

Impact and Lessons of Dairy Development Intervention: Dry Zone Livelihood Support and Partnership Programme (2006-2012)

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FOREWORD

The Dry Zone Livelihood Support and Partnership Programme (DZLiSPP) is implemented by the Ministry of Agriculture with the objective of achieving sustainable increase in income and to improve the living standards of the poor households in four districts; namely, Anuradhapura, Kurunegala, Badulla and Moneragala. The overall project scope has six components and the dairy development programme comes under the first component. The programme was linked to dairy development through the approach of dairy Farmer Field School (FFS). The aim of this sub component was to increase farmer income by introducing a “stall-fed” cattle management system in the project area and to adapt improved animal husbandry techniques thereby to replace the conventional free grazing cattle rearing system.

The objective of this study was to evaluate success of FFS approach in dairy development. The specific objectives of the assignment were, to assess the impact of dairy FFS developed by the programme on cattle management systems, to analyze dairy FFS in terms of financial and economic aspects and to evaluate sustainability of dairy FFS. The study was conducted in all four project implemented districts namely Kurunegala, Anuradhapura, Monaragala and Badulla. The study has found positive and negative points in project intervention process in DZLiSPP which can be used in the future for better project intervention.

I congratulate the research team for successfully undertaking this study and hope the findings and recommendations would be useful for the policymakers and other stakeholders in dairy development.

E.M. Abhayaratne
Director

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I am very much indebted to Messrs L.R.A.P. Gunathilaka, J.S. Kumara and K.P.J.R. Kumara, Investigators of HARTI for their commitment and dedication in the process of field data collection. The service rendered by Mr. M.D.L. Senarath, Senior Analyst Programmer and C.N. Pramawardena, Analyst Programmer of HARTI in analyzing data is highly appreciated. Finally, I warmly acknowledge the co-operation extended by the farming community of the selected study areas. Without their support, this project would not have been a success.

N.P.G. Samantha

EXECUTIVE SUMMARY

The Dry Zone Livelihood Support and Partnership Program (DZLiSPP) funded by the International Fund for Agricultural Development (IFAD) and implemented by the Ministry of Agriculture (MOA) targeted the rural poor in the dry zone. The programme was involved with dairy development through the approach of dairy Farmer Field School (FFS). The aim of this sub component was to increase farmer income by introducing a “stall-fed” cattle management system in the project area and to adopt improved animal husbandry techniques thereby to replace the conventional free grazing cattle rearing system. The total cost spent on developing these FFS has been LKR 87 million. The average cost per farmer was about LKR 10,000. The project had established 43 milk collecting centers in four districts and the target is to establish 60 centers. The objective of this study was to evaluate the success of FFS approach in dairy development. The specific objectives of the assignment were, to assess the impact of dairy FFS developed by the programme, to analyze dairy FFS in terms of financial and economic aspects and to evaluate sustainability of dairy FFS. The study was conducted in all four project implemented districts: Kurunegala, Anuradhapura, Monaragala and Badulla. From each district 10% of FFS were selected as the sample. The selection was done by using categorization of FFS based on project indicators on performance basis. All members of the selected FFS were grouped into four strata of equal number after arranging them in ascending order according to the number of cattle possessed by them. From each stratum, one household was selected at random, thus constituting a beneficiary sample size of 4 per selected FFS and all together 207 households were selected for the study and 106 households were selected as control group within the project area. Key informant discussions and focus group discussions were conducted with the officers of Department of Animal Production and Health (DOAPH) in selected districts and Project staff of DPMO and PCU and office bearers and members of FFS.

The study found that out of 207 selected FFS members, 45% practised dairy farming as their primary occupation. Dairy farming has become a primary income source for the female farmers who are not employed. According to the survey, 50% of FFS members had experience in cattle farming for more than ten years and 84% of the FFS members who joined the project had been practising dairy farming before attending the FFS. Only 36% of the FFS members had maintained any form of cattle sheds to provide housing for animals before the project. A majority of cattle shed (62%) maintained by farmers before the project intervention were in informal category, which consisted only of a shelter over the cattle. Condition of the cattle shed has improved in all the study locations as a result of project intervention. According to the survey on control group, 40% of farmers had maintained cattle sheds and out of them 30% was categorized as formal, 37% semi-formal and the rest 33% fell into the informal category. The condition of cattle sheds is comparatively better in the FFS sample compared to the control group. Especially the percentage of informal category in FFS sample was 23% and it was 33% in the control group. As a

result of engaging in project activities, 86% of selected FFS members had received funds and material to build cattle sheds.

The survey found that only 17 percent of the FFS members had received credit facilities from the project to purchase cattle. In the Badulla district, 98 percent of FFS members were not linked with the credit programme. According to the survey, only 16 percent of FFS members were newcomers to dairy farming and most of the new dairy farmers joined FFS with the intention of purchasing animals by obtaining credit facilities from the project. The project had failed in some areas in linking farmers with credit programmes and as a result, some newcomers had given up dairy farming and cattle sheds built with the project money had not been used. An improvement in feeding of pasture and fodder was visible in all the study locations after the project intervention. Farmers have shifted from free grazing and tethering systems to tethering and cut and feed system. Training and use of cattle shed had a positive effect on these improvements. A significant improvement in maintaining own grasslands could be identified only in the Kurunegala district. A new variety CO-3 (Coimbatour-03) has been introduced to dairy farmers in the Kurunegala area by the project officers with the help of VS officers and it has become popular among farmers who could supply water even in the dry season. Only 36% of FFS members had used concentrate feeding as a main component of cattle feeding before the project intervention and it has increased to 78% after project implementation. A substantial increase of 60% could be observed in Kurunegala and Monaragala using concentrate feed. However, in the Anuradhapura district tethering and free grazing is practised and the use of concentrate is comparatively low. According to the survey, only 45% of FFS members had used AI as a breeding method before the project intervention and it has increased to 76% after implementation of the project. The percentage of using AI service after intervention of the project has significantly increased in Kurunegala and Monaragala areas where natural mating was predominant. Vaccination has increased in all the study locations following FFS. It has had a significant impact in Kurunegala, Anuradhapura and Monaragala areas where vaccination of animals is considered very important. According to the views of VS and LDI, conducting of vaccination programme was made easier when farmers gathered in groups. Especially in Kurunegala area some FFS had provided transport facilities to the officers to conduct vaccination programmes and the FFS had given priority to the members.

Difficulties in finding good quality animals or non-availability are major problems faced by farmers in obtaining cows with a higher genetic potential. They have had upgraded animals especially through Artificial Insemination (AI) and using stud bulls of other farmers. However, there is a high demand for animals with high milk production from the farmers in every area. Lack of follow-up by the project officials is recorded as a drawback in all the study locations. The project has set targets to Field Facilitators, forming a number of FFS every year. They follow targets than considering about the sustainability of the FFS. As a result, 50% of the FFS started in 2008 are now not functioning well. Further, the survey found that 34% of the FFS had never conducted meetings after the initial meeting. Accessibility of veterinary service

is poor in most of the project areas. Absence of a proper AI service in time and higher service charges are the main problems faced by farmers in most areas. On average, in all the study locations only 27% of FFS member were satisfied with the extension services they received before the project intervention and it has increased to 51% after the project indicating a positive impact on the project. Only 36% of farmers have been satisfied with the extension services they received in control group in all the study locations. Record keeping on dairy farming activities has increased in all the study locations after the project intervention and it is limited to AI related records. Only 15% FFS members had maintained records on dairy farming before the project and it has increased to 60% following the project. In control group, only 19% farmers had kept records on dairy farming activities. Keeping records on cost and return on dairy farming was very rare in all the study locations before and after the project.

A huge competition between milk procurement and processing companies to attract dairy farmers in all locations was clearly observable. Formation of dairy farmers' organizations to collect raw milk and provide services through these organizations is the popular method followed by many milk collecting agencies and companies. Grouping farmers as FFS was a major benefit to farmers when building linkages with the company.

According to the survey, only 27 percent farmers had practised evening milking before the project intervention. The project intervention is not at a satisfactory level in this regard especially in the Anuradhapura area. Only 17 percent FFS members who did not practise evening milking had started it after attending FFS. The study found that, on average, in all the study locations, feed cost is the largest (78%) cost item when calculating without adding values to the family labour. It is as higher as 88% in the Badulla district where the concentrate feed is highly used with intensive cattle farming system. The average cost of herd in all the study location per month is around Rs.2275 without imputed cost. The lowest value is recorded in the Anuradhapura district due to the poor cattle management practices such as free grazing and lack of practicing concentrate feeds. According to the calculation of cost and return, a household could gain a net return of Rs.13, 172/month as an average without adding values to the family labour. It differed from one study location to another based on average milk yield per month. The highest net return was recorded from the Kurunegala area where the highest average milk yield per month was recorded. The lowest net return without adding value to the family labour was recorded in the Anuradhapura district where the average milk yield was the lowest among the study locations. When calculating the cost of production by adding value to the family labour, the dairy farming is not an economically viable industry in all the study locations.

Non-function of the revolving fund is identified as a limiting factor for sustainability of FFS and only 28% FFS recorded proper functioning of the revolving fund in all the study locations. According to the survey, only 18% of FFS could be able to arrange

loan facilities for their members. This is a limiting factor and this situation had led to the collapse of certain FFS.

The survey found that only 38% of FFS had proper connection with milk collecting company as a group. All the group members agreed to sell their milk production to the selected company and if the price and other services are not satisfied as they expected all the members agreed to shift to the other company in a group. In this manner the bargaining power increased and they are able to strike a better deal with the selected company.

The study suggests forming FFS during the first part of the project lifecycle and during the second phase sustainability of the FFS should be considered. Formation of FFS at the end of the project is futile as there is no time for the FFS to be sustainable. Activating a revolving fund is very important as it is the linking factor of FFS. By motivating FFS for bulk purchasing of input and other materials FFS could be able to reduce the cost of production and maintain a welfare fund for the benefit of the members. Two or three FFS could be linked to one milk collecting centre as in the Moneragala district rather than providing a milk collecting center for each FFS. The research team observed that some milk collecting centers do not function well due to lack of sufficient milk. It is advisable to link social mobilization programme with FFS to change the attitudes of farmers to link in group activities. FFS should be reformed before linking with the district level federation by appointing efficient office-bearers. It is recommended to conduct financial auditing on all the FFS before linking with federation, since the money granted by the project remained in the bank without being used in most of the FFS. A regular follow-up service covering all the FFS should be established using field facilitators until the FFS are sustainable rather than increasing the number of FFS. It is suggested to formulate a common plan when building cattle sheds and farmers should be motivated to adhere to the plan. Further, one or two farmers from each FFS can be trained as leader farmers to fill the gap of veterinary services and lead FFS members with the latest technology. Establishment of breeding farm within FFS could provide good quality animals to the members at low rate. The project could provide more facilities to such selected farmers and animals could be distributed on a revolving system.

