animal population.

2.3.2 KOISP Activities

Implementation of the KOISP enabled to bring into light some negative effects on the cattle and buffalo husbandry in the new area as well as in the old area of the project. Before the implementation of the KOISP, the present new area of the project was primarily covered with jungles. There were many small-scale dilapidated village irrigation tanks still in operation which were the source of drinking water and ideal sites for wallowing for thousands of cattle and buffaloes. However, the necessity of the maintenance of these jungles and the small-scale village irrigation tanks to foster the cattle and buffalo husbandry has not been fully realized in Phase I of the project. At the beginning of the implementation of the project, an extent of 1800 ha of jungles which were used as grazing grounds for cattle and buffaloes was indiscriminately and more disastrously cleared, and a large number of small-scale irrigation tanks which provided drinking water and wallowing sites were drained out and levelled in the process of development.

The herdsmen in the old area of the project were confronted with two major problems as a result of the project: (1) with jungle clearing under the project development in the new area the extent of the traditional grazing land shrinked drastically causing shortages in the required animal feed. (2) the development activities of the project facilitated double cropping in the old area of the project thus shortening the fallow period of paddy fields in a year severely curtailing the time of keeping animals for feeding in them.

2.3.3 Adjustments

To cope with new problems created by this development project, the herdsmen were compelled to make new adjustments. There are three such adjustments which need emphasis here.

(1) Jungle Based System: Some herdsmen moved with their herds into the jungles and remained in far away localities outside the project. They, having built up cow-pens (*gala*) and temporary huts (*wadiya*) near the abandoned tanks which they found in the jungle, started to feed their herds in the jungle in the same way that they did in the village. Such herding prevails can be found in the upper catchment areas of the Lunugamwehera reservoir, Kadawarawewa, Bundala and Yala sanctuaries. They heavily depend on stationed hired labour for animal watch and the owners daily travel from their resident villages to their herding sites for overall supervision of the activities.

(2) Migrating System: Some herdsmen, in response to the increasing shortage of grazing land, adopted the practice of seasonal migration. During the cultivation season they feed their herds in the jungles outside the project. While the majority of the migrating herdsmen in the Right Bank (RB) seasonally move their herds to the western part of the Lunugamwehera Upper Catchment Area (LUCA) and Kadawarawewa, the others in the Left Bank (LB) and Ellegala System move to the eastern part of the LUCA, Amarawewa and Bembawa grazing grounds (Fig. 2). When the paddy fields in the project area is in fallow they return to the farming areas in the project to feed the animals on paddy residues. Animals are kept at night in the temporary cow-pens put up adjacent to the fallow paddy fields. Herdsmen in this management system too, heavily use hired labour.

(3) Village Based System: Some herdsmen reduced the size of their herds to the extent that they could feed with the resources available within the village and confined the movement of animals

to the boundaries of their villages or hamlets. During the cultivation period, the animals are mainly grazed on road-sides, canal-sides and in reservations. In order to prevent the animals from damaging the crops, the grazing animals have to be kept under the supervision of herdsmen during the day time and confine the animals to pens during the night. During the fallow period, the animals are kept in the fallow paddy fields adjacent to the settlement areas. Cattle and buffalo husbandry in this system is entirely dependent on available family labour.

Some herdsmen in certain locations where jungles are still available in the catchment areas of the irrigation tanks, i.e.old area of the project, still practise the traditional system of cattle and buffalo husbandry with some modifications. Similar to the traditional system, they graze their animals on the fallow paddy fields and in the jungles adjacent to the village. But in contrast to the traditional system, they do not leave the non-lactating animals to stay in the jungles for longer periods. Instead, they keep the non-lactating animals together with the lactating animals, and get all the animals back to the cow-pen site in every morning.

From the foregoing, four types of management systems can be identified: (1) traditional system (2) jungle based system (3) migrating system and (4) village based system. The table 2.1 shows the distribution of the management systems in the KOISP area. It seems that while the majority of the herdsmen in the new area of the project belong to the village based system, the majority of the herdsmen in the old area belong to the traditional and migrating systems.

2.4 Present Characteristics of Cattle and Buffalo Husbandry

2.4.1 Socio-economic Characteristics of Herdsmen

It is evident from the results of the present study (Table 2.2) that the social status of the herdsmen in terms of income, land ownership, herd size, and political and social power substantially vary with the management system adopted.

Table 2.1 : Distribution of Management Systems in the KOISP

Management System	Left Bank	Right Bank	Old Area
	%	%	%
Traditional System	00	15	25
Jungle-Based System	00	00	10
Migrating System	40	27	48
Village-Based System	60	57	17

Source: *Grama Niladhari* Records, 1991

Table 2.2: Socio-Economic Characteristics of Herdsmen

Management System	Land Ownership		Herd Size	Household Income Rs/Month
	Paddy (Ac)	Upland (Ac)		
Traditional	1.9	0.58	67.3	3250.00
Jungle Based	2.5	0.91	447.6	11420.00
Migrating	2.1	0.83	76.0	7650.00
Village Based	2.36	0.54	16.8	1240.00

Source: Field Survey, 1991

All these parameters which indicate the social status are quite significant in the jungle based system. While the migrating system and the traditional system rank second and third, the village based system is the lowest in rank order. While animal husbandry is the major source of income for the majority of jungle based and migrating herdsmen, most of the traditional and village based herdsmen are engaged in paddy cultivation and chena cultivation. Those who keep their animals in jungles with the aid of hired labour, are involved in paddy cultivation and various other income-generating activities. The village based herdsman are mainly new settlers in the project and they are paddy cultivators.

To them animal husbandry is a secondary source of income.

2.4.2 Herd Composition

While 56 per cent of the domestic bovines in the project area are buffaloes, 44 per cent are cattle. Though the buffalo population is higher than the cattle population, only 24 per cent of herdsmen keep buffaloes only. While 56 per cent of the herdsmen keep cattle only, 20 per cent keep both cattle and buffaloes. However, it can be noticed from the table 2.3 that the herd composition considerably varies with the management systems. It is evident that while the majority of the herdsmen who manage their animals under the traditional system keep buffalo only, the majority of the herdsmen who manage their animals under the village-based system keep cattle only. Others, show a sort of mixed preferential pattern.

Table 2.3: Herd Composition by Management Systems

Management System	Buffalo Only	Cattle Only	Both
	%	%	%
Traditional	66	34	00
Jungle-Based	34	00	66
Migrating	33	37	29
Village-Based	07	81	11

Unit: Percentage of herdsmen
Source: Field Survey, 1991

Table 2.4 shows the correlation between the herd composition and the management systems. It enables to conclude that the herdsmen who keep their animals in association with jungles prefer buffaloes whereas the herdsmen who keep their animals within the settlement areas throughout the year strongly prefer cattle. The former group consider cattle as beef animals rather than milk animals. Milk yield is relatively low due to genetic reasons and poor feed available. The price of milk is low due to

Table 2.4: Distribution of Cattle and Buffaloes by Management Systems

Management System	Buffaloes	Cattle
	%	%
Traditional	58	42
Jungle-Based	77	23
Migrating	52	48
Village-Based	06	94

Unit: Percentage of Animals

Source: Field Survey, 1991

the low fat content. On the other hand, the reproduction rate of cattle is higher than that of buffaloes due to low rate of calf mortality among the former. The local agents of butchers offer better prices for cattle than for buffaloes. This is because killing buffaloes for meat is illegal though it is done on the sly to enhance beef supply to the urban population.

(1) Buffaloes have the habit of grazing during the night and wallowing during the day time. Free grazing during the night is not possible within the settlement areas where cultivated lands are widespread whereas it is possible in the jungles which are located away from the cultivated areas.Therefore, the village-based herdsmen cannot keep buffaloes. They prefer cattle since the cattle have the habit of grazing during the day time. When they graze during the day time the herdsmen can watch the animals and prevent them from causing crop damages whereas it is not possible in the case of buffaloes which graze mostly during the night.

(2) Buffaloes generally move in compact flocks whereas neat cattle often tend to disperse when they move. Hence, when the cattle are kept in jungles, it is extremely difficult for the herdsmen to herd them together. Therefore, cattle are less suitable for the management systems under which animals are maintained in jungles.

Table 2.5: Breed Composition by Management Systems

	Traditional %	Jungle Based %	Migrating %	Village Based %
Pure-Bred	0.0	3.5	0.0	1.0
Cross-Bred	3.0	30.0	6.5	19.0
Native	97.0	66.5	94.5	80.0

Source: Field Survey, 1992

Table 2.5 gives data on breed composition by management systems. In general, indigenous breeds account for the majority in all management systems. However, percentages of pure-bred (3.5 per cent) and cross-bred animals (30 per cent) are quite significant in the jungle based system. In the village based system, high-bred and cross-bred animals account for 1 per cent and 19 per cent respectively. High-bred animals were not reported from traditional and migrating systems.

2.4.3 Herd Size

It can be noticed from table 2.6 that the herd size ranges from 17 to 448 with varying management systems. While the herd size is largest in the jungle based system, it is smallest in the village based system. It seems that the herd size is positively correlated with the length of time that the animals are kept in jungles. In jungle areas, if water is adequately available, there is no shortage of feed, and any single person can watch a large number of animals. On the other hand, when the animals are kept in jungles, hired labourers has to be employed, because the owner has to be away from the jungle-base to market milk and attend other household tasks. The cost involved in animal husbandry is substantially high when the animals are kept in jungle areas due to the payments for hired labour, cost of food and shelter in jungles, and the cost of travel between jungles and residence, and between the jungles and milk collecting centres. Therefore, the herdsmen who keep their animals in jungles for prolonged periods tend to expand their herds in order to reduce the cost

per animal and increase income. All these factors account for the correlation between the herd size and the length of the period during which the animals are kept in jungles.

Table 2.6: Average Herd Size by Management Systems

Management System	Herd Size
Traditional	67.3
Jungle Based	447.6
Migrating	76.0
Village Based	16.8

Source: Field Survey, 1991 2.4.4 Age Structure of Herds

2.4.4 Age Structure of Herds

The table 2.7 shows that the adult male animal population is substantially low. This is because most of the herdsmen sell off their male stocks for meat at the age of 2-3 years. Maintenance of male animals is a burden, notably because draught animal power, has been already replaced by tractors. Therefore, the herdsmen sell their male stocks at the earliest available opportunity. Disposal of male animals also reduces the pressure on the existing feed resources. Male stocks are sold once or twice per year depending on the herd size. It is interesting to note that the birth rate of male animals is slightly higher than that of females. This trend is evident among cattle as well as buffaloes.