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LIST OF ABBREVIATIONS

AI	-	Artificial Insemination
DOAPH	-	Department of Animal Production and Health
DPMO	-	District Project Monitoring Office
DSD	-	Divisional Secretariat Divisions
DZLiSPP	-	Dry Zone Livelihood Support and Partnership Programme
FFS	-	Farmer Field School
HARTI	-	Hector Kobbekaduwa Agrarian research and Training Institute
IFAD	-	International Fund for Agricultural Development
IPM	-	Integrated Pest Management
LDI	-	Livestock Development Instructor
PCU	-	Project Coordinating Unit
VS	-	Veterinary Surgeon

CHAPTER ONE

Introduction

1.1 Background

The Dry Zone Livelihood Support and Partnership Program (DZLiSPP) funded by the International Fund for Agricultural Development (IFAD) is implemented by the Ministry of Agriculture (MOA) targeting the rural poor in the dry zone. The aims of the project were to alleviate rural poverty by improving the living conditions of the peasants, in selected dry zone districts in Sri Lanka. The project was implemented during 2006 – 2012 (seven years) in four dry zone districts namely Anuradhapura, Kurunegala, Badulla and Monaragala with the ultimate goals of achieving a sustainable increase in income and improved living standards of poor households in the program area. The program was implemented in 44 Divisional Secretariat divisions in selected four districts covering 1,070 *Grama Niladhari Divisions* benefiting 250,000 households.

The programme had five major components as follows:

1. Development of Highland Agriculture Production Activities (crop & livestock)
2. Marketing and enterprise development
3. Irrigation rehabilitation (Small Scale irrigation Schemes)
4. Micro-finance and Income Generating Activities
5. Community infrastructure development – (Rural roads, drinking water, household electricity)

Dairy development sub-component came under the first component and the programme had concentrated on dairy development through the approach of dairy Farmer Field School (FFS). The aim of this sub component was to increase the farmer income by introducing a 'stall-fed'" cattle management system in the project area and to adopt improved animal husbandry techniques thereby replacing the conventional free grazing cattle rearing system. The number of targeted dairy FFS of the project was 700 and by the end of 2011, 548 dairy FFS had been completed. The total number of cows of these assisted FFS was 16,635 including 11,651 milking cows. The project assisted in building cattle sheds that could accommodate 3-4 cows, growing grass, providing credit facilities for purchasing animals, construction of milk collecting centres, arranging new milk routes and twice -a - day milking, introduction of artificial insemination system to improve herd quality and giving training on dairy farm management. The number of farmers belonging to these FFS is 8,670 and the total cost incurred to develop these FFS has been LKR 87 million. The average cost per farmer is about LKR 10,000. The project had established 43 milk collecting centers in four districts and the target was to achieve 60 milk collecting centers. The aim of this study was to evaluate the impact of dairy programme on farmers and the success of FFS approach in dairy development.

1.2 Objectives of the Study

Main Objective

The main objective of the study was to evaluate the success of FFS approach in dairy development.

The specific objectives of the assignment were,

- To assess the impact of dairy FFS developed by the programme on cattle management practices.
- To analyze dairy FFS in terms of financial and economic aspects.
- To evaluate sustainability of dairy FFS.

1.3 Methodology

1.3.1 Data Collection

Two interrelated data collection instruments were used to elicit necessary information for the study.

1. Primary Data Collection:

(a) Key informant discussions and focus group discussions were conducted with the officers of Department of Animal Production and Health (DOAPH) in project areas and Project staff of District Project Monitoring Office (DPMO) and Project Coordinating Unit (PCU) and office-bearers and members of FFS.

(b) Structured questionnaire survey was used to gather information from farmers to evaluate the impact of FFS approach.

2. Secondary Data: Secondary data was gathered from the data base at the district level project offices, monitoring and evaluation reports, aide-memoires etc.

1.3.2 Sample Design

To meet the aforesaid objectives of the study multi stage stratified sampling design was followed for the selection of households for the study. The sampling units at different stages included districts, dairy FFS, household of FFS, control group and household of control group.

1.3.2.1 Study Area: - All four districts which implemented the project were selected for the sample survey namely Anuradhapura, Badulla, Monaragala and Kurunegala. Having consulted project officers 13 Divisional Secretariat Divisions (DSD), covering the entire project area were selected.

1.3.2.2 Selection of FFS: - In each district, 10 percent of dairy FFS formed under DZLiSPP was selected. The selection was done by using categorization of FFS based on project indicators on performance basis. Then all the FFS were divided into four categories as A, B, C and D from the highest to the lowest performed. From each category the required number of FFS was selected proportionately using the simple random sampling technique. Data were received only for 425 FFS and based on the above categorization. Fifty FFS were selected from all the study locations and distribution of the sample is shown in the table 1.2.

Table 1.1: Selected Number of FFS, Households and Focus Group Discussions

District	A'pura	Kurunegala	Monaragala	Badulla	Total
Sample size(FFS)	16	11	11	12	50
No of households	68	42	47	50	207
No of households (control group)	30	23	16	37	106
Focus group discussions	16	11	11	12	50

1.3.2.3 Selection of households: - All members of the selected FFS were grouped into four strata of equal number after arranging them in ascending order according to the number of cattle possessed by them. From each stratum, one household was selected at random, thus constituting a beneficiary sample size of 4 per selected FFS. The table 1.1 describes the selected number of FFS from each district and the selected number of households in FFS sample and control group.

1.3.2.4 Selection of control group: - Farmers who did not benefit from DZLiSPP were selected from the same area with similar characteristics as a control group. Two farmers who did not benefit from the project were selected randomly from nearby area of each selected FFS with similar characteristics.

1.3.2.5 Milk collecting centers: Thirteen milk collecting centers were selected from four districts to evaluate the impact of project intervention.

1.4 Methods of Data Analysis

The study involved both quantitative and qualitative aspects. The univariate and bivariate tables and their techniques (Mean, Median etc.) were used for the analysis of quantitative data. In addition, descriptive statistics, tables and graphs were used to assess the before and after effects of the project.

Table 1.2: Distribution of Sample in Selected Districts

District	DSD	Category				Total
		A	B	C	D	
Kurunegala	Polpthigama	2		2	1	5
	Ahatuwewa		1	2	1	4
	Ambanpola	2				2
	Total	4	1	4	2	11
Anuradhapura	Palagala		1	1	1	3
	Madawachchiya	1	4	1		6
	Thirappane	1	1	3	2	7
	Total	2	6	5	3	16
Badulla	Welimada	1	2	1		4
	Uwaparanagama			2		3
	Bandarawela		1	1	2	4
	Passara				2	2
	Total	1	3	4	4	12
Monaragala	Siyabalanduwa		1	1	1	3
	Buttala	2		1	1	4
	Wellawaya		1	2	1	4
	Total	2	2	4	3	11
Grand Total		9	12	18	12	50

CHAPTER TWO

Socio- Economic Characteristics of Selected FFS Members

2.1 Introduction

This chapter briefly discusses socio-economic characteristics, such as Age – Sex distribution, sources of income, experience in cattle rearing and living conditions of selected beneficiaries. Total sample of 207 FFS members were selected for the survey including 42 members from Kurunegala, 68 members from Anuradhapura, 47 members from Monaragala and 50 members from Badulla.

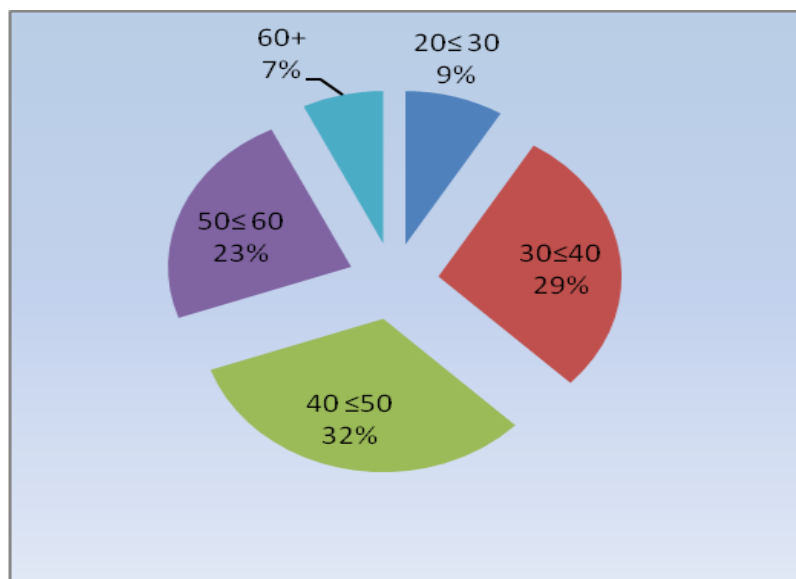
2.2 Age – Sex Distribution of Beneficiaries

In this section status of age – sex distribution of selected FFS members is taken into consideration. Accordingly, it is clear that the involvement of the younger generation in dairy farming activities is very low compared to the older age groups. Figure 2.1 shows the age distribution of selected dairy FFS members and it reveals that the highest proportion (73 percent) of dairy farmers belongs to over 40 years age groups. Only 9 percent of dairy FFS members from the total sample belong to age categories below 30 years. This reveals the diminishing interest of youth in dairy farming activities in all four districts. Less involvement of the younger generation in dairy farming activities in Dry Zone is mainly due to the fact that members of these age categories are seeking better jobs in the non-farm sector with regular monthly incomes. Most of them have been educated at least up to G.C.E. Ordinary level and they prefer prestigious work than engaging in dairy farming. The mean age of respondents was 43.57 and median was 43. Annex 1 illustrates the age distribution of selected FFS members by the study location. Accordingly, the involvement in dairy farming of younger age group was significantly low in the Kurunegala district compared to the other three study locations. Among the interviewed respondents, males are predominant in Kurunegala (72 percent) and marginally higher in both Moneragala (53 percent) and Anuradhapura (51 percent) districts. The female percentage was higher in Badulla district. On average in all the study locations, 55 percent of the FFS members were male, indicating more participation of males in dairy farming activities (Annex 2). The majority of respondents in all the study locations had 1-2 dependents in their households. Only 2 percent of households recorded over five dependents.