Table 2.7: Age Structure of an Average Herd

Age (Months)	BUFFALO		CATTLE	
	Male	Female	Male	Female
0-8	9.75	5.77	5.65	4.30
8-12	6.00	4.74	5.54	4.45
12-36	6.40	7.05	3.96	7.13
Over 36	2.20	31.91	0.73	16.12

Source: Field Survey, 1991

from the table 2.9 the mortality rates, calf as well as adults, are significantly lower under the jungle based system. This may be due to diversity and higher nutritional value of the jungle fodder. The highest mortality rates were reported in the traditional system. However, the large majority of the herdsmen in all management systems have failed to identify the causes of the death of their animals. According to those who could identify the most common reasons for the calf mortality were Haemorrhagic Septicaemia (63%) parasitism (25%) and Pneumonia (12%). The adult mortality rate too varies in the same pattern with maximum in the traditional system and minimum in the village based system. For the mortality of adults, the major reasons were Haemorrhagic Septicaemia and the Foot & Mouth disease in all management systems. It seems that accidents have also substantially contributed to the mortality among calves as well as adult animals. Some common accidents were getting caught to traps, falling into gem pits or wells, and being shot by trap guns. It is also evident that calf mortality rates among buffaloes are substantially higher than that of cattle. Unlike cattle, buffalo calves require shelter, extra food and care. But most of the herdsmen do not provide such facilities for calves.

Table 2.9: Calf and Adult Mortality

Management System	Calf Mortality		Adult Mortality	
	Buffalo	Cattle	Buffalo	Cattle
	%	%	%	%
Traditional	42.6	25.4	4.5	3.2
Jungle Based	23.0	8.3	2.3	1.9
Migrating	36.5	17.6	3.4	2.7
Village-Based	38.0	18.8	1.2	0.9

Source: Field Survey, 1991

Most of the herdsmen get their animals vaccinated against Haemorrhagic Septicaemia (HS) and Foot & Mouth disease. There were a few cases of vaccination against Rinder Pest too. While only the calves (3 - 24 months in age) are vaccinated against HS, both calves and adults are vaccinated against the Foot & Mouth disease. Percentage of animals vaccinated ranges from 60% to 80% in all management systems. How-

ever, the herdsmen in the village based system show a poor interest in vaccinating their animals.

2.5 Herd Profitability

Table 2.10 shows analysis of herd profitability according to different management systems. Gross herd income was estimated by summing up the income from milk, income from sales of animals and the increase in the value of the stock over the years due to inflation. From the gross income, all the expenses were deducted to obtain the net herd income. The net herd profit was estimated by deducting imputed cost of family labour and imputed interest on capital from the net herd income. The percentage return on capital was calculated by subtracting the imputed interest on capital from the net herd income and expressing it as a percentage of capital. The return of family person day was obtained by subtracting the cost of family labour from the net herd income and dividing this by family person days per annum. It is interesting to note that in contrary to the common belief, sales of animals for beef accounts for more than half of the net herd income (cash) in migrating and traditional systems. The percentage of income from milk ranges from 38 per cent (traditional system) to 78 per cent (jungle based system). Labour is the most important cost item in the all four management systems. In the village based system, labour accounted for 88 per cent of the total expenses. It is 74 per cent, 71 per cent and 68 per cent in traditional, migrating and jungle based systems respectively. Fuel accounts for 22 per cent and 15 per cent of the total expenses in jungle based and migrating systems under which most of the herdsmen use motor cycles for the transportation of milk. Compensation payments for crop damages caused by the roaming animals is also an important cost item in the traditional system where it accounts for 11 per cent. Such compensation payments were not recorded in the jungle based system. In the village based system and the migrating system compensation payments for crop damages accounts for 3 percent and 2 per cent of the total cost. Cost of feeds was recorded only in the village-based system. Veterinary expenses account for only 1-3 per cent of the total expenses in all management systems. Cost per livestock unit was obtained by dividing the total expenses (except the imputed interest on capital) by the number of

livestock units in each management system. While the maximum cost per livestock unit was found in the migrating system, the minimum cost was in the traditional system.

Table 2.10: Profitability of Cattle and Buffalo Husbandry by Management Systems

	Traditional	Jungle Based	Migrating	Village Based
No. of Herds	6	5	27	27
Average Herd Size	63.3	447.6	76.0	16.8
Livestock Units	42.25	270.94	47.66	11.7
Rs.	Rs.	Rs.	Rs.	
INCOME				
(1) Milk	25346	223499	29315	8149
(2) Sales of Animals	36625	64800	47166	6531
(3) Stock Inflation (14%)	12801	88333	18226	3973
GROSS INCOME	74772	376632	94707	18653
EXPENSES				
(4) Ropes	562	6666	1224	779
(5) Hired Labour-Wages	0	48000	11380	0
(6) Hired labour-Food	0	41040	12486	0
(7) Fuel	0	49200	11337	0
(8) Compensation for crop damages	2900	0	5003	375
(9) Veterinary	475	7383	1122	410
(10) Feeds	0	0	0	198
(11) Depreciation/Maint.	3020	6268	2806	185
(12) Equipment (non-durable)	10	73	26	2
NET HERD INCOME	67805	218002	49323	16704
(13) Family Labour	20156	59643	30102	14850
(14) Imputed interest on capital (12%)	11565	76893	16438	3536
NET HERD PROFIT/LOSS	36084	81466	2783	-1682
RETURN ON CAPITAL %	49	25	14	6
RETURN/FAMILY LA. DAY	209	177	82	66
NET HERD INCOME/L.U.	1605	805	1035	1428
NET HERD PROFIT/L.U.	854	300	58	-144

Source: Field Survey, 1991

Note (1) : Livestock Unit

Cows in milk = 1; Non-lactating cows and bulls = 0.8;
Heifers = 0.6; Steers = 0.4; Calves = 0.25

Note (2) : Productivity Parameters of Profitability

	Traditional	Jungle Based	Migrating	Village Based
No. of Herds	6	5	27	27
(1) Herd Size	63.3	447.6	76.0	16.8
(2) Livestock Units	42.2	270.9	47.6	11.7
(3) % of Buffaloes	58.0	77.0	52.0	6.0
(4) Calving Rate-Buffalo (%)	56.0	50.0	53.0	69.0
(5) Calving Rate-Cattle (%)	60.0	58.0	63.0	73.0
(6) "Interval-Buf.Months	21.3	24.0	22.6	17.3
(7) "Interval-Catl.Months	19.9	20.5	18.91	16.4
(8) Cows in Milk	12.1	98.3	16.4	5.2
(9) Cows Normally Milked	16.8	111.3	23.2	7.4
(10) Non-lactating Cows	18.8	104.9	16.5	2.8
(11) Lactate .yield (Buf.) Lit.	252.0	224.0	210.0	322.0
(12) Lactat.yield(Cat.)Lit.	160.0	200.0	208.0	240.0
(13) Family Labour Days per Herd per Year	268.7	795.2	401.3	198.2
(14) Hired Labour Days per Herd per Year	0.0	949.0	185.0	0.0
(15) Stock Value (Rs)	91440.0	630950.0	130186.0	28389.0
(16) Capital value of Paddock (Rs)	4040.0	6030.0	4582.0	964.0
Durable Equipment (Rs)	897.0	3792.0	2214.0	125.0
(17) Repairs/Maintenance Paddock (Rs)	134.0	300.0	152.0	32.0
Bicycle/Motor Cycle (Rs)	2333.0	4833.0	1827.0	37.0
(18) Person Days/L.U.	6.3	6.4	12.3	16.9
(19) Cost of Production Milk/Litre (Rs/Lit)	14.57	13.00	26.80	16.17
(20) Milk yield/Day Buff(Lit)	1.8	1.6	1.5	2.3
Cattle(Lit)	1.0	1.4	1.3	1.5
(21) Calf Mortality Buff. (%)	42.6	23.0	36.5	58.3
Cattle (%)	25.4	6.0	17.6	15.8
(22) Cost/Livestock Unit (Rs) (less interest)	642.00	800.00	1584.00	1436.00
(23) Income from sales of Animals (%)	59.0	22.0	62.0	44.0

Source: Field Survey, 1991

The results show that cattle and buffalo husbandry in the project area generates profits in all management systems except the village based system. The net herd profit ranges from Rs. 2783 in the migrating system to Rs. 81466 in the jungle based system. The net herd loss in the village based system is Rs. 1682. The results also indicate that the profitability of cattle and buffalo husbandry in the area is mainly determined by the labour requirement per livestock unit. While the highest profitability is reported in the traditional system where the labour requirement per livestock unit is minimum (6.3 person days), profitability is minimum in the village based system where the labour requirement is maximum (16.9 person days). Cost per livestock unit too varies in the same pattern.

In all profitable management systems, the return per family labour day is well above the opportunity cost of family labour in the area (Rs.75.00). The return on capital is also above the rate of interest on livestock loans (12 per cent) in all profitable management systems. In the village based system which is unprofitable, the return on capital and the daily return per family person day is 50 per cent and 17 per cent lower than the opportunity cost of respective items. To compute the net herd income per livestock unit, the net herd income was divided by the number of livestock units in each management system. The net herd income per livestock unit is maximum in the traditional system (Rs. 1605) and is minimum in the jungle based system (Rs. 805). It indicates that cattle and buffalo husbandry performs better in the traditional system than all other management systems. Next to the traditional system, the village based system shows better performance. The net herd profit per livestock unit, was obtained by dividing net herd profit by the number of livestock units in each management system. While the village based system, recorded a net herd loss, all other systems recorded net herd profit per livestock unit. In the village based system, income per livestock unit is not sufficient to cover the imputed family labour and capital costs.

The results clearly indicate the significance of the income from the sales of animals for the herd profitability. If there is no income from the

sales of animals, cattle and buffalo husbandry would not be profitable in all management systems except the jungle based system. For instance, in such a case, net loss per livestock unit would be Rs.932, Rs. 702 and Rs. 13 in migrating, village based and traditional systems respectively. It was also found that the cost of milk production exceeds the farm gate price of milk (Rs.7 - Rs.11) in all management systems. Hence, the cattle and buffalo husbandry only for the purpose of milk production, is non-profitable. It is the income from the sales of animals which make the cattle and buffalo husbandry profitable. On the other hand, removal of the non-productive animals reduces the unnecessary expenses on unwanted animals and relieve the pressure on the available limited grazing lands. Therefore, it seems that the sales of animals for beef substantially contribute to the profitability of cattle and buffalo husbandry in the project area by increasing the herd income and reducing the expenses.

CHAPTER THREE

Problems of Cattle and Buffalo Husbandry in the KOISP

3.1 Shortage of Grazing Lands : Causes and Consequences

3.1.1 Clearing of Jungles and Scrublands

Prior to the project, the new area of the KOISP was covered with jungles and scrublands. Based on the interpretation of aerial photographs taken in 1956, about half of the project area was estimated to be under jungles of various kinds. Preliminary studies of more recent photographs indicate that the forest land comprised scrub jungles (regrowth of forest after some years of shifting cultivation) and primary forest. Within these jungles and scrublands, there were hundreds of small-scale irrigation tanks both ruined and operative (Fig.3).These tanks provided drinking water and wallowing sites for the animals. So, this area was ideal for the traditional extensive system of cattle and buffalo husbandry. This is the area where the majority of herdsmen used to graze their animals. This area represented the heart of the Ruhunu dairy industry.