2.3 Occupation

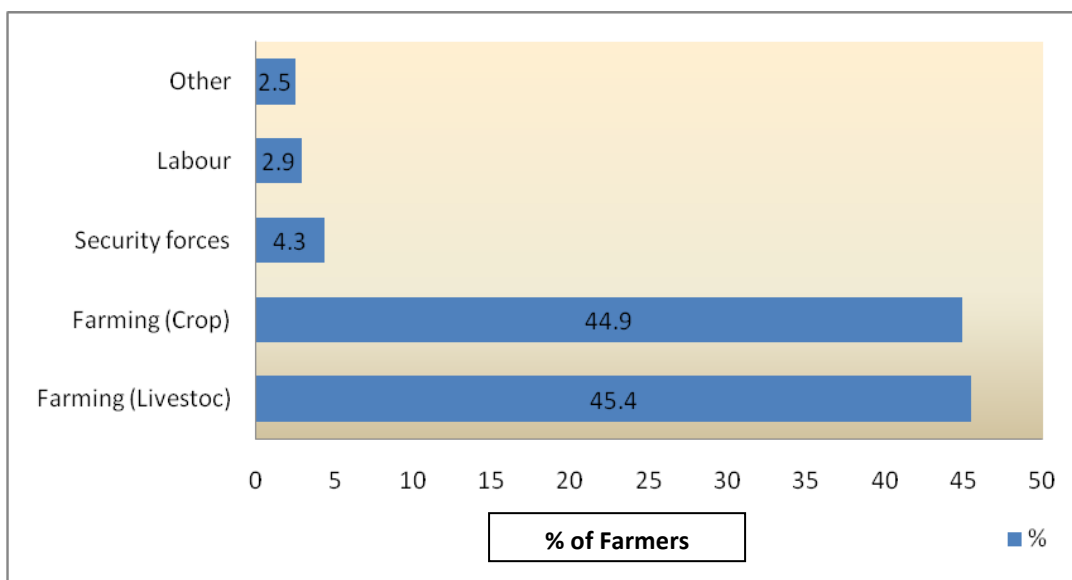
According to the survey, 90 percent of FFS members had engaged in farming (crop or livestock) as primary occupation. The project targeted the farming community in Dry Zone areas. Out of 207 selected dairy farmers, 45 percent practised dairy farming as

their primary occupation. The rest of the farmers (55percent) practised it as a secondary occupation while being engaged in some other income earning source (such as crop farming, government and private sector employment and estate sector employment) as primary employment. Out of the total number of male farmers involved in dairy FFS, 35 percent had selected dairy farming as the primary occupation. It is very clear that most of the male farmers practised dairy farming as a secondary income source of the family. Apart from that, most of female FFS Members (59 percent) had selected dairy farming as their primary occupation. Dairy farming has become a primary income source for the female farmers while being at home. Further, the survey indicated that the 56 percent of the respondents were the main income earner of the household.



Source: HARTI Survey, 2012

Figure 2.1: Age Distribution of Selected FFS Members



Source: HARTI Survey, 2012

Figure 2.2: Primary Occupation of Selected FFS Members

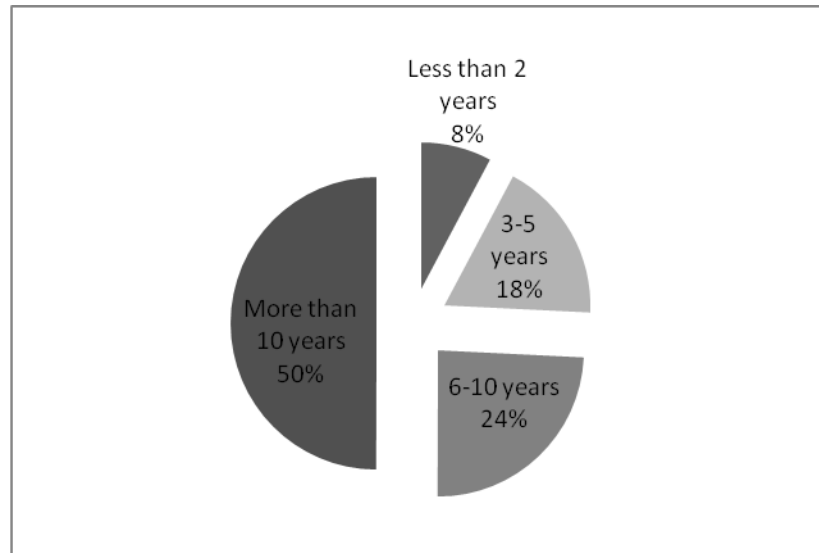
2.4 Living Conditions

For an overall understanding of the living conditions of the selected FFS members the condition of house (Floor, roof and wall), drinking water and lighting of the house were considered. Accordingly, 60 percent of the houses consisted of cement floor, roofing tiles with brick or cement block walls. Out of the total sample, 60 percent of FFS members obtained their drinking water from wells in their premises or in a neighboring place. Only 26 percent had access to pipe borne drinking water. Most of the FFS members (78 percent) had linked with the hydro power while 16 percent had used kerosene oil for lighting their houses. On the whole, the situation in the Monaragala district was worse compared to the other three study locations. In our sample 35 percent of the FFS members had access to the nearest town which was within less than 5 km of distance.

2.5 Experiences in Cattle Farming

The traditional farming system in Sri Lanka was linked the crop farming with livestock to ensure food security and family nutrition. According to our survey, 50 percent of FFS members had experience in cattle farming for more than ten years. Another 24 percent of FFS members had 6-10 years of experience in cattle farming. According to that, it was evident that most of the FFS members have had traditional knowledge in cattle farming. On the other hand, the survey revealed that 84 percent of the FFS members engaged in the project had been involved in dairy farming before attending the FFS. It was higher in the Badulla district where 88 percent FFS members had engaged in dairy farming before attending FFS activities. In the Monaragala district the percentage of new farmers to FFS is comparatively higher than the other study

locations and 23 percent FFS members were recorded as newcomers to dairy farming. Out of the total sample 64 percent of the FFS members had experienced in attending FFS activities for less than three years. The project had implemented the dairy FFS activities in the latter part of 2008 and most of the FFS had developed during 2010 and 2011 especially in Monaragala and Badulla areas.



Source: HARTI Survey, 2012

Figure 2.3: Experience in Cattle Farming

In the control group 47 percent farmers had over ten years experience in cattle farming and another 20 percent farmers had 6-10 years experience. Thus the control group is much similar in terms of experience with the FFS sample.

CHAPTER THREE

Impact of Dairy FFS on Cattle Management Practices

3.1 Introduction

FFS approach was first developed in 1989 by the Food and Agriculture Organization of the United Nations (FAO). It was used to train rice farmers in Indonesia on Integrated Pest Management (IPM) as part of their National IPM Programme. The approach proved to be very successful in helping control rice pests and was quickly expanded to other countries in Asia, Africa, the Middle East and Latin America. In 1995, the FFS programme began to broaden its scope beyond IPM to cover other types of agricultural production and incorporate socio-ecological conditions.

According to the literature a FFS is a capacity building method based on adult education principles using groups of farmers. It is best described as a 'school without walls', where farmers learn through observation and experimentation in their own fields. This allows them to improve their management skills and become knowledge experts on their own farms. The approach empowers farmers using experiential and participatory learning techniques rather than advising farmers what to do. Farmers are encouraged to handle their own on farm activities in which they apply previous experiences and test new technologies. A FFS usually comprises a group of 20–30 farmers who meet regularly over a defined period of time, a crop production season for example, to validate (new) production options with the help of a facilitator. Management decisions are made at the end of every meeting on what action to take. After the training period, farmers continue to meet and share information with less facilitator contact.

FFS is a process, not a goal. It aims to increase the capacity of farmers to test new technologies in their own fields and assess results and their relevance to particular circumstances. Farmers interact with researchers and extension workers on a demand driven basis, only asking for help where they are unable to solve a problem themselves. As an extension methodology, a FFS is a dynamic process that is practised, controlled and owned by the farmers to help them transform their observations to create a better understanding of their crop–livestock system. To enable a FFS group to test alternative solutions and take the risk of experimenting with new technologies, a grant or loan is often made available by the funding agency. Since the grant is entirely the property of the FFS and under the sole management of the members, it empowers the group to access the information and instruments when they need them.

The objective of the DZLiSPP (IFAD) intervention to dairy farming is to increase family income as a secondary income source and to increase the level of family nutrition. To achieve these objectives cattle management practices should be improved. The

efficiency of cattle farm operations depends heavily on good management of cattle and other farm resources. To achieve the optimum production and productivity from cattle and the farm, cattle farmer has to focus thoroughly on cattle management practices. In this chapter, first, the procedure of implementing FFS in DZLiSPP are described briefly and secondly, the changes of cattle management practices as a result of project intervention and their impact are taken into consideration.

3.2 Procedure of Implementing Dairy FFS

The first step of forming FFS is the conducting of a common meeting in a selected area with the help of officials of Department of Animal Production and Health at provincial level. After this awareness meeting farmers are selected based on their willingness to attend FFS and divided into small groups. The maximum number of the FFS members depends on the area and the survey found that in some areas it was 10 and other areas it was 20. After selection of farmers and grouping them, FFS has to be registered and a number or name is assigned to each FFS. The office-bearers of the FFS are selected among the members. Then each FFS has to open a bank account to facilitate financial transactions with the project and subsequently, the project activities are officially started.