It seems that the project has underestimated the significance of these jungles and scrublands for the very existence of the local dairy industry. The project's concern was only the timber value of these jungles and scrublands. The Phase I appraisal report states that 'The scrub jungle has no economic value except for firewood. Because of the dry conditions, which permit limited wood growth only, the primary forest is also of low timber quality'. Significance of the jungles and scrublands as a source of

fodder for the thousands of cattle and buffaloes, and as a source of income for the herdsmen was overlooked. At the very inception of the project, a large part of the jungles and scrublands of this area was removed and a part has submerged under the reservoir. Development of irrigation area entailed clearing of nearly 6,000 ha of jungles and scrublands. This is the root of the present crisis of cattle and buffalo husbandry in the project area.

3.1.2 Destruction of Small-Scale Village-Irrigation Tanks

When the new irrigation system was developed, most of the small-scale village irrigation tanks and associated canal systems which were used by the domestic cattle and buffaloes for drinking water and for wallowing were destroyed, levelled and developed for paddy fields. Some of the village irrigation tanks which were destroyed are

- Asarappuliwewa
- Lassanawewa
- Galwewa
- Tammannawewa
- Kodigahawewa
- Beralihelawewa
- Bogahawewa
- Punchi Appuduwewa
- Julmullawewa

It seems that when the new irrigation system was designed and constructed, the planners have failed to identify the requirement of water for the domestic animals and the wallowing sites for the buffaloes. Hence, measures were not adopted to meet such requirements. Furthermore, when the new irrigation system was built up canals were constructed across the traditional cattle paths (*harak mannila*) but specific structures were not constructed at such cattle-crossings to protect the canals. Within the new irrigation system, there are no provisions for wallowing sites. Consequently, the roaming cattle and buffaloes cause heavy damage to the canals when they get into and get out of the canals.

3.1.3 Cropping Pattern

Prior to the KOISP, when only one crop per year was cultivated, paddy fields in the area were available for grazing over a prolonged period. Now irrigation water is issued to the Ellagala system during every *Yala* season, and when sufficient water is available, to the other areas too. Hence, the command area of the Ellagala system is now not available for grazing during the *Yala* season. On the other hand, when sufficient water is not available in the reservoir, the settlers in the new area are encouraged to grow Other Field Crops (OFC) during the *Yala* season. Although the area cultivated with OFC is very limited, it is widespread in small patches everywhere in the tract. These cultivated plots are not protected by fences. Therefore, it is extremely difficult for the herdsmen to keep their animals away from the crops. It is also widely alleged by farmers that herdsmen deliberately damage fences, thus allowing animals to enter cultivated fields. Consequently, crop damage by the grazing animals becomes a very serious problem. To avoid this problem rather than to solve it, the herdsmen are forced to evacuate their herds from the fallow paddy fields where OFC are cultivated. Since it is the mid-dry season, there is no alternative lands with enough fodder and water. Again, at the beginning of every *Maha* (Main) season, the herdsmen have to evacuate their animals from the fallow paddy fields, very often before the on set of *Maha* (Main) rains because irrigation water for *Maha* season is often issued about 3-4 weeks before the onset of *Maha* rains. For instance, water for the 1991/92 *Maha* crop was issued in mid-October, about 4 weeks before the on set of rains. When water is issued the herdsmen have to evacuate their herds from the fallow paddy fields. But since it is before the rains, there is neither fodder nor water in the jungle areas.

3.1.4 Encroachment of Traditional Grazing Lands

Jungle areas and the water spread areas of the tanks which have been traditionally used as grazing lands are now increasingly encroached for farming. Encroachment of tank-beds by paddy cultivators is quite evident in the Ellegala system where a substantial extent of the upper portions of water spread areas of the tanks were converted to paddy fields. Clearance of jungles and scrublands by the illicit chena cultivators has

brought disastrous consequences. At the beginning of every *Maha* season when the herdsmen migrate into the jungles with their herds, chena cultivators too start their cultivations very often in the same jungle area. With the rising pressure on the available limited cultivable land, clearing of jungles for chena cultivation is done at an increasing rate. Though reliable statistics are not available on the extent of land under chena cultivation, informal discussions and casual observations reveal that encroachment of traditional grazing lands by chena cultivators has increased alarmingly. Chena cultivation has spread not only in common jungles and scrublands, but also in the areas allocated for grazing. For instance, expansion of chena cultivation is evident in the Amarawewa Grazing Land which is allocated for grazing under the Hambantota Integrated Rural Development Project. These chenas are generally not enclosed with strong fences to keep roaming cattle out. Even though these chenas are unauthorized cultivations it is evident that the chena cultivators could claim compensation for crop damage from the cattle owners.

Abandoned small-scale irrigation tanks are the major source of water for the animals when they are maintained in the jungles. It is evident that the jungles in the catchment areas of these tanks were also encroached by the illicit chena cultivators. Clearing of jungles on the catchment areas has resulted in siltation in the tank bed. Consequently, water storage capacity of such tanks has declined. The consequence is that most of the remaining small tanks run dry during the dry season. Water remaining in the bottom is polluted and unsuitable for drinking. The animals being unable to drink such polluted water often trek long distances in the hot sun in search of drinking water, causing weight loss and milk reduction. It was found that the milk yield in all four management systems drop by 50 per cent - 60 per cent during the dry season (June-August) due to the lack of water and feeds. During the peak of the dry season (September- October) the milk yield further drop and consequently, most of the herdsmen stop milking.

3.1.5 Conflict Between Herdsmen and the Public

In the past, farmers were considered to be responsible for erecting fences around their farms to protect the crops from the trespassing cattle and

buffaloes. This was the accepted practice because the very same farmers were often the individual users of cattle in the village cattle herd. To protect both cattle and crop the best compromise has been the protection of cultivated crops with strong fences erected around them. This tradition has now changed (Tennakoon, 1986). Now, the cattle and buffalo owners are considered to be responsible to keep their animals away from the crops regardless of the fact that the crops are protected with fence or not. But it is extremely difficult in a situation where there is no strict enforcement by law to properly fence the unauthorized chenas widespread in the jungles and scrublands which have traditionally been used by the local herdsmen for grazing. The prevailing law being in favour of the crop growers, compensation for crop damage has become a major cost item. The herdsmen in all management systems (except the jungle based system) have paid compensation for crop damage, 2 - 3 times per annum. Although the procedure for assessment of crop damage and compensation is laid down by the Department of Agrarian Services, in practice, there is no proper method to estimate the value of crop damage. In some situations, the crop damage is estimated by the *Grama Niladhari* and in some other situations it is done by OIC of the local police station or chairman of the local Peace Committee.

Table 3.1 shows the pattern of land utilization for grazing in the village based system. It can be noticed from this table that road-sides, home gardens, canal-sides and reservations are the common places where the animals are grazed during the cultivation season. The home gardens are often inadequate to graze the animals. Grazing in elsewhere causes public conflicts. Grazing on road-sides is hazardous to the motorists and inconvenience commuters. Grazing on the canal-sides damages the canal-bunds. Many parts of the reservations where the animals could grazed have been without inconvenience to the public, have been already encroached and cultivated. Such unauthorized cultivations in reservations bring the farmers and herdsmen into constant conflict.

Table 3.1: Types of Grazing Lands - Village Based

Grazing Lands	Cultivation Period %	Fallow Period %
(1) Tank-Bunds	11	
(2) Canal-Sides	70	
(3) Road-Sides	92	
(4) Home Gardens	81	
(5) Fallow Paddy Fields	00	100
(6) Reservations	70	
(7) Scrublands	03	
(8) Tank-Beds	07	
(9) Tank-Upper Catchment Area	03	

Source: Field Survey, 1991 Unit: Percentage of herdsmen

Animal theft is all too frequent in all management systems, notably where the animals are maintained in jungles. While the loss rate is highest (6.5 per cent) where the animals are maintained in jungles throughout the year. It is lowest (0.67 per cent) where the animals are maintained in villages throughout the year. The loss rate of animals in traditional and migrating systems were 5.1 per cent and 4.9 per cent respectively. The stolen animals are sold by the cattle thieves to the buyers, and then they are illicitly transported together with the legally purchased animals.

3.2 Inadequate Supporting Services

3.2.1 Veterinary Service

Provision of veterinary facilities for the project area is a responsibility of the Department of Animal Production & Health. Veterinary services for the area are extended by two Veterinary Surgeon's Offices which are located in Hambantota and Tissamaharama. For both centres, there is only one Veterinary Surgeon (VS) and four field officers (LDI). The VS who is based in Hambantota has to cover the Tissamaharama range as well. There is one jeep provided for the use of the Veterinary Surgeon,

and no transport facilities provided to the field officers. The MDADDP livestock centre at Jambugaswewa provides some veterinary services. The extension officers of the livestock centre are inadequately trained. On the whole veterinary services available in the project areas are grossly inadequate.

The veterinary services and drug supplies are urban based while cattle herds are maintained in the remote countryside. The latter is particularly more so during the *Maha* cultivation season during which most of the herds are shifted to the jungles for feeding. Therefore, the veterinary service personnel are unable to provide an efficient service. It is a common practice that the veterinary service personnel are compelled to provide transport facilities by the herdsmen whenever the veterinary services are required. Though the herdsmen who have motor cycles could do it, the others have to face great difficulties when they are in need of any veterinary service. The veterinary personnel are not provided with at least some frequently needed drugs and equipment. The herdsmen from the countryside have to travel over long distance to towns to purchase the prescribed drugs.

The inadequacy of the veterinary field staff, transport facilities, equipment and drugs seriously hamper the vaccination programmes. The vaccination programme is carried out every year from mid-June to mid-September. During this period, the animals are normally vaccinated against HS and Foot and Mouth diseases. This programme has to be completed by mid-September before the on set of *Maha* rains. Any delay in completing the programme would cause a heavy animal death toll. However, inadequate drugs, field staff, and vehicles often hamper the timely completion of the programme. Drugs required for vaccination are normally provided at the beginning of the vaccination programme. But it was evident that the arrival of drugs some times delayed. Vehicles are not provided for the field staff involved in the programme. Instead, they are expected to use public transport. But, most of the locations where the herds are maintained are not accessible by public transport.

A single vaccination programme per year is insufficient to control HS

and Foot and Mouth diseases. For HS, the calves younger than 3 months are not vaccinated since they are naturally resistant. They should be vaccinated when they become older than three months. But there is no second vaccination programme for the animals left unvaccinated, and therefore they have to be vaccinated only during the next programme in the following year. It is this group of unvaccinated animals which die of HS every year. There are no formal training programmes aimed at the promotion of the herdsmen's knowledge about basic veterinary principles. Their poor knowledge is indicated by the fact that 68 per cent of the herdsmen have failed to identify the cause of the death of their animals. It seems that regular visits by veterinary personnel to the herdsmen and informal discussion are more effective than formal training programmes in educating the herdsmen. But such a method is not practical due to the limited veterinary personnel available for the area.