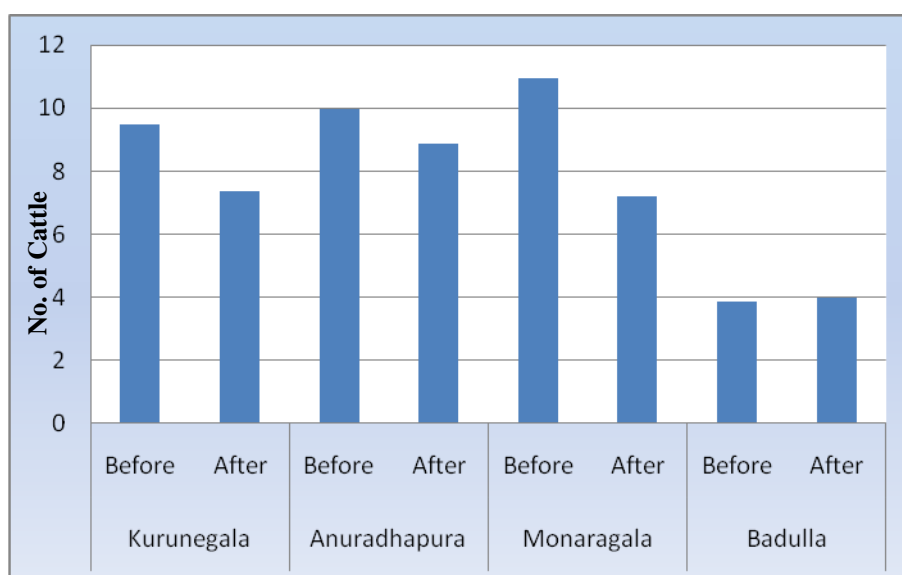
According to the survey and project documents the main target of the project in dairy development sector was to build cattle sheds to improve cattle management practices. Hence the project grant targeted the cattle shed and around Rs.10, 000 has been granted to each FFS member to facilitate the establishment of cattle shed. In Kurunegala and Anuradhapura areas the grant was in the form of money while in Monaragala and Badulla it was material. Compared to the total cost of building of cattle shed the amount granted by the project is very less and it is only an incentive to the farmers to build a cattle shed. Before starting building the cattle shed, basic training was provided by the project with the help of Veterinary Surgeon (VS) and Livestock Development Instructor (LDI) the area. The plan of cattle shed, provided by the Provincial Department of Animal Production and Health, is common to the entire FFS members.

While the building of cattle shed is in the process, other facilities in dairy farming are linked by the project to improve the management practices of dairy farming. Village level basic training on cattle management and in-house training is provided to the farmers to improve their knowledge. In some areas planting material of improved varieties of grass had been distributed by the project to have their own grassland to the farmers. Field visits had also been organized to share the knowledge on dairy farming activities among the project facilitated farmers. The other important activity of the project on dairy FFS is the linkage of credit facility. The project had implemented micro credit programme called '*Bhagya*' and dairy farmers are linked to that credit programme to purchase high yielding improved cows. Leader farmer training on breeding farms and building of milk collecting centers are other important activities conducted by the project to develop the dairy farming in study areas. The

final stage of FFS is to link all the FFS at divisional and district level to federation to attain sustainability following the project.

3.3 Average Herd Size Before and After the Project

The average herd size of the smallholder dairy farming sector varies among different management systems. According to the cattle breeds, available resources (grassland, and land availability, labour), services available (input supply, extension and other knowledge dissemination, marketing), cost for maintenance of a herd and other factors determining the size of the herd, vary.



Source: HARTI Survey 2012

Figure 3.1: Average Herd Size Before and After Intervention of the Project

The cattle management system of dry zone in Sri Lanka is largely characteristic of free grazing and local breeds with large herds. The purpose of maintaining a large herd is to reflect the wealth of the owner than considering its productivity.. The project had changed the attitudes of the farmers to a certain extent and led them to profitable dairy farming. The change is prominent in Kurunegala, Anuradhapura and Monaragala areas where the farmers had sold their low yielding local breeds to purchase high yielding cows of improved breed. As a result the average herd size has shrunk in all the study locations except in Badulla. Even following the intervention no change could be observed in terms of herd size in the Badulla district. However, the land availability and other resources have limited the average herd size and the intensive system is practised especially in the estate sector in the Badulla district. On average, in all the study locations, the herd size reduced to seven from nine animals following the intervention.

3.4 Herd Composition

Generally, a cattle herd comprises all the animals such as milking cows, heifer, calves, bulls etc. However, the most productive animals in the dairy farm are cows and heifers. The Table3.1 describes the herd composition in four different study locations before and after the project intervention. Accordingly, positive improvements could be observed in all the study locations where percentage of heifers and calves had increased while the percentage of male animals had decreased after the intervention.

Table 3.1: Herd Composition Before and After the Project Intervention (%)

	Kurunegala		Anuradhapur		Monaragala		Badulla		Total	
	Before	After	Before	After	Before	After	Before	After	Before	After
Cow	58	51	39	36	32	33	44	38	42	39
Heifers	15	22	17	20	18	25	20	21	17	22
Male animals	13	7	20	13	23	13	5	5	17	10
Calves	14	20	24	31	27	29	31	36	23	29
Total	100	100	100	100	100	100	100	100	100	100

Source: HARTI Survey 2012

Especially in Monaragala and Anuradhapura, the percentage of unproductive male animals was 20 and 23 respectively before the intervention and it had dropped to 13 in both locations after the intervention. This situation indicates a clear drop in the herd size in the study locations after the intervention.

When compared with the control group, the percentage of unproductive male animal was 25 in the herd and it was higher than the FFS sample.

3.5 Ownership of Cattle Herds

The ownership of a cattle herd is very important in terms of the development and its further expansion. Generally, farmers pay more attention and care in management practices and day- to- day activities in the cattle farm, when the herd is solely owned by them than having partial ownership on the basis of 'Ande' or any other form. According to the survey, 97 percent of the FFS members had sole ownership of their herd and no change was observed after the project intervention.

In the control group, 95 percent farmers had sole ownership which is similar to the sample of FFS members.

3.6 Maintaining Cattle Sheds

As an integral component of well managed cattle farms, housing makes operation and maintenance activities easy allowing farmers to reach high productivity and make cattle farming a profitable venture. According to the survey, only 36 percent of the farmers had maintained any form of cattle shed to provide housing for animals, before the project. The situation was worse in Kurunegala, Anuradhapura and Monaragala districts where the percentage of non maintaining cattle shed was high.

The percentage of maintaining of cattle shed has increased in all study locations after the project, since the main intervention of the project was to provide facilities to build cattle sheds for FFS members. A common plan had been given to FFS members by the Department of Animal Production and Health at provincial level. Before starting the construction of cattle shed, basic training on building of cattle shed had been provided by the VS or LDI in all study areas. First installment is released after inspection of the building structure. The second or the final installment is released after construction of cattle shed according to the given plan. In the Badulla district FFS members were given roofing sheets or cement instead of money. Although, the FFS members have built cattle sheds the percentage of using it as an intensive system was very low in the study locations except in the Badulla district. Especially in dry season most of the farmers in sent their cattle too far away areas for grazing and do not use the cattle shed for their animals even at night.

Table 3.2: Maintaining of Cattle Sheds Before and After the Project (%)

Response	K'gala		A'pura		Monaragala		Badulla		Total	
	Before	After	Before	After	Before	After	Before	After	Before	After
Maintained	39	100	12	79	25	96	71	96	36	91
Not maintained	61	0	88	21	75	4	29	4	64	9
Total	100	100	100	100	100	100	100	100	100	100

Source: HARTI Survey 2012

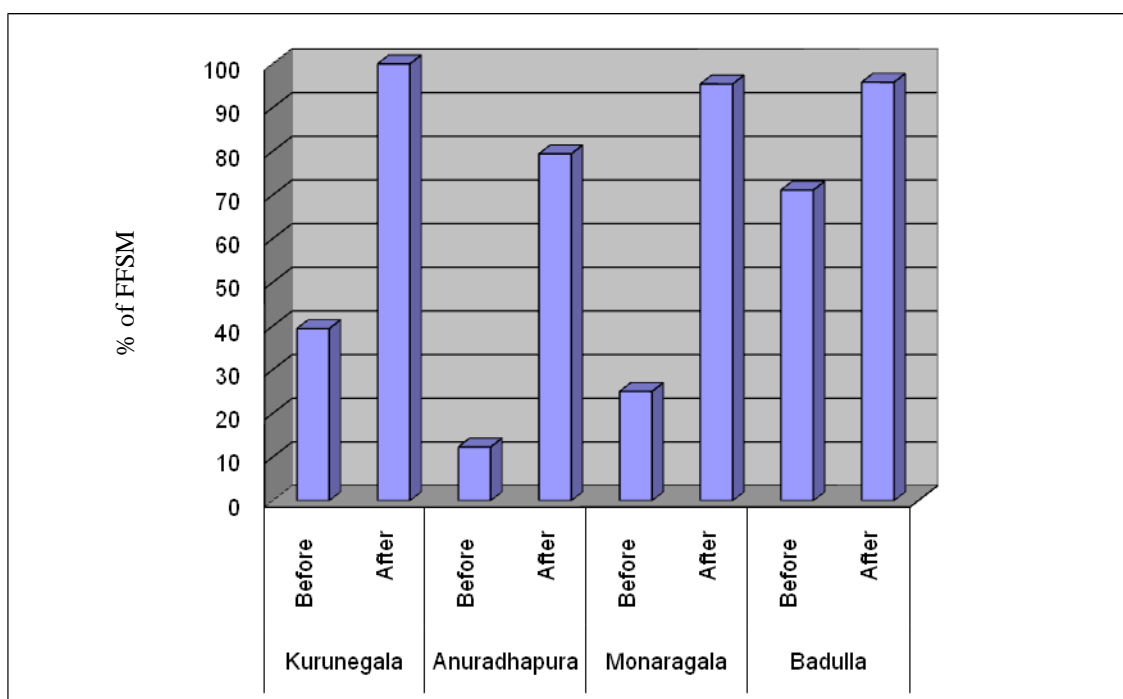
The intervention of building of cattle shed by the project is very important due to various reasons. Although the percentage of using of cattle shed during the dry season is low due to lack of water for cleaning purposes, it is more useful during the rainy season to protect their animals from rain and disease. Some farmers had changed their free grazing system to semi- intensive system especially in the Kurunegala district as a result of building of cattle shed. The other advantage is that the animals were provided with drinking water at night. It would directly lead to the increase of the milk yield of the cows. According to the field observation, it was clear

that most of the farmers had built the cattle sheds to their own plan although the plan was given by the Provincial Department of Animal Production and Health. The percentage of maintaining cattle shed by the control group was 60 and it was significantly higher (86 percent) in the Badulla district. Accordingly, it is clear that maintaining of cattle shed is higher in the Badulla district with or without project intervention.

A majority of cattle sheds (62 percent) maintained by farmers before the project intervention falls in the informal category, which consisted only of a shelter over the cattle. The hygiene of such cattle sheds is very poor and the floor is not concreted or rock paved. Wastage of forages and labour requirement in cattle shed management are comparatively very high in such a shed.

Another 23 percent of the cattle sheds maintained before the intervention were semiformal having concrete or rock paved sloppy floor to drain out urine and dung through a canal outlet. Only 15 percent of cattle sheds fell in the formal category with adequate facilities for animals.

Figure 3.2: Maintaining of Cattle Shed Before and After the Project



Source: HARTI Survey 2012

The condition of cattle sheds constructed as a result of the project in the Kurunegala district is comparatively better compared with the other study locations. Most of the cattle sheds (55 percent) were in good condition with more facilities in the Kurunegala district while the majority of cattle shed in other three study locations

belonged to semiformal category. Nearly one fourth of cattle sheds as an average in all the study locations are provided only shelter for animals without any facilities. Especially in the estate sector in the Badulla district farmers had not paid any attention even to the minimum required height of cattle shed and ventilation, and its common rock laid floor is difficult to clean. This condition may affect the hygiene or health of the cattle.

According to the table 3.3, the conditions of cattle sheds have improved in all the study locations as a result of project intervention. Lack of water for maintaining cattle sheds during dry season is a major problem faced by most of the farmers in dry zone in Sri Lanka. Although the farmers had built water containers in cattle sheds they provide water to the animals through water supply system.

Table 3.3: Type of Cattle Sheds Before and After the Project Intervention

Type of Cattle Shed	K'gala (percent)		A'pura (percent)		Moneragala (percent)		Badulla (percent)		Total (percent)	
	Bef	Aft	Bef	Aft	Bef	Aft	Bef	Aft	Bef	Aft
Formal	15	55	0	26	0	31	22	33	15	35
Semi formal	23	21	14	48	0	47	31	46	23	41
Informal	62	24	86	26	100	22	47	21	62	23

Source: HARTI Survey 2012

Table 3.4: Comparison of Type of Cattle Sheds with Control Group

Type of Cattle Shed	Ku'gala percent		A'pura percent		Mo'gala percent		Badulla percent		Total percent	
	FFS	Conl	FFS	Conl	FFS	Conl	FFS	Conl	FFS	Conl
Formal	55	33	26	21	31	17	33	34	36	30
Semi formal	21	42	48	29	47	33	46	41	41	37
Informal	24	25	26	50	22	50	21	25	23	33
Total	100	100	100	100	100	100	100	100	100	100

Source: HARTI Survey 2012

According to the survey of control group, 40 percent of farmers had maintained cattle sheds and out of them 30 percent was categorized as formal, 37 percent semi formal and the balance 33 percent as informal. The condition of cattle sheds is comparatively improved in the FFS sample compared to the control group. Especially the percentage of informal category in FFS sample was 23 percent and it was 33 percent in control group. The difference was visible in Kurunegala, Monaragala and Anuradhapura districts when compared to the control group. The percentage of formal cattle sheds was 55 percent in FFS sample and it was 33 percent in control

group. According to the table 3.4, it is very clear that the conditions of cattle sheds had improved in the Monaragala and Anuradhapura districts significantly and the project has had a great impact in those areas. When considering the situation in the Badulla district the project did not have much impact on the condition of cattle shed. The figures of FFS members and control group are very similar in the Badulla district indicating that farmers had maintained cattle sheds with or without project intervention.

Financial strength and motivation might be the factors of maintaining cattle sheds. Due to the absence of the above factors there were cattle sheds which lacked even the essential components such as the paved floor with a drain, feeders and ventilation. As a result of engaging in project activities, 86 percent of the selected FFS members had received funds and material for building cattle sheds. Another 11 percent of FFS members had benefited by any other project or Government funds via VS office to build cattle sheds. Almost all the FFS members had received basic training on building cattle sheds.

According to the survey of control group, only 14 percent of farmers had received financial assistance to build cattle sheds. This was also a greater barrier to build cattle sheds in control group in selected areas. The project had done a great service by providing financial facilities to farmers to build cattle sheds. As a result, the percentage of maintaining cattle shed has increased in FFS sample compared to the control group at significant level.

3.7 Purchasing of Cattle

Providing credit facilities to the FFS members to purchase genetically improved cattle is one of the strategies of the *DZLISPP*. The project aims to provide this facility via *Bhagya* loan scheme through micro credit programme which is another component of the project.

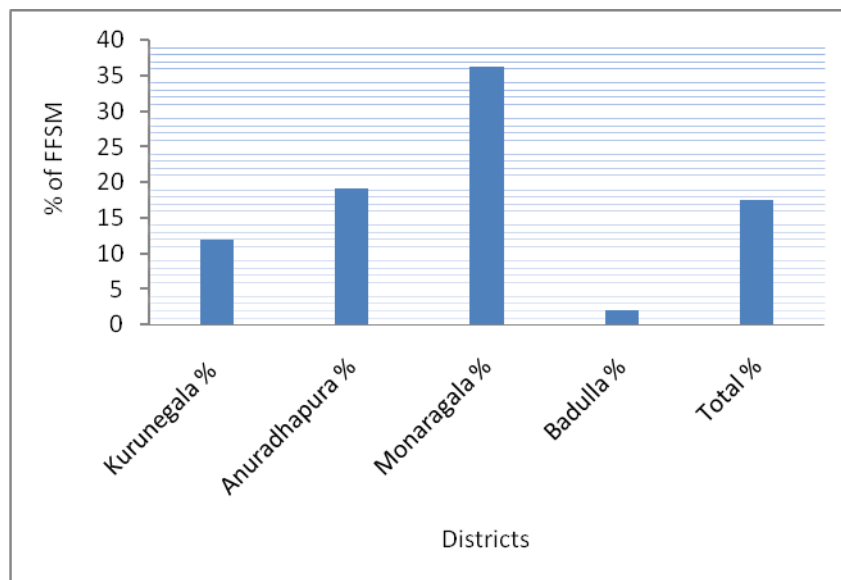
According to the figure 3.3, only 17 percent of the FFS members had received the credit facility from the project to purchase cattle. In the Badulla district, 98 percent of FFS members had not been linked with the credit programme. According to the survey, only 16 percent of FFS members were newcomers to the dairy farming as a result of the project intervention. Most of the new dairy farmers joined the FFS with the idea of purchasing animals on the credit facility of the project. The project had failed in some areas in linking farmers with the credit programme. As a result some new farmers had given up the idea of dairy farming due to high rates of animals..

In focus group discussions with FFS members, it was highlighted that the project had done a great service in terms of selecting good cows. In some areas the project had provided transport facilities to the FFS members to distant locations in search of for genetically improved cows with high yield.

Lack of genetically improved high yielding animals is the major problem faced by FFS members in dairy farming. Especially in dry zone area farmers practised free grazing of large herds of cattle without milking. Having gained knowledge and support from the project they expect to reduce their herd size and improve it with good quality animals to carry out dairy farming in a profitable manner. Only then the project could achieve its objective of stall fed dairy farming and this issue should be addressed by the project.

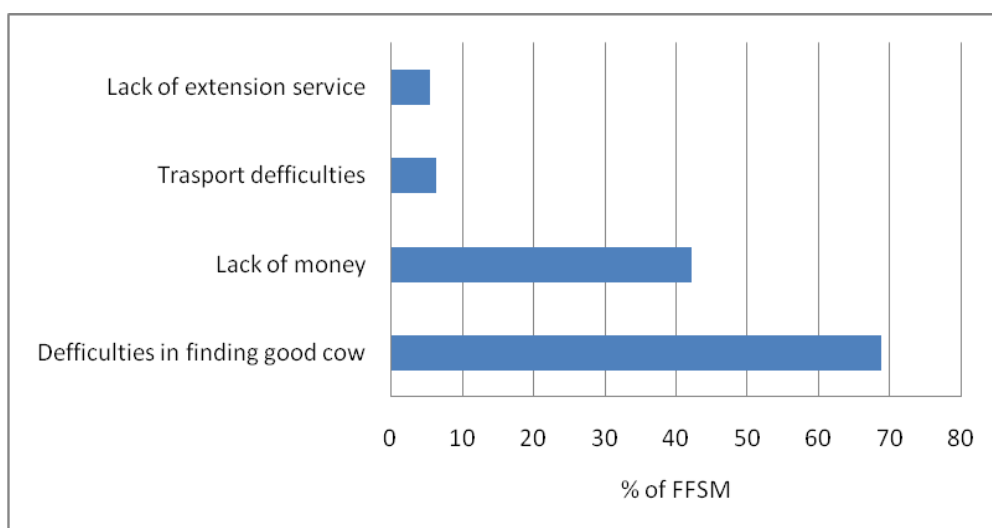
3.8 Cattle Feeding

Efficiency of farm operations and profitability of cattle farming depend heavily on the good management of the animals and other farm resources. Animal feeding and nutrition is one of the major management practices in cattle farming as the nutrition status of the animals in all categories has a direct effect on the animal’s reproductive capacity and milk production, health condition and healthcare practices. Therefore, to maintain the nutrition of animals at the optimum level, feeding animals is an essential task of cattle farming, hence, farmers have to pay greater attention to cattle feeding.



Source: HARTI Survey 2012

Figure 3.3: Obtaining of Credit by FFS Members from the Project to Purchase Cattle



Source: HARTI Survey 2012

Figure 3.4: Problems Faced by FFS Members in Purchasing Cattle

3.8.1 Pasture and Grass Fodder

The method of feeding highly depends on the management system practised according to the available feed sources, agro-ecological condition of the area and economic background of the farmer. As far as forages are concerned (grass and fodder), there are three cattle feeding methods widely used here in Sri Lanka; free grazing, tethering and cut and feed system.

The table 3.5 describes the feeding method of pasture and grass fodder for milking cows by selected FFS members. Out of the total sample of 207, only 164 FFS members had milking cows before the project and 188 FFS members had milking cows after joining the project. Hence the total percentages of the table are based on those values. According to that tethering was the primary method of feeding pasture and fodder for milking cows in all the study locations before the project intervention. Intensive system or cut and feed system took place at negligible level, except in Badulla in all the study locations before the project intervention.

Table 3.5: Pasture and Grass Fodder Feeding Methods Before and After the Project

District	Free Grazing Percentage		Tethering Percentage		Cut and Feed Percentage		Tethering and Cut & Feed Percentage	
	Before	After	Before	After	Before	After	Before	After
Kurunegala	27	0	67	28	3	13	3	59
Anuradhapura	21	7	65	55	2	7	12	27
Monaragala	0	0	84	47	3	11	14	42
Badulla	0	0	48	27	30	49	23	22
Total of respondents	12	3	65	42	9	18	13	36

Source: HARTI Survey, 2012

According to the data given in Table 3.5 in Monaragala and Badulla free grazing is not practised due to the lack of grazing land and farmers had to avoid free grazing to prevent crop damages especially in Monaragala area. In Anuradhapura and Kurunegala cattle are tethered under coconut palms, road sides, canal bunds and harvested crop fields.