3.2.2 Animal Breeding

There is no systematic breeding programme in any of the management systems. Bulls run with herd while at the same time herds of different owners mix freely on the common grazing grounds. All the herdsmen interviewed expressed their willingness to improve their stocks but the shortage of quality stud bulls was found to be the major constraint. In all management systems, 60 per cent - 80 per cent of herds used native breeds as stud bulls. Most of the herdsmen have no practice of changing the stud bulls. They keep the same stud bull for longer period and it leads to inbreeding. In the village based system, it was found that 72 per cent of herdsmen have no stud bulls at all. For them, maintenance of stud bulls is economically not viable due to the small size of their herds and the shortage of feeds. High prices of the quality stud bulls and the frequent cattle thefts were often mentioned as major reasons why most of the herdsmen do not like to maintain their own stud bulls. Some settlers have purchased quality stud bulls from the local state farms but their performance was recorded unsatisfactory. There is no programme to castrate the low quality bulls, and therefore upbreeding cannot be successfully done even if the qualify stud bulls are available. There is also no programme for artificial insemination. Such a programme is also not

practical in a situation where large herds are maintained freely in jungles.

3.2.3 Milk Marketing

Purchasing of the milk produced in the project area is done by the MILCO and some private curd producers. The MILCO collects milk through its chilling centre at Debarawewa and its other milk collecting agents. The Hambantota Milk Producers' Cooperative Society (HMPCS) is acting as a collecting agent and it is involved in collecting milk in the old area. The Livestock Centre of the MDADDP is collecting milk in the new area of the project. It maintains 3 centres in the left bank for milk collection, and they are yet to commence milk collection in the right bank. The MDADDP maintains its own mini dairy at its service centre. It produces yohgurt, curd and ghee, and the excess milk is sold to the MILCO. The HMPCS maintains a collecting centre at Badhagiriya. Apart from these agencies, there are private milk collectors who are registered with the MILCO as its regular suppliers. They do milk collection mainly in the areas where there are no milk collecting centres. The NESTLE Co. has also very recently (from mid-October) started to collect milk in the area competing with the MILCO. The private curd producers mainly purchase buffalo milk.

In case of MILCO, NESTLE and their collecting agencies, the purchasing price of milk is fixed, and is determined by the fat content and the content of solid non fat (SNF). Fat content is naturally higher in buffalo milk, and therefore buffalo milk receives a better price. Fat content of milk naturally rises as the calves grow. Majority of births take place during December-February and therefore the fat content of milk rises towards end of the year as the calves grow (Table 3.2). As a result, the purchasing price of milk which is mostly determined by the fat content too gradually rises towards end of the year. On the other hand, the prices offered by the private curd producers is mainly determined by the supply of milk and the demand for curd. The curd producers mainly purchase buffalo milk and they often offer a price better than the MILCO. Although the price offered by the MILCO and its collecting agents remains between Rs.7 - Rs.10 per litre of buffalo milk depending on the fat content and

SNF, the private milk collectors often offer Rs.15. Therefore, the herdsmen often sell their buffalo milk to the private curd producers, and the cow milk to the MILCO and its collecting agents. However, when there is a surplus, buffalo milk is also sold to the MILCO.This often happens during the wet season. On the other hand, although the curd producers normally do not purchase cow milk, when there is a short supply of buffalo milk, they also purchase cow milk and mix with buffalo milk. This is a common practice during the dry season.

Table 3.2 : Monthly Variation of Milk Collection in the Collecting Centre - Hamlet 3, LB, KOISP

Month	Litres	No of Suppliers	Fat	SNF
January	160	17	3.95	8.65
February	217	13	3.88	8.58
March	227	13	3.88	8.54
April	257	12	3.55	8.35
May	275	14	4.29	8.63
June	284	14	4.38	8.60
July	154	27	4.41	8.66
August	161	26	4.28	8.66
September	156	21	4.35	8.50
October	148	23	3.88	8.50
November	137	22	4.14	5.65
December	136	19	3.85	8.61

Note: While the higher fat content during the period May-August is due to the increased supply of buffalo milk, the higher fat content during the period September-November is due to the growth of calves.

Source: Official records, Milk Collecting Centre, Hamlet 3 Left Bank, KOISP, 1990

There is no competitive market for cow milk because cow milk can only

be sold to the MILCO, NESTLE and their collecting agencies. Therefore the herdsmen who maintain their herds in the areas where there are no such milk collecting centres have to face greater difficulties in marketing their milk. In some cases cows are not even milked due to the marketing problem in such areas. They only milk their buffalo cows. Absence of milk collecting centres is particularly a problem for the small producers, because for them it is not economically viable to use motor cycles for the transportation of milk over long distance as the large scale producers do. There is no mobile milk collecting service. Therefore, when herds are maintained in distant locations in jungles, the herdsmen have to spend much time for the transportation of milk to the collecting centres.

Marketing of cow milk becomes a very serious problem towards the end of the dry season, because most of the milk collecting centres which are located in distant localities are closed down during this period as the income of such collecting centres sharply declines due to the short supply of milk. While the milk collecting centres of the HMPCS get Rs. 0.75 per litre of milk they purchase the milk collecting centres of the MDADDP get Rs.0.50 per liter. This is to cover the transport expenses and the cost of management. When the milk supply sharply declines, the income of the milk collecting centres becomes insufficient to cover their expenses, and it leads to the temporary closure of the milk collecting centres during this period. Some major reasons for the seasonal fluctuation of milk supply are as follows:

(1) 82 per cent of the calf births occur in January - February period. It is natural that the milk productivity of cows is high at the young age of the calves. As calves grow milk productivity gradually declines towards end of the year. The whole pattern is also related to the seasonal fluctuation of feed availability.

(2) When the *Maha* rains starts in mid-October, the migrating herdsmen leave the area and move into the jungles with their herds. Then, they supply their milk to milk collecting agents in different areas, perhaps outside the project. Table 3.2 shows the seasonal decline of the number of suppliers.

(3) During the dry season when the overall milk supply is in short, the

herdsmen withdraw their buffalo milk supply from the milk collecting centres because they can get a better price for buffalo milk from the private curd producers.

Informal discussions with the milk producers reveal that the officers of the milk collecting centres often deliberately undervalue the fat content and the SNF. On the other hand, the registered milk collectors offer lower prices without measuring the fat content and SNF. The milk producers could get a better income when the fat content of milk increases during the period September - November. But as it is shown in table 3.2, the high-fat period coincides with the period of low milk production, and therefore though the purchasing price of milk increases towards end of the lactation period, it does not adequately contribute to the producers' income because they could supply less milk when the price is high.

Most of the herdsmen are not satisfied with the current farm gate price of milk. As it is indicated in table 3.3 the farm gate price of milk has not increased in proportion to the cost of living. It has also been pointed out that the farm gate price of milk in Sri Lanka is the lowest in the South-East Asian region as shown in the table 3.4.

Table 3.3 : Farm Gate Price of Milk and Cost of Living

Year	Milk Price (Rs)	Cost of Living Index	Rate of Increase	
			Milk Price	Cost of Living
1978	2.20	37.5	1.00	1.00
1981	2.70	399.6	1.22	1.68
1983	3.20	506.3	1.45	2.13
1984	3.70	598.0	1.68	2.51
1985	4.30	598.4	1.95	2.51
1988	4.80	802.0	2.18	3.37
1989	5.80	884.0	2.63	3.72
1990	6.80	1090.9	3.09	4.59

Source: Central Bank Report, 1990

Note : (1) Price of a litre of milk with 4.2% butter fat and 8.4 per cent of SNF.

(2) Rate of increase was estimated assuming that the milk price and cost of living in 1978 was 1.00

(3) Cost of Living = Colombo consumers' price index for food items.

Table 3.4: Farm Gate Price of Milk in the South-East Asian Region

Country	Milk Price (Rs.)
India	8.97
Bangladesh	10.69
Indonisia	7.70
Malaysia	11.85
Nepal	7.63
Philippines	11.76
Thailand	10.47
Sri Lanka	6.80

Source: FAO, 1990.

Although the farm gate price of milk has been increased with effect from 15th October 1991 by Rs.1.50 per litre, it has not fully benefited the milk producers because a certain amount of the increment is taken by the milk collectors. For instance, HMPCS has given only 50 per cent of the increment to the milk producers keeping the rest for the organization. It was evident that some milk producers were even unaware of the recent price increase of milk.

3.2.4 Curd Marketing

More than 80 per cent of the curd producers in the area own neither cattle nor buffaloes. They purchase milk from the herdsmen and produce curd. Most of the herdsmen are not involved in curd production due to the following reasons : (1) The herdsmen have to spend on average 3 - 6 hours per day depending on the management system for watching and milking animals. Therefore, due to the limited time available, they prefer

selling fresh milk rather than producing curd.(2) Curd production is traditionally considered to be a female job. But female labour is not available when the animals are maintained in jungles. (3) Even if curd is produced in remote jungle areas, transportation is quite problematic. Transportation of fresh milk is easier and safer than the transportation of curd.(4) A certain degree of risk is involved in curd production, because any failure to sell the curd in time would lead to a total loss.

Some herdsmen who live near the main roads and those who live with their families in the settlement area are involved in curd production. But this category represents less than 20 per cent of the total number of curd producers. Some of them, in addition to their own milk, purchase milk from others for curd production. Curd producers can be divided into two broad categories with respect to their marketing channels. While the first group of curd producers sell their curd directly to the consumers, the second group sell to the middlemen.

(1) To consumers: Some small-scale curd producers sell their curd to the consumers in the locality who visit the producers' residence to purchase curd. While some large-scale curd producers who are residing near the main road, have their own curd shops and sell their products directly to the consumers, those who live far away from the main roads daily carry their products to the nearby town and sell to the consumers. Selling to the consumers is often done on cash.

(2) To middlemen: Some middlemen visit the curd producers' residence to purchase curd from the small scale curd producers. Some large-scale curd producers carry their products to the nearby towns and sell to the middlemen who come to the town from far away cities such as Matara and Galle. Selling to the middlemen is often done on credit. Payments are made on the following day after selling the purchased curd.

In both cases, seasonal fluctuation of demand for curd is a serious constraint. Demand for curd is high during the dry season and low during the rainy season. There are two major reasons for the seasonal fluctuation:

(1) there is a common belief that consumption of curd on rainy days causes illness such as influenza, and therefore most of the consumers abstain from consuming curd during the rainy season, (2) during the rainy season various kinds of fresh fruits are available at low prices. So, the people tend to consume fresh fruits during the rainy season as a substitute for curd. Discussions with some randomly selected curd producers and curd sellers reveal that demand for curd drops by 25 per cent - 35 per cent during the rainy season. Generally the demand for curd also rises during the week ends and it drops during the week days.

While the high-demand period, (August - November: dry season) coincides with the low-supply period, the low-demand period (January - June: wet season) coincides with the high- supply period. Therefore during the high-demand period, the curd producers cannot produce to meet the increased demand. They all attempt to purchase more and more buffalo milk in order to increase their curd production. Consequently, price of buffalo milk rises from Rs.12 to Rs.15 per litre, and price of curd too rises from Rs.22.50 to Rs. 25.00 per one litre pot. But the increase of milk and curd prices do not adequately contribute to the income of the producers due to the short supply of milk during this period.

During the high demand period, it is a common practice that most of the herdsmen as well as curd producers add water and cow milk to the buffalo milk to increase the volume of their milk production. The herdsmen can easily sell such adulterated milk to the curd producers since the curd producers have no equipment required to measure the fat content and SNF of milk. On the other hand, during the low - demand period: January - June, the curd producers are unable to sell their total curd production, and therefore instead of producing curd daily, most of the curd producers start to produce only once in 2 - 3 days. But they have no access to safe methods of curd preservation. Most of the methods now they use for the preservation of curd result in the degradation of the quality. Some of such methods are given below.

(1) Cream of the spoiled curd pots is carefully removed and covered with tissues soaked in salt water so that the buyers cannot detect the low quality by seeing or smelling.

(2) The spoiled upper layer is removed, replenish with fresh milk and re-curdled in order to give a fresh look to the old and spoiled curd.

Supply of contaminated and spoiled milk by the herdsmen is often mentioned by the curd producers as a serious problem. Contamination of milk with cattle urine or dung are some common problems, and such contaminated milk cannot be detected at the time of purchasing. It can only be realized when the purchased milk is boiled. In some cases, delay in the transportation of milk from remote jungle areas results in spoiling milk. Herdsmen's negligence and poor knowledge in sanitary practices also cause contamination and spoiling of milk. For instance, some herdsmen use unsuitable and unclean vessels for milking and milk transportation. The survey reveals that the plastic cans which are used by 38 per cent of the herdsmen for milk transportation are a kind of cans in which harmful chemicals were imported. The inside of these plastic cans cannot be cleaned properly because of their small openings. Furthermore, over 40 per cent of the herdsmen use empty cans (in which dried milk powder is imported to the country such as "Anchor") for milking, which are also either uncleaned or rusted. The inner-surface of these cans such as "Anchor Tins" is uneven making cleaning difficult and hence milk residues often remain on it. The vessels used for milking and milk transportation too are not properly cleaned due to the scarcity of clean water in the milking sites. All these result in contamination and spoil of milk.

There is no well organized market for the sale of animals. Cattle market in the project area is a buyers market. These buyers come from distant places such as Kadhana, Ja Ela, and Wattala. The MDADDP has once commenced a programme to purchase excess animals from the local herdsmen and to transport them to Colombo which was later abandoned. In the project area, there are about 10 - 15 cattle buyers who are involved in purchasing, temporarily herding and transporting animals. These "collectors" stay temporarily in the area and purchase animals with the support of their local brokers, keep the purchased animals in the vicinity of the place where the buyer stays and use locally available cheap labour to maintain animals purchased. When a sufficient number of animals for a full lorry load is collected the animals are transported to Colombo.

Table 3.5: Vessels Used for Milking and Milk Transportation

Type of Vessels	% of Herdsmen
For Milking	
(1) Aluminum Buckets	03
(2) Aluminum Small Pots	18
(3) Anchor Tins	41
(4) Plastic Mugs	38
For Milk Transportation	
(1) Milk Cans	26
(2) Plastic Cans	38
(3) Aluminium Pots	36

Source: Field Survey, 1991

3.2.5 Sales of Animals

The animals are sold when they are 18-24 months old before these animals gain the maximum possible weight. Because of recurrent animal thefts the herdsmen are reluctant to keep their male calves even till they achieve maximum weight. Buyers determine the price based on weight. A steer of 18 -24 months fetches something in the range of Rs.1200 - Rs.2000 according to its weight. Informal discussions with 3 randomly selected cattle buyers reveal that once the purchased animals are transported, slaughtered and cleaned, the carcass is sold to the beef sellers at the price of Rs.50 per kg.. However, the price the cattle buyers pay to the herdsmen is as low as about Rs.35 per kg. According to the cattle buyers, the reason why they cannot pay a reasonable price to the herdsmen for their animals is the high cost of transportation. The cost of the transportation of animals includes (1) the cost on hired vehicle and (2) the cost of 'clearing the way' (by greasing the palms all the way) up to the destination. The latter ranges from Rs.6000 to Rs.18000 per lorry load, and it is the major cost item which depresses the purchasing price. Such a cost is required because transportation of animals often involves violation of the law because : (1) most of the cattle buyers transport the purchased animals without valid permits (2) animals are over- loaded in vehicles when they are transported (3) buffaloes and breedable cows that are prohibited to be slaughtered are also transported.

CHAPTER FOUR

Current Programmes for the Promotion of Cattle and Buffalo Husbandry in the KOISP : An Evaluation

4.1 Hambantota Integrated Rural Development Project (HIRDP)

With NORAD funding the Hambantota IRDP started animal husbandry development work in the district in 1983. Under this project the development work was carried out mainly in 3 sub-sections.

4.1.1 Improvement of Veterinary Services

In improving the veterinary services of the Hambantota district, NORAD has funded building of office and quarters for Hambantota and Tissamaharama veterinary surgeons. A room with some basic facilities such as tables, chairs etc. to conduct training and demonstration classes were also provided, attached to these Veterinary Offices. To facilitate field visits of veterinary surgeons, a jeep was also provided to each veterinary office. But during the height of terrorism in 1987 the Tissamaharama veterinary office was completely burnt together with the vehicle. At the time of the survey, this office was being maintained at the Veterinary surgeon's quarters which is adjacent to the burnt office, and the re-building work had just commenced. But more important to note is that there was no veterinary surgeon permanently appointed to Tissamaharama range since its creation in 1986.

4.1.2 Dairy Cooperative Project and Milk Collection

Under this project, producer groups were formed on a cooperative basis, and a milk producer's cooperative society was formed in Hambantota.

mis-management, high cost of milk transportation and high institutional expenses were the major reasons for the down fall of the cooperative society. Neither the funding agency nor the IRDP monitored the activities of the Cooperative Society.

4.1.3 Development of Amarawewa Grazing Land

Development of Amarawewa grazing land was needed urgently for the use of cattle and buffaloes that were to be removed from the Lunugamvehera project area. This land had already been gazzetted as a grazing land and many farmers were keeping their animals there. Development of this grazing land which is about 400 ha in extent, was expected to commence on an experimental basis and extend to the other proposed grazing lands in the district in a more efficient way using the so gained experience. The Bogahapelessa branch of the Hambantota milk producers' cooperative was given the responsibility of maintenance and protection of the grassland because it is located within its management, and the members of this branch would be the beneficiaries. NORAD has funded the project which was to provide the following facilities in the grazing lands.

1. Water for animals and pasture nursaries
2. Veterinary services
3. Animal Breeding services
4. Breeding materials both good quality animals and pasture cuttings and programmes to educate the herdsmen.

Development work started in late 1986 with the improvement of the 4 km long dilapidated road from the 9th mile post of the Tissa-Kataragama road to Amarawewa. A new track of about 6.4 km was also laid from Amarawewa to the other two abandoned tanks namely, Ralahamigewewa and Malittanwewa. The cluster of these three tanks were to be restored, making water available in the grazing land throughout the year. In this aspect the sluice of Amarawewa was sealed off and the bunds of other two tanks were renovated. But de-silting or deepening work was not done. Illicit gem-mining had been going on in this area and the mined soils were washed into these tanks. As a result these tank beds were very

shallow and water storage capacity was not enough to carry on through the dry season. On average for about two months in every year these tanks run dry, and the animals cannot be maintained there during this time. Also the work on the proposed 3 wells close to each tank, along with windmills to provide pure drinking water, had been abandoned due to the presence of the bed rock. One of these wells had been dug for upto 10-15 feet and even concrete rings laid, but was abandoned after meeting the bed rock.

A sufficiently strong fence using fast growing trees such as Glyricidia, Ipil Ipil, Eucaliptus etc. and in specific areas barbed-wire fence was proposed to be erected by the milk producers' cooperative with the cooperation of *Gramodaya Mandalaya*. But this was not done as expected and today, there is no fence around the grazing land. About 50 concrete posts that were brought in for fencing could be seen piled up on the road side. The grazing land is also subjected to illegal gem-mining and chena cultivation. Animals sustain injuries by falling into these gem pits and also from the chena cultivators. A higher percentage of the land is covered by scrub jungle without good quality grasses. The proposed Pasture Nurseries, Night Paddocks for animals, Veterinary Services and the Animal Breeding Services all were left only for the proposals, except the living quarters for the stud-centre keeper which was built and left unoccupied in the grazing land.

Today, only about 15-20 herdsmen use this grazing land, and during the dry season when the tanks run dry, these animals have to be taken elsewhere. On the whole, there is hardly any difference made after spending about 2 million rupees from NORAD, and as such Amarawewa grazing land development project remains a failure.

4.2 Mahaweli Draught Animal and Dairy Development Project (MDADDP)

The MDADDP, being the only institution in Sri Lanka with extensive experience in the methodology of settlement based livestock development, was entrusted with the responsibility of developing animal husbandry in the KOISP. Under this project the development work was carried out as follows:

4.2.1 Service Centre

A land extent of about 174 ha. including a small perennial tank on the left bank tract 3 under the Kirindi Oya project, some 12 km off Tissamaharama on the Hambantota-Kataragama trunk road has been set aside for this purpose. Even though it was originally intended to develop a service centre of less than half of this extent, a larger land area was allocated, perhaps with the consideration of low carrying capacity of this evidently infertile land. It is estimated that about 40 per cent of the total land area consists of exposed rocks, limestones and coarse gravels. The lands locational advantages are that it is close to the highway and has access to electricity supply. Furthermore, it is adjacent to LB tracts 3 and 4 which have bigger homestead lots and are expected to be the main focus of the envisaged livestock development.

Having cleared the land in 1987 and a reasonably satisfactory road network developed, the area was fenced around. However the approach road to LB tract 3 passes through this farm. The absence of cattle traps/ barriers at the points of entry and exit of this road does not preclude the entry of stray cattle from out side to this cordoned farm. Similarly the entry point and exit point of the canal passing through this land enables the forced entry and exit of stray cattle.