The improvement in feeding of pasture and fodder is visible in all the study locations after the project intervention. Farmers have shifted from free grazing and tethering systems into mixing of tethering and cut and feed system. Training and usage of cattle sheds have a positive impact on these improvements.

Table 3.6: Comparison of Pasture and Grass Fodder Feeding Methods with Control Group

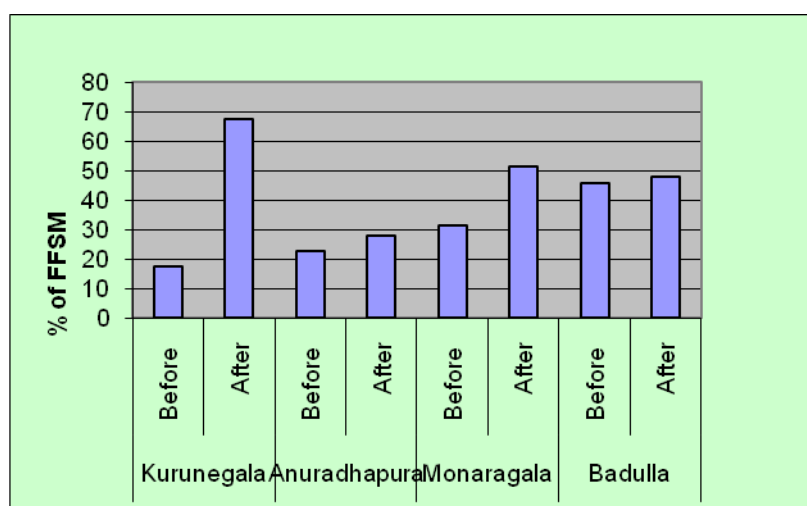
District	Free Grazing Percentage		Tethering Percentage		Cut and Feed Percentage		Tethering and Cut & Feed Percentage	
	Conl	FFS	Conl	FFS	Conl	FFS	Conl	FFS
Kurunegala	0	0	57	28	19	13	24	59
Anuradhapura	36	7	36	55	10	7	16	27
Monaragala	15	0	85	47	0	11	0	42
Badulla	0	0	22	27	56	49	0	22
Total of respondents	13	3	42	42	26	18	18	36

Source: HARTI Survey, 2012

According to the table 3.6, 57 percent of farmers in control group practised tethering as the main feeding method of pasture and fodder in the Kununegala district. Fifty nine percent of farmers in FFS sample practised tethering with cut and feed. According to this it is clear that the project had improved tethering system by adding cut and feed for their animals. It is a positive impact of the project when compared with the Anuradhapura and Kurunegala districts where free grazing system is practised. Similarly, 35.5 percent and 15.4 percent farmers in the control group respectively in two districts and only 7 percent and zero in the FFS sample respectively in both districts practised free grazing. On the other hand, tethering system is predominant (84 percent) in the Monaragala district in the control group and it is 47 percent in the FFS sample. As in the Kurunegala district, FFS members started practicing tethering system with cut and feed as a result of project interventions. Cut & feed system is the main feeding method of pasture and fodder in the Badulla district with or without project intervention. Finally, the feeding method of pasture and fodder has improved in Kurunegala, Monaragala and Anuradhapura areas compared to the pre project period and the control group.

3.8.2 Maintaining Own Grasslands by FFS Members

Sri Lankan cattle management is primarily forage based and milk production depends heavily on the forage availability in different agro-ecological zones. There is a fluctuation in supply (both quantity and quality) of forage with seasonal rainfall patterns and agro-ecological zones. Bimodal vegetative growth of grass and fodder in dry zone is resulted in high forage production in rainy seasons (two monsoons) and less and inadequate production during the remaining period. Therefore, it is essential to maintain farmers' own grass or fodder plots to supply the feed of a herd continuously. In this section comparison is made on maintaining of own grass land before and after the project intervention.



Source: HARTI Survey, 2012

Figure 3.5: Maintaining Own Grasslands by FFS Members Before and After the Project

According to the figure 3.5, significant improvement of maintaining grassland could be identified only in the Kurunegala district out of all the study locations. CO-3 (Coimbatour-03), one variety of Napier has been introduced to dairy farmers in Kurunegala area by the project officers with the help of VS officers and it has become popular among farmers who can supply water even in the dry season. Therefore, these grasslands have been limited to farmers' homestead supplied with pumped water. However, it is a good fodder source that could be easily grown with cow dung and a pumped water supply.

Even in the Badulla district where most of the farmers practice cut and feed system, the percentage of farmers who maintain grasslands is limited to 46 percent and 47 percent respectively before and after the project intervention. This situation is mainly due to lack of adequate land lots owned by estate workers to cultivate grass in

the Badulla district. However, they maintain fodder in small lots given by the estate owners to cultivate vegetables. In Welimada and Bandarawela areas small land lots are available adjacent to worker line rooms and other estate lands with water sources have been used for fodder cultivation. Further, fodder especially Napier varieties such as Clone-13 are widely planted in the boundaries surrounding the worker lines.

In Dry Zone, especially in Kurunegala, Monaragala and Anuradhapura districts lack of lands with an assured water supply is the major problem for maintaining grasslands. Farmers are constrained by scarcity of water especially in the dry season.

Table 3.7: Comparison of Maintaining Own Grasslands with Control Group

Status	Kurunegala percentage		Anuradhapura percentage		Monaragala percentage		Badulla percentage	
	Conl	FFS	Conl	FFS	Conl	FFS	Conl	FFS
Yes	44	67	13	28	25	51	46	48
No	56	33	87	72	75	49	54	52
Total	100	100	100	100	100	100	100	100

Source: HARTI Survey, 2012

Table 3.7, compares the maintaining of grasslands by control group and FFS members. A significant difference is visible in Kurunegala Anuradhapura and Monaragla districts among different groups. Maintaining of own grassland by FFS members is comparatively higher in all the study locations. The highest difference is recorded in the Monaragala district while the lowest is recorded in the Badulla district. Again it is highlighted that the project does not have much impact on the Badulla district while the project impact is higher in other study locations compared to the control group. The problem of not maintaining grasslands is more similar among different groups.

3.8.3 Rice Straw

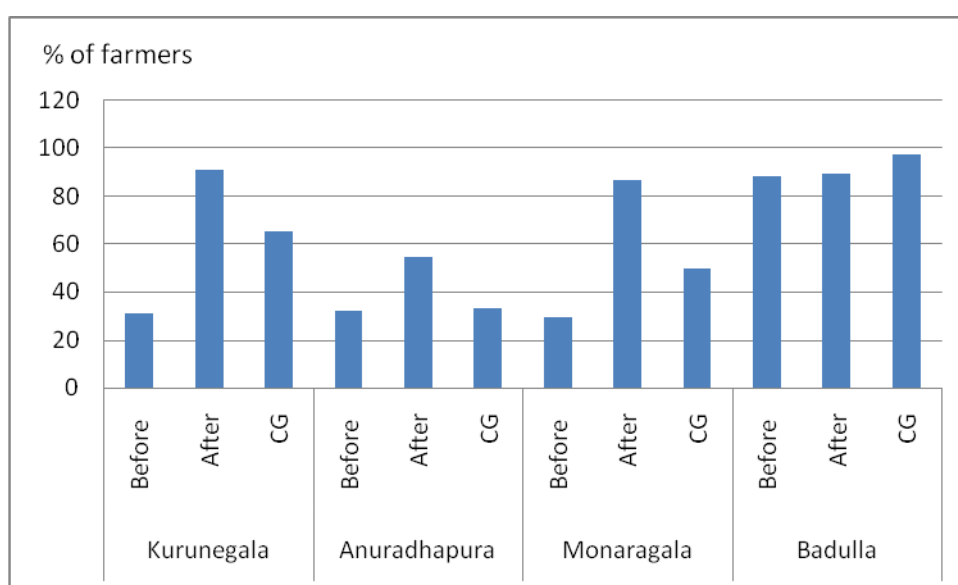
Rice straw is the only crop residue used by the dairy farmers as a non-conventional feed stuff in the study areas. Rice straw is the largest single crop residue available in most parts of the country. Generally well dried straw is collected and properly stored protected from rain and fungi attack for drought feeding.

Even though, rice straw is readily available in all study areas except Badulla only one third of the farmers (34percent) from all three study areas practise straw feeding. Field level extension officers have to play a vital role to motivate farmers to practise straw-feeding, to minimize the cost for animal feeding. The project had not paid much attention to this aspect.

No significant difference was observed compared with the control group where only 27 percent farmers were recorded as using rice straw as a feeding resource.

3.8.4 Concentrates

Concentrates are feeds rich in nutrients such as energy, protein, minerals, and vitamins essential to the animal. Concentrates are relatively expensive as local production is limited and cannot meet the national requirement. Coconut poonac, rice polish, soya bean meal, gingerly *poonac* or a mixture of these ingredients are common examples for concentrate feeds. According to Jayatilake *et al* (1995) although feeding concentrates to dairy cattle is a vital component for improving milk yields, the readiness of farmers to feed concentrate rations to their cattle depends, however, on the price-relationship between milk and concentrates.



Source: HARTI Survey, 2012

Figure 3. 6: Use of Concentrate Feeds

On average, in all the study locations, only 36 percent of FFS members had used concentrates feeding as a main component of cattle feeding before the project intervention and it increased to 78 percent after joining the project. Location wise, nearly 60 percent increase could be observed in Kurunegala and Monaragala in the use of concentrate feed. However, in the Anuradhapura district tethering and free grazing are mostly used as a feeding method of cattle and the use of concentrate is relatively low.

Stall feeding management system which is quite similar to the intensive system practised in the Badulla district, uses concentrate-feeding method and the main

supplement feed stuff of the forages grass and fodder even before the project intervention. Hence the change in using concentrate in Badulla is very minimal.

All the farmers obtain concentrate feeds from milk collecting agencies, especially processed concentrate mixture on credit. The provision of concentrate feeds for dairy farmers is completely handled by the milk collecting centers. Farmers readily rely on milk collecting centers specially regarding vitamin and concentrate feed mixture, marketing rice bran and rice polish, are predominantly handled by private traders. Provision of concentrates on credit to be recovered by milk payment is an important activity undertaken by milk collecting centers and it has been strengthened after grouping as FFS.

The use of concentrate feed by the FFS members is comparatively higher in all the study locations except in Badulla compared with the control group. The highest difference of 36.7 was recorded from the Monaragala district indicating a significant impact on changing farmers' attitude to use concentrate feed by the project.

3.9 Cattle Breeding

Though cattle population in the country especially in the Dry Zone is relatively high, most cattle are of low production potential. On the other hand, even cattle with a high production potential, their optimum potential is very low due to feed constraints. To increase milk production the production potential of cattle should be upgraded while the number of good quality animals has increased. Meanwhile breeding programmes undertaken should thoroughly consider the efficiency of reproduction of heifers and cows. The reproduction efficiency of heifers and cows plays a vital role in determining the efficiency and sustainability of smallholder dairy farms; hence, it has an impact on the economic returns of dairying. The objective of cattle breeding is to provide dairy type cattle with a high genetic potential in milk production depending on the different agro-ecological conditions. The changes in cattle breeding as a result of project intervention are discussed in this section.

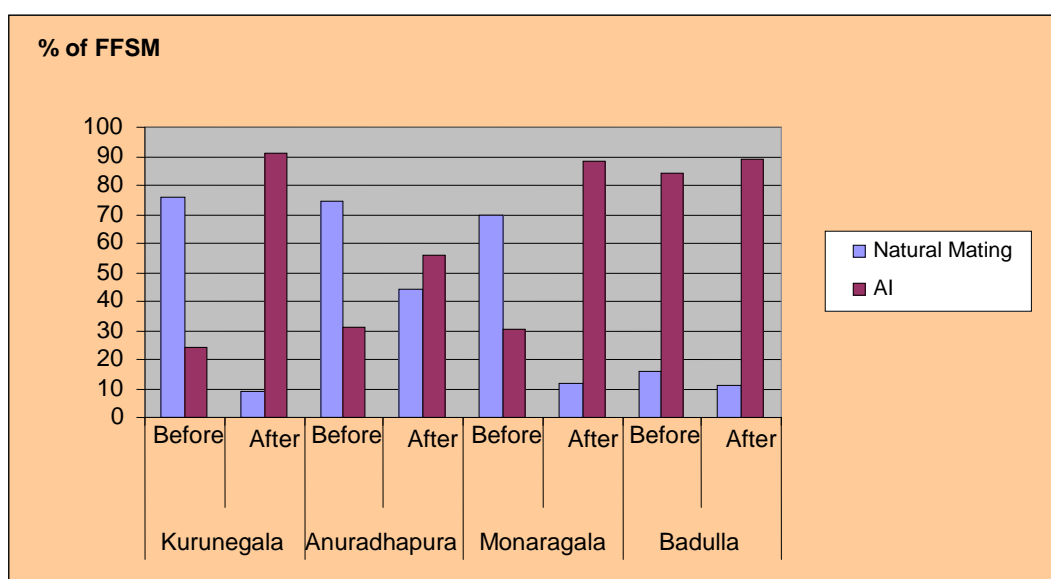
3.9.1 Farm Level Cattle Breeding Practices

The number of cattle with a high genetic potential for milk production with the ability to adapt to the prevailing climatic conditions in different agro-ecological zones is inadequate to meet the farmers demand. Therefore, increase of herd size of smallholder farmers with animals with a high production potential should be carried out by cross breeding of existing cows. Natural service and Artificial Insemination (AI) are used to cross breed the animals.

In case of cattle breeding, majority of farmers has placed the trust on AI service instead of practising the natural mating after joining the project. As an average in all the study locations, only 45 percent of FFS members had used AI as cattle breeding

method before the project intervention and it has increased to 76 percent after joining the project.

The percentage of using AI service after intervention of the project has significantly increased in Kurunegala and Monaragala areas where natural mating was predominant. Farm level training and awareness program on cattle breeding have directly affected this situation. An efficient follow-up service is not received by the farmers after AI is performed in most areas. Due to inadequate monetary allocations for fuel and lack of VS, a proper follow-up service is usually not practised. To obtain the service for pregnancy detection (PD) and other follow-up services, farmers have to bring the VS at their own expense. Due to high transport costs, farmers are reluctant to obtain PD and other follow-up services and it may lead to lengthy calving intervals. Hence this situation causes reduction of the reproduction capacity of the animal.



Source: HARTI Survey, 2012

Figure 3.7: Method of Cattle Breeding

Compared with the control group, percentage of using AI service is higher in all the study locations except in Badulla. The highest difference was recorded in Monaragala where the farmers have received more advantages from the project on AI service. According to the table 3.8, the percentage of using AI service in Monaragala by the control group is 56.2 percent and it is as higher as 88.4 percent in FFS sample. Again in the Badulla district the difference between two groups is very less because the AI service is the main method of breeding there with or without project interventions.

Table 3.8: Comparison of Method of Breeding with Control Group (Percent)

Method of breeding	Kurunegala		Anuradhapura		Monaragala		Badulla	
	Conl	FFS	Conl	FFS	Conl	FFS	Conl	FFS
Natural Mating	30	9	67	44	44	12	8	11
AI	70	91	33	56	56	88	92	89
Total	100	100	100	100	100	100	100	100

Source: HARTI Survey, 2012

3.9.2 Natural Mating

Natural mating is still used for cattle breeding in all three study areas by a minority of farmers while AI is widely practised. Natural service can be practised using a specific stud bull or it may happen in random mating especially in free rearing large sized cattle herds.

However, random mating affects and degrades the quality of animals due to inbreeding. According to the survey, random intercourse hardly occurs in all four study areas due to farmers' awareness on the importance of cross breeding of cows with good quality stud bulls or by AI.

3.10 Cattle Health

Health of cattle directly affects their productivity which ultimately determines the productivity of the entire farm operations. Healthiness of the animals is very important to achieve the optimum production potential. It is impossible to obtain the optimum production of cattle maintaining a high nutritional status and practising other management activities at the required level without maintaining a prime health condition. Therefore, maintenance of a healthy cattle herd is an essential factor for sustainable cattle farming. In this regard farmers have to pay their thorough attention to disease preventive measures as a prerequisite for prime level of health conditions.

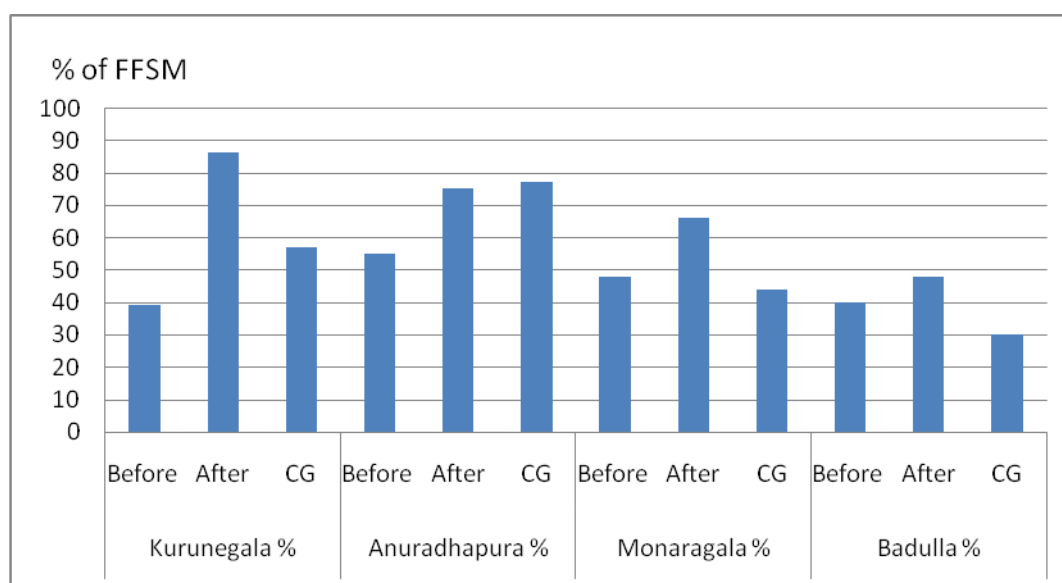
Especially cattle in the Dry Zone are very vulnerable to various types of infectious diseases due to the prevailing harsh climatic conditions. Therefore, vaccination programmes for preventing these diseases are conducted annually prior to monsoon rain. Foot and Mouth Disease (FMD), Hemorrhagic Septicemia (HS) and Black Quarter (BQ) are the main diseases covered by the vaccination programmes. All vaccination programmes are conducted by the government veterinary offices free of charge in all the study locations in Dry Zone and selected areas in the Badulla district. Use of vaccination has increased all the study locations after attending FFS. It has a significant impact in Kurunegala, Anuradhapura and Monaragala areas where the vaccination of animal is highly important. According to the views of VS and LDI, the

conducting of vaccination programme is made easier when farmers gathered in groups. Especially in the Kurunegala area some FFS had provided transport facilities to the officers to conduct vaccination programmes and the FFS had given more priority to the members.

According to the figure 3.8, vaccination of animals is higher in FFS sample compared to the control group in all the study locations except in the Anuradhapura district.

3.11 Marketing of Milk

Availability of an efficient marketing channel in any form of agricultural product including milk and other livestock products is an integral component for the sustainability of that particular production system (crop or livestock production). Milk is a perishable commodity hence an efficient marketing channel is essential. Majority of dairy farmers in Sri Lanka, market their produce as raw milk instead of in the value added or processed form. According to the survey, only 3.2 percent of farmers have been involved in value added milk production. There is a high competition in milk collection among different milk collecting and procurement agencies. Hence, in study areas three or more milk collecting agencies were involved in this.. All the selected FFS members market their milk production as raw milk to the milk collecting companies.



Source: HARTI Survey, 2012

Figure 3.8: Vaccination of Animals Before and After the Project

3.11.1 Methods of Milk Marketing

According to the survey, 84 percent of the selected FFS members had direct contacts with the milk companies via milk collecting centers. In the Badulla district the role played by the private collectors is comparatively higher than that of the other study locations. Milk companies provide more incentives and promotion packages to retain and attract dairy farmers.

Organized village level milk producers' societies are maintained at milk collecting points, a common place, where most of the members have easy access. Farmers individually handover their milk to those collecting centers. The quantity (volume) of milk is measured and a sample of each supplier is taken for testing. The lactometer readings and fat percentage are measured at the collecting points. The collecting points where fat content measuring devices are not available, milk samples are sent to the nearest laboratory of the milk collecting agency. The payments are made on the volume (number of liters) or weight depending on the company. The value of a litre of milk of each farmer is calculated according to the price chart formulated including both fat and SNF percentages (solid non-fat). The activities and record maintaining at the milk collecting points are carried out by the secretary recruited by the village level society. This type of milk producers' societies had been formed by the milk collecting companies in most of the areas before the project intervention. Some FFS were sub sets of these milk producers' societies which were formed many years ago.