Service centre development included creation of a water system, building of stock yards, farm office and stores, a mini dairy and staff housing. The water system to the farm provides only one turnout of which only about 7 ha could be irrigated. This restriction is due to the shortage of water in the KOISP and as a result it was very difficult to maintain a satisfactory stand of pasture and fodder for the use of the service centre as well as to provide a source for forage planting material for the settlers. About 40 ha of pasture were established in *Maha* 1989/90 with *Brachiaria brizantha*, *Brachiaria decumbens*, *Panicum maximum* (Hamil) etc., but only very few could withstand the draught conditions during the dry months of July/August. As a result there was very little grass in the farm during the time of survey. *

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* Personal communication with the former manager of the service centre (Jambugaswewa farm)

To save at least some of the established grasses, spraying had to be done at the rate of 12-15 bousers/ha at 5 day intervals during the dry months. But this is uneconomical because of high cost of operation. *Brachiaria ruziziensis* (NB 21) and legumes such as *Stylosanthes* or *Centrosema* which were to be planted according to the original proposal have not yet been planted. There were some tree legumes such as *Gliricidia maculata* and *Leucaena Leucocephala* planted around the fence. Further strengthening of a live fence with those two species of tree legumes would be highly desirable as these would provide a nutritious diet to the farm breeding stock.

4.2.2 Local Cattle and Buffalo Upbreeding Programme

The programme for upgrading the project area's herd included procurement of pure-bred as well as 75 per cent upgraded stud bulls and mating of the existing unimproved herd in the area, to these improved sires. Procurement of bulls were to be from two sources. Initially, 25 pure-bred Sahiwal cattle and 5 Murrah buffaloes were to be imported from Pakistan. By year three of the project a further 30 stud bulls of at least 75 per cent improved tropical breed were to be procured locally, to service the growing number of F1** heifers. But these animals did not arrive in time in required numbers. The unstable political environment which prevailed in the country during this period, and the intensity of the disturbances specially in this area from July 1987 to end of 1988, hindered most of the development work. The scarcity of feed in the farm did not permit to run a higher farm breeding stock. Hence, only 8 pure-bred Sahiwal cattle and one Niliravi buffalo stud bull were brought into the farm. These animals arrived in December 1990, about three years after the expected time. Eighteen Sahiwal studs of 75 per cent improved genetic character, were also procured from Niraviya and Girandurukotte farms during the period between late 1989 and early 1990. Out of these, 7 animals were sold and 5 are being kept at the stud bull centres in the settlement area.

** First progeny from cross-breeding between two compatible breeds

These animals were meant to service the F1 heifers received after crossing the purebred Sahiwals to local cows, and hence should have been brought 3 years after the procurement of the purebred animals, whereas actually they arrived before the purebred animals.

Initially cows and heifers of the settlers were to be brought to the farm for mating, but later bulls were also to be stationed in the hamlets. These non-pregnant but cycling female animals were to be brought to the farm before the onset of Oestrus, and to be fed and rared within the farm together with the improved stud bulls. After mating and performing a pregnancy diagnosis test, these ruminants were to be released back to their owners. But this system of Board and lodging in the farm could not be extended to a larger scale because of the feed problem. Also the farmers who could be benefited by this system were those who lived in close proximities and hence those who are living far away from the farm did not get this opportunity. As table 4.1 shows, only 27 per cent of the sampled cattle owners in the LB had obtained this service and none from the Ellegala system, mainly due to the distance. It is important to note that on average only about 3 cows are being serviced per month at the farm under this system. The services provided by the bulls stationed at the five stud-bull centres in the LB are quite satisfactory in terms of the number of successful services which was about 30 per month. These studs are freely rared with the herds owned by the selected farmers and the services are also obtained by the neighbouring farmers. But during cultivation season, when animals are driven out of the settlement areas into the jungles, these stud bulls are returned to the farm, and as a result the availability of services is limited only to the period when animals are kept within the settlement areas. Apart from this, both farmers' poor knowledge in heat detection and non-castration of local males in their herds had reduced the possibility of getting hybrid offspring. Artificial insemination is not done either in the project area or elsewhere in the Hambantota district.

An upgrading the project area's herd, the project was also to purchase and distribute annually 700 two year old *Sinhala* heifers (total 2,800) and 100 three year old local buffaloes (total 400) over the four year imple-

mentation period. To reduce the pressure being experienced with the free ranging traditional herds as well as to reduce the expansion capacity of the existing herds, these breeding animals were to be purchased from within, or adjacent to the project area. The heifers were to be quarantined for one month on the service centre, brucellosis tested, vaccinated,

Table 4.1: Awareness and Use of MDADDP Services by the Herdsmen

Package	Awareness		Use	
	Left Bank N = 22	Ellegala System N = 16	Left Bank N = 22	Ellegala System N = 16
Milk producers' co-operative Society	20 (91%)	09 (56%)	17 (77%)	02 (12%)
Milk Collecting Centres	21 (95%)	12 (75%)	16 (73%)	03 (19%)
Provision of stud-bulls	20 (91%)	10 (62%)	12 (54%)	01 (06%)
Purchase and re-selling after mating with purebred sires	16 (73%)	06 (37%)	00	00
Board and Lodging System	18 (82%)	06 (37%)	06 (27%)	00
Supply of hybrid cows	21 (95%)	10 (62%)	14 (64%)	01 (06%)
Veterinary Service	20 (91%)	05 (31%)	19 (86%)	02 (12%)
Training classes	16 (73%)	04 (25%)	13 (59%)	00
Supply of milk cans	17 (77%)	00	00	00

Source: Field Survey, 1991

Note: Percentage values are given within parenthesis

mated and supplied to the selected settlers. However, the settlers response to this programme has been poor. They normally do not like to purchase these local animals with the expectation of having a hybrid calf

some months later. This programme yields long-term results, but they are in much need of a more quick method of upgrading their herds. Since there is 50 per cent probability of receiving a male calf, the majority of the herdsmen who are in need of only female hybrid offspring, are a bit reluctant to purchase these local adults under this system. Also some believe, that these local females mated with purebred studs of larger body sizes, have difficulties in giving birth to the hybrid calf (dystoxia) which is bigger than the native. Also some have lost confidence in this system as there were incidences where these animals, after having purchased from the farm had given birth to native calves. This was because no pregnancy diagnosis tests were done before acquiring these animals from the local areas, and the animals might have been already conceived by local males at the time of acquiring. The farm extension staff lack necessary knowledge and training in performing these pregnancy diagnosis tests. Also there is a risk of mating with the local stray cattle that could enter the farm. Anyhow under this system the project could so far distribute only 60 animals that were acquired from the project area and there was no follow-up programme to monitor the progress of these animals after re-selling to the settlers. Once again, one cannot forget the disturbances which hindered most of the farm development work and the scarcity of feed in the farm, being reasons. In addition to this system the project had also arranged distribution of 111 hybrid breeding cows purchased from the Niraviya, Girandurukotte and Wirawila government farms. But no such effort was made in upgrading the local buffaloes even though the project area has a very high buffalo population.

Bank loans, at an interest rate of 12.5 per cent are provided to the settlers to purchase breeding cows but the delays caused in processing loan applications was found to be a hindrance to the speedy supply of breeding cows. To overcome this problem, the MDADDP has created a revolving fund to meet the cost of the procured animals until such time as the bank loan is released. Even then, the high incidence of defaulting crop loans in the project area has made the prospective applicants for cattle breeding loans ineligible for such loans from which the dues in the revolving fund were expected to settle. Hence only 110 settlers who were willing

to buy animals but were found to be non-defaulters of previous bank loans granted for cultivation purposes. Out of a total 171 breeding cows supplied to the settlers, 92 animals were procured using the loans obtained from the Bank of Ceylon and the Peoples Bank.

4.2.3 Extension, Milk Collection and Processing

The Jambugaswewa farm which runs as the service centre also act as a base for extension work. It provides a mini dairy processing facility as well. The project was to employ one graduate farm manager and five high school graduate livestock officers. From the start in May 1987 to July 1991, the extension staff consisted of two livestock officers and the farm manager, who are agriculture diploma holders. From July 1991 two more livestock officers were appointed to the extension staff. They have just completed the diploma in agriculture examination but need to acquire field experience in extension activities. These new recruits have been given a two weeks training on livestock extension in Girandurukotte and another two weeks training on livestock extension and yoghurt manufacture at Niraviya farm in the Mahaweli Project. The extension staff did not consist of officers with extension experience in the Mahaweli settlements, as desired at the beginning.

The proposed extension programme included creation of demonstration homestead lots illustrating an integrated approach, distribution of seeds and planting material for a variety of tree and conventional forage crops, encouraging utilization of crop residues including treated rice straw, etc. Extension messages were to be conveyed through regular contact, field days at the demonstration homelots, the use of video tapes made both in the locality and in other settlement areas plus competitions for the best cattle and integrated homelot. The livestock officers were also responsible for providing a vaccination service and assisting with organization of milk collection centres.

At the beginning, livestock extension effort was limited only to the Left Bank and the Ellegala system. An extension programme for the Right Bank has just been developed. As mentioned earlier, the farm development work, local cattle upgrading programme, and the proposed exten-

sion programme all were severely affected due to the disturbances in the country. Two groups of livestock farmers of 20 each were sent on an educational trip to Girandurukotte and Niraviya farms, arranged by the MDADDP in 1988. Field days and demonstration homelots have been planned from *Maha* 1991. Arrangements have been made for 20 demonstration homelots and some field days with the participation of 52 livestock farmers in hamlets 1,2,3 and 7 of the LB. Eleven straw treatment demonstrations were conducted with the participation of 55 livestock farmers, but all were on 1 per cent urea spray-feed system. The two pit-system of 4 per cent urea treatment method should also be introduced as this substantially enhances the nutritive value of straw, and this method could beneficially be promoted specially in the hamlets where pasture is not adequately available. The livestock officers also run a veterinary service which include vaccination against Haemorrhagic Septicaemia, Foot and Mouth diseases and simple cattle treatment. This service has so far been limited only to the left bank and the Ellegala system. A fairly high percentage of the sampled cattle owners of the LB had obtained this veterinary service. But in Ellegala system only 31 per cent reported awareness and 12 per cent had really obtained this veterinary service (See Table 4.1). There was no Veterinary Surgeon permanently based in the service centre run by the MDADDP.

Milk collection began in July 1990 with an initial collection of about 250 litres/day from three collection centres in the LB. As expected a higher percentage (73 per cent) of the sampled cattle owners of the LB had contributed to the milk collecting centres as against to those in Ellegala system (Table 4.1). The daily total milk collection varies from 550 litres during the peak season to 90 litres in the dry season. Producer groups were encouraged to form into associations on a cooperative basis, around a collection centre. Capital cost for the building, milk testing equipment, bulk cans, a table and record books were met by the project and turned over as assets to the societies. The cost of a secretary to record milk quality, weights and payments were also met by the project for the first year. Milk from the collection centres is transported by a project vehicle to the project's milk processing facility. About 50 cents per litre of milk is deducted from the producers, for transport and other recurrent ex-

penses, and this amount is credited into the societies. At the time of the survey one society had Rs 5000.00 and the other two had around Rs 15,000.00 each in the bank, as assets of these producer societies. Also preliminary extension work has done on establishing a collection centre in track one of the RB.

The mini dairy started functioning in August 1990, and has a storage capacity for 1000 litres. It was anticipated that the daily production would initially be 3,300 plastic cups (112 gm) of Yoghurt, 153 pots of curd and 75 kg of butter. But at the time of the survey the production was about 700 plastic cups (112 gm) of yoghurt and one litre of butter oil daily. Buffalo milk is not received by the collection centres as it fetches much higher price from the outside curd producers. Hence the mini dairy could produce curd, only out of the buffalo milk collected from the animals kept in the farm, and the daily production was about 6-8 pots. Butter is not yet produced, and the surplus milk is sold to the MILCO chilling centre in Tissamaharama. The processed milk products are sold at the sales outlet run by the farm. Very recently, the Nestle Company has been granted permission to collect milk in the project area. At the time of the present study, Nestle milk collecting centres were functioning in the project area in the locations such as Beralihela, Pannegamuwa, Ranawaranawa, Weligatta and Alibokkuwa. Some of these centres are located just in front of the MDADDP-milk collecting centres. Competition among the milk collectors, of course, brings benefits to the producers, but it will in the near future, adversely affect the MDADDP - mini dairy due to the short supply of milk.

4.3 Other Recent Initiatives

Recently the project management (Land Settlement) office of the KOISP, in helping to alleviate the stray cattle problem has come up with suggestions to create cattle owners associations and some common grazing lands for their use. The project manager (Land Settlement) with the help of the Community Development Officer of the Lunugamvehera A.G.A Office has worked on identifying the suitable areas for these common grazing lands. Based on the area that cattle were kept during the cultivation

season, the herdsmen have been grouped into four associations and each association is proposed to maintain a common grazing land of between 1200-4000 ha. At the time of this study, all necessary actions have been taken for 3 associations to register with the Agrarian Services Act. The field staff of the project managers' office were involved in a preliminary survey in the proposed grazing lands, to determine the suitability of these. The ultimate objective of the whole is to build strong associations of the local herdsmen, so that all their common needs in animal husbandry activities are looked into and channelled through these associations.

CHAPTER FIVE

Conclusions and Recommendations

This section attempts to summarize some of the main findings of the study with regard to specific issues concerning cattle and buffalo husbandry in the KOISP. Based on these findings some recommendations are made which, it is hoped, would prove useful for any future policies on cattle and buffalo husbandry in the KOISP.

5.1 Management Systems of Cattle and Buffalo Husbandry

After the implementation of the KOISP the traditional system of cattle and buffalo husbandry has undergone serious difficulties due to the shortage of grazing lands. Consequently, the traditional system under which the animals grazed in the village-jungles has become impractical in many areas, and as adjustments to the problems three new management systems emerged: (1) jungle based system, (2) migrating system and (3) village based system. However, the traditional system too still remains with slight modifications in some locations where jungles are still available in close proximity to the settlement areas. Therefore, at present four different management systems can be identified in the project area. Summary of the major characteristics of the management systems are given below.

5.2 Traditional System: A Model?

The traditional system of cattle and buffalo husbandry which has been practised for hundreds of years in the project area can be considered as a system which was well adapted to the local physical and cultural environ-

ment. Feeding of animals on perennial tree fodder as it has been traditionally practised, is perhaps the most appropriate feeding system under the climatic conditions prevailing in the area.

Table 5.1: Summary Characteristics of the Management Systems

	Traditional System	Jungle Based System	Migrating System	Village based System
Grazing (Cul. Period)	Village-Jungle	Jungle	Jungle	Village-Vacant Lands
Grazing (Fal. Period)	Village-fallow Paddy Fields	Jungle	Fallow Paddy Fields	Village-Fallow Paddy Fields
Herd Size	Medium	Large	Medium	Small
Herd Composition	Buffalo & Cattle	Buffalo dominant	Buffalo & Cattle	Cattle dominant
Labour Type	Family Lab. only	Hired Lab. dominant	Hired Lab dominant	Family Lab. only
Labour Intensity	Low	Low	Medium	High

Note: Labour Intensity = Number of labour days per livestock unit per year

Unlike pasture, the perennial trees with a long root system could withstand the prolonged drought prevailing in the area. The greater diversity of plant varieties in jungles also enhanced the quality of the diet. The traditional herdsmen were aware of various fodder species which were specifically suitable for calves and lactating cows. The village irrigation tanks which were widespread in jungles served as sources of drinking water and as wallowing sites. The irrigation system associated with village tanks were designed in such a way that the water could be used by the village cattle and buffaloes without causing damages to either the

irrigation structures or the cultivated crops. All cultivated areas were protected with strong fences and therefore there was no conflict between the herdsmen and the crop cultivators.

The traditional system was also economically viable and environmentally sound. As mentioned earlier, the maximum profitability was recorded in the traditional system. While cost per livestock unit was lowest, the profit in terms of return on livestock unit and on family labour were highest in the traditional system. The animals were fed on the locally available resources i.e. paddy residues, jungle-leaves and twigs, which have no opportunity costs. On the other hand, this system has also contributed to the conservation of forest resources. The local farmers/herdsmen were aware of the fact that the existence of the local forest was vital to the existence of their livestock and for their own survival. Hence the local forest was conserved by the local people themselves. There is no evidence to prove that feeding of animals in jungles causes any significant destructive effects on flora, fauna, soil or water resources. The very existence of the traditional system of cattle and buffalo husbandry over hundreds of years in harmony with the local environment itself proves the fact that the traditional system of cattle and buffalo husbandry is environmentally sound.

Though the traditional system of cattle and buffalo husbandry itself is now not practical in its original form, the principles on which the traditional system was based, may have some practical values which could be used in future planning. Some of them are listed below.

(1) Fodder Trees :Indigenous fodder tree species should be incor porated into any package of feeding system which is proposed to be introduced into the area.

(2) Forest Management by Local Users: Active participation of the local users of forest (those who use in sustainable manner) is vital for the conservation of local forest resources.

(3) Designing of Irrigation Systems: When the irrigation system is designed, priority should also be given to provide drinking wa

ter and wallowing sites for cattle and buffaloes in the project area.

(4) Fencing of Cultivated Crops : To achieve harmony between herdsmen and crop cultivators, the latter should be forced to erect fences for the protection of their crops.

(5) Use of Draught Animal Power: Use of draught animal power by the farmers would contribute to reduce the conflict between farmers and herdsmen.

(6) Use of Indigenous Knowledge: Indigenous knowledge of fod der species, veterinary practices etc., which played a vital role in the past should be collected and improved.

5.3 Selective Approach to Planning

For the purpose of planning, the herdsmen in the project area could be categorized into two groups: (1) The herdsmen who maintain their herds in the village throughout the year (village based system) and (2) the herdsmen who maintain their herds totally or partially in jungles (traditional system, migrating system and jungle based system). The herdsmen of the former group have small herds and they mainly keep cattle for milk production. They are also socially, financially and politically weak. On the other hand, the herdsmen of the later group have large herds and they keep primarily buffaloes for milk and cattle for beef. In contrast to the former group, they are socially, financially and politically very powerful. Therefore, two different strategies should be formulated for these two distinct groups, and in planning, these two distinct groups should be approached separately.

5.4 Current Policies

Government policies for the livestock sector are directed towards bringing about a change from the traditional extensive form of production to a more intensive and commercialized system. Such a transformation require a substantial reduction of herd size and enhancement of herd productivity. Any attempt to such a transformation will encounter four major

constraints: (1) At present 98 per cent of the animals are native low-productive breeds and are not suitable for any intensive system, (2) The size of land holdings among the settlers is grossly inadequate for pasture cultivation which is an essential element of any intensive system. (3) Majority of animals are in large herds, and any reduction in herd size will result in substantial decline in profit in terms of return on family labour and on capital, and return per livestock unit. (4) The existing farm gate price of milk is inadequate to cover the cost even under the present extensive system, and therefore it would not be possible for the herdsmen to shift to an intensive system which is more costly. Under these circumstances, forcing the herdsmen to shift from the existing extensive system to an intensive system without removing these constraints would result in sales of total stocks for beef and seeking alternative employment. In fact, this is now happening in the project area.

5.5 Recommendations

5.5.1 Immediate Measures

At the time of this study there was a growing tension among the herdsmen in the area. They were increasingly inclined to sell off their total stocks and to seek alternative employment. Therefore, some immediate measures should be adopted to sustain the cattle and buffalo husbandry in the area. The measures which are recommended to be adopted immediately are as follows:

1. Organizing the two groups* of herdsmen into two separate organizations so that they could collectively seek solutions and take joint actions to solve their own problems. Such organizations would facilitate the project administration to deal with the herdsmen with regard to their problems. The two organizations may have branches on the basis of the geographical areas where the herds are maintained.

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* Two groups: (1) The herdsmen who maintain their herds totally or partially in jungles, (2) the herdsmen who maintain their herds in villages. Organizations for the first group have already been formed and initiatives have already been taken to allocate grazing grounds for the organizations.

2. Lands for grazing should be allocated and management right of the allocated grasslands should be vested with the above mentioned organizations. For the large herdsmen's organizations, jungle areas remaining outside the project area should be allocated, the reservations in appropriate locations within the project area may be suitable for the small herdsmen's organizations.

3. The organizations of the large herdsmen should be provided with technical support required for renovation of ruined tanks and digging of water holes or wells in the allocated lands. In order to facilitate the animals to get into the irrigation canals without causing damage to the canals and bunds, such places should be strengthened with concrete structures.

4. Administrative measures should be taken to assist the crop cultivators to protect their cropping lands with strong fences erected in order to prevent the roaming cattle and buffaloes from causing crop damage. Appropriate measures should be taken by district administration to protect the herdsmen from unfair claims made by farmers on the pretext of heavy crop losses. Immediate steps should also be taken by the police authorities to prevent lower level police officers harassing the herdsmen.

5. Representatives of the herdsmen's organizations should also be appointed to the Project Management Committee so that their problems could be heard and taken into consideration in the Management Committee meetings. When the dates of water issues are decided not only the crop cultivators but also the herdsmen should be consulted, because the herdsmen have to remove their herds from the fallow paddy fields before the irrigation water is issued.

6. The existing services such as veterinary services and the collection and transportation of milk should be strengthened. Arrangements should be made for the collection and transportation of milk produced in remote areas. At least one VS should be appointed to the Tissamaharama range. In addition, field staff of the VS offices and

the MDADDP should be expanded and vehicles, other necessary equipment and drugs should be provided. Such resources are particularly necessary for the vaccination programme.

5.5.2 Medium-Term Measures

The medium-term measures are recommended to achieve the following objectives: (1) to increase the quality and productivity of the animals, (2) to reduce the herd size of the herdsmen who keep their animals mainly in jungles and (3) to popularize cattle and buffalo husbandry among the settlers. To achieve these objectives the following measures are recommended to be taken in the medium-term.

1. The MDADDP should maintain a breeding herd which could supply heifers and stud bulls. Its present programme of supplying pregnant cows should be replaced with a programme to supply cross-bred heifers and stud bulls. The MDADDP should also concentrate on buffaloes instead of its present bias towards neat cattle.

2. Measures should also be taken to encourage the private sector to develop breeding herds. Importation of breeds suitable to the local conditions may also be necessary to overcome the shortage of improved breeds. Further research should be undertaken to develop the breeds which are most suitable to the area.

3. Differences in management systems should be taken into account when the improved breeds are distributed among the settlers. It is appropriate to give stud bulls to the large herdsmen and heifers to the small herdsmen.

4 The existing programme of establishing stud centres should be strengthened with the support of the proposed organization of the village based small herdsmen. The programme should be expanded in order to set up stud centres in all villages/hamlets, and the management of such centres should be entrusted to the local branches of the organization.

5. The board and lodging system of the MDADDP is recommended to be decentralized by setting up board and lodging centres in the left bank, the right bank and in the old area. Such measures are necessary to expand its service to the whole project.

6. A cattle insurance scheme should be introduced and popularized among the herdsmen in order to secure the safety of the valuable breeds. The herdsmen's organizations should be directed to take collective measures to overcome the problem of cattle theft.

7. Measures should be adopted to standardize the quality of curd produced by the private curd producers, and to facilitate the transportation of curd to the urban market in distant locations. It is recommended to form a curd producers organization in order to assist them to take collective action to solve the problems involved in curd production and marketing.

8. The VS offices and the MDADDP should be provided with sufficient field staff and resources, and their training and extension services should be intensified in order to familiarize the herdsmen with the technical aspects of maintaining quality breeds.

9. Larger upland allotments should be given to the settlers who possess experience in cattle and buffalo husbandry and who wish to continue with cattle and buffalo husbandry so that they could develop sufficient feed resources within their homegardens.

10. The herdsmen's organizations should be directed to maintain their own veterinary services. In addition, local youths selected from each village should be trained as veterinary volunteers. The veterinary volunteers should be given at least a minimum training in first aid practices.

11. Supply of stud bulls and heifers to the herdsmen should be done not for cash but in exchange for their low-productive native breeds on

Such a system will contribute to reduce the herd size with the promotion of herd quality.

12. With the supply of high quality stud bulls, a programme should be implemented to castrate the low-productive native bulls. It will contribute to reduce the herd size and to improve the herd quality.

13. The present legal constraints on the transportation of animals should be removed. It will facilitate the speedy disposal of excess animals, and also the herdsmen could receive a better price for their animals. For this, the Animal Act should be revised.

14. The herdsmen's organizations should be directed to get involved in sales of the animals of their members. It is recommended to hold public auctions by the herdsmen's organizations to sell the animals. Such a measure will enable the herdsmen to get better prices for their animals.

15. The herdsmen's organizations should also be directed to maintain correct and updated statistics on the herds of their members. A membership fee or a tax should be levied from the members, and the amount of the fee\tax should depend on the herd size. Such a measure may discourage the maintenance of large herds with low-productive breeds.

5.5.3 Long-Term Measures

Once the herd size is reduced and the herd quality is improved, then the measures should be adopted to transform the existing extensive system of animal husbandry to an intensive system, and to integrate the cattle and buffalo husbandry with crops cultivation. Therefore, the following measures are recommended to achieve the objectives : (1) transformation from the present extensive system to an intensive system and (2) integration of crops and livestock sectors.

1. A low-cost package of feeds based on locally available resources

e.g. tree fodder, straw etc., should be introduced. Such a package is necessary to enable the herdsmen to maintain their herds within their land holdings.

2. Selected enterprising farmers, at least one from each hamlet/ village, should be directed to establish intensive livestock farms as models in order to demonstrate the fact that the intensive system of cattle and buffalo husbandry is practical and economically viable.

3. Credit and subsidies should be provided as incentives for intensification. Such supports are necessary at the initial stage of intensification, because of the high capital investment required for the intensification of cattle and buffalo husbandry.

4. Farm gate price of milk should be raised to a level that the farm income could cover the extra expenses incurred in the intensive system. The herdsmen's organizations should be directed to intervene in the milk marketing system in order to get a better price for their members' milk.

5. The herdsmen's organizations should be directed to grow fodder trees and suitable varieties of grass in the lands allocated for the organizations. Experiments for the selection of suitable species of trees and grasses should be undertaken by the herdsmen themselves with the technical support of the DAP&H.

6. Initiatives should be taken to popularize domestic dairy-based industries. Extension, training and technical support for the development of such dairy based industries should be provided through the herdsmen's organizations.

7. The MDADDP should take necessary steps to re-popularize the use of draught animal power for paddy land preparation and threshing. Such a measure is necessary not only to integrate crop and livestock sectors but also to re-achieve the harmony between the crop cultivators and the herdsmen.

8. Measures should be adopted to popularize the use of cow dung as fertilizer and as a source of bio-gas. At present there is no habit among the farmers to use cow dung to fertilize their farms. It is evident that cow dung remains unused in large volumes near the cow pens. Therefore, extension and training programmes should be directed to popularize the use of cow dung by the local farmers.

9. The herdsmen should be encouraged to collect and store paddy straw and to use treated straw as feeds. Such a measure is necessary when the animals are kept in and fed instead of the present system of free grazing on fallow paddy fields.

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FIGURE 1
PROJECT MAP
KIRINDI OYA IRRIGATION AND SETTLEMENT PROJECT

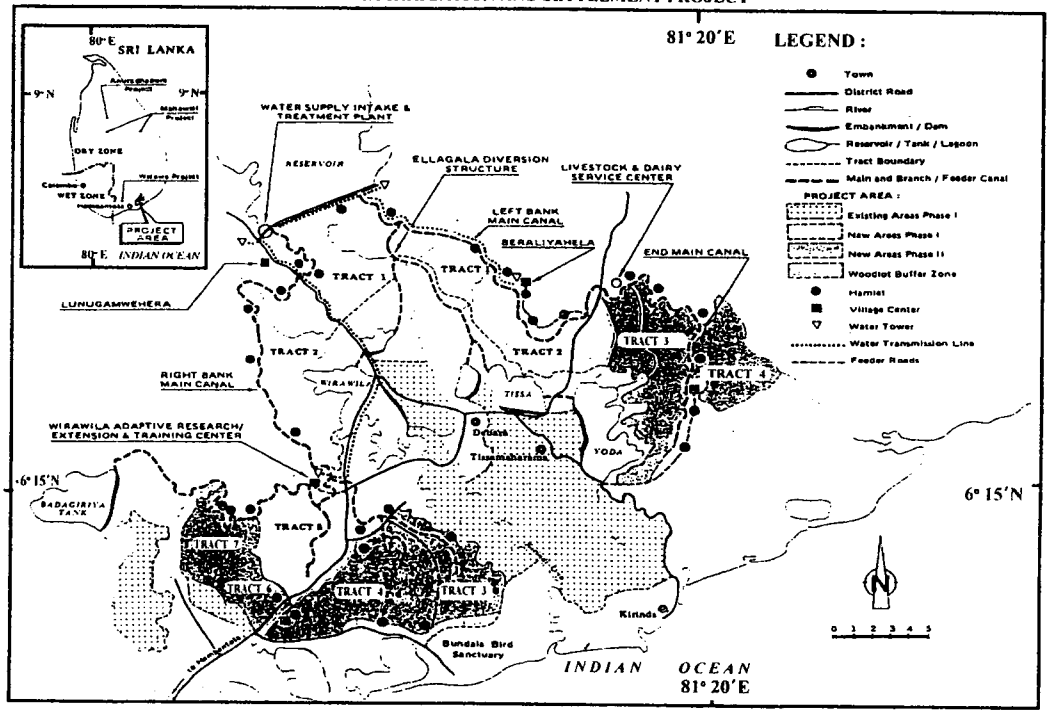

FIGURE 2
SEASONAL MIGRATION PATTERN OF CATTLE AND BUFFALOES IN THE KOISP

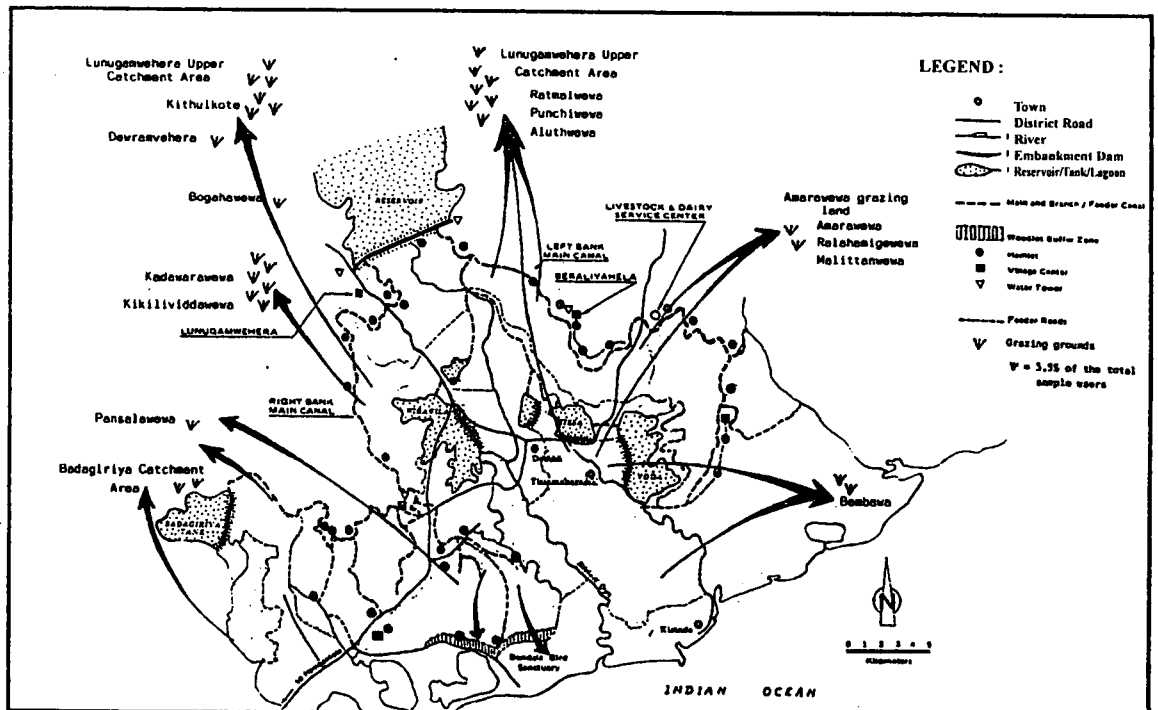

FIGURE 3
DISTRIBUTION OF IRRIGATION TANKS DURING THE PRE-KOISP PERIOD