Table 3.9: Selling of Milk

Place of Selling	Kurunegala		A'pura		Monaragala		Badulla		Total	
	No	%	No	%	No	%	No	%	No	%
Private company	36	86	58	94	39	85	32	68	165	84
Collectors	6	14	2	3	4	9	12	26	24	12
Other	0	0	2	3	3	7	3	6	8	4
Total	42	100	62	100	46	100	47	100	197	100

Source: HARTI Survey, 2012

The project intervened in milk marketing by providing facilities to build milk collecting centers. It was highlighted in the Monaragala district where two or three FFS had linked to one milk collecting centre. It was more efficient rather than providing facilities to one FFS. In our survey, 15 milk collecting centers built using project funds were studied and it was found that most of them function very well providing more facilities to the members. It is a good indicator of public- private partnership in project areas as the project has given support to the FFS to build milk collecting centers and the private company provides other facilities such as freezer and electricity charges to promote evening milking by farmers. In Anuradhapura district

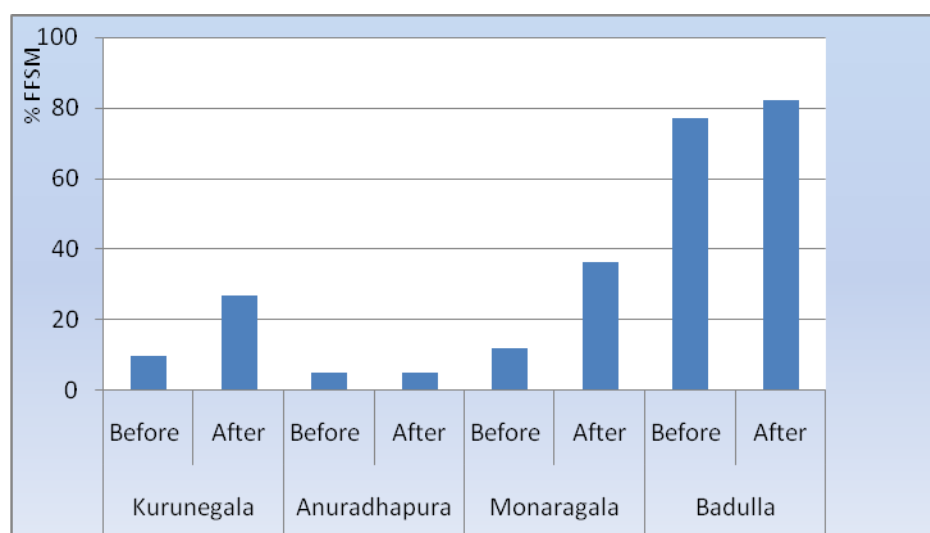
certain milk collecting centers were not in use due to differences of price paid by the milk collecting companies.

As a company owned by the government MILCO plays an important role in collecting and procuring milk, maintaining a large network of FMSs (Farmer Managed Societies) at village level in all study locations and most parts of the country. According to the survey, 64 percent of the FFS members are satisfied with the current price they receive.

3.11.2 Constraints in Milk Collecting Network

Certain milk collecting agencies do not practise evening milk collection. Most of the farmers do not milk in the evening due to marketing constraints. Hence, it is essential to establish an evening milk collecting network to maintain high productivity of the individual animals and the farm as a whole.

According to the survey, only 27 percent farmers practised evening milking before the project intervention. The project intervention is not satisfactory in this regard especially in the Anuradhapura area. Only 17 percent FFS members who did not practise evening milk had changed to practising it after joining FFS. The Badulla district is an exception because it had a well-formed milk collecting network even before the project intervention.



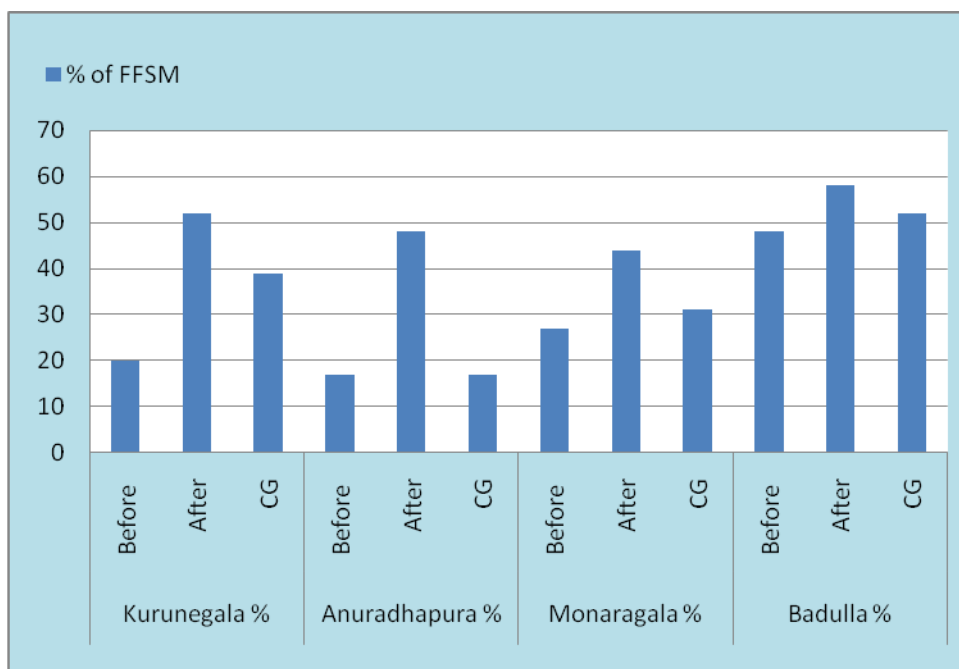
Source: HARTI Survey, 2012

Figure 3.9: Practice of Evening Milking

3.12 Extension Services

To have a profitable dairy industry, timely extension services is very important. Extension services related to dairy farming totally depend on the Government sector and the Provincial Department of Animal Production and Health (PDAPH) is responsible of providing veterinary services. In our study, farmers were inquired of the level of satisfaction with regard to veterinary related extension services before and after project intervention. Further, it was useful to compare with the control group to gain a better understanding on the project intervention. The figure 3.10 illustrates the percentage of the number of farmers who are satisfied with the extension services they received. Accordingly, most of the farmers in Anuradhapura (52 percent) and Monaragala (56 percent) are not satisfied with the extension services they receive at the moment. As a result of project intervention, the attention of veterinary related extension officers has increased due to forming of linkages with office- bearers of the FFS group. According to the veterinary officers, the provision of services has become easier with the connection of groups rather than with an individual. According to the figure 3.10, the change of the percentage of satisfaction of farmers is higher in Kurunegala, Anuradhapura and Monaragala districts than in the Badulla district. The percentage of satisfied farmers on extension services was higher in the Badulla district before the project intervention than that of the other three study locations. The project has a bigger impact in this regard in all the study locations compared to the control group. On average in all the study locations only 27 percent of FFS member were satisfied with the extension services they received before the project intervention and it has increased to 51 percent after the project intervention indicating a positive impact of the project. Only 36 percent of farmers have been satisfied with the extension services they receive in control group in all the study locations.

Maintaining records on daily farming activities has increased in all the study locations after the project intervention and it is limited only to AI related records. Only 15 percent FFS members had kept records on dairy farming before the project intervention and it has increased to 60 percent after the project. In control group, only 19 percent farmers had maintained records on dairy farming activities. Keeping records on cost and return on dairy farming was very rare in all the study locations before and after the project intervention.



Source: HARTI Survey, 2012

Figure 3.10: Satisfaction on Extension Services

3.13. Impact of Dairy FFS on Monthly Income

In this section, the impact of FFS on gross monthly income is considered without considering the cost of production and changes in milk prices before and after the situation. According to the reports, the gross monthly income has increased in all study locations after project intervention. The most important thing is the changes of gross monthly income and the highest change has been recorded in the Monaragala district as 69 percent followed by the Anuradhapura district (44 percent). Thus, it is very clear that the project has made much impact in Anuradhapura and Monaragala districts than in Kurunegala and Badulla districts in terms of gross monthly income. Before the project intervention, in these two districts dairy farming was practised not for milking purposes and the project seemed to have changed the attitude of farmers towards milking and this has resulted in increasing the monthly milk production at significant level. In the Badulla district the change of gross monthly income is recorded as 5 percent and this is because the farmers in the Badulla district had practised dairy vigorously before the project intervention and the project intervention had no great impact on their gross monthly income.

Table 3.10: Average Milk Production and Gross Income of Household/Month.

District	Average Production/Month(L)		Average Price	Gross Income / Month		Change of Gross Income (%)
	Before	After		Before	After	
Kurunegala	295	367	50	14635	18218	24
A'pura	181	261	49	8925	12852	44
Moneragala	178	302	50	8879	15042	69
Badulla	326	342	48	15740	16504	5
Average	231	311	50	11550	15550	35

Source: HARTI Survey, 2012

Box 1**Success FFS in Rawaela**

Rawaela village is situated in *Polpithigama* DSD in Kurunegala. *Suhada* dairy FFS was initiated in 2009 with eight members with the support of DZLiSSP. At present the membership has increased to 30 members and the FFS is functioning very well providing more facilities to the members.

Why is it a success?

1. Regular meetings and discussions.

The FFS held regular meetings on the 27th of every month. It is a common platform for all the members to discuss their problems as a group and seek solutions. All the members are encouraged to take part in meetings regularly as a rule. If any member fails to present for three consecutive meetings, he / she will be given termination notice of his/her membership in writing by the FFS. As a result, members ensure the participation of a representative upon their failure to attend.

2. Revolving fund

FFS is financially strong with the revolving fund granted by the project as well as monthly subscription and fine. Out of this revolving fund the society provides loan facilities to the members on personal collateral among group members

3. Linkages with other organizations

The FFS has strong linkages with Government institutes, Departments and NGOs to obtain benefits for the members. The office-bearers of the society visit such institutes and organizations and get there annual programme such as training, subsidies and grants related to daily farming activities and made requests on behalf of the members.

4. Annual general meetings

The FFS holds annual general meeting with the participation of heads of all the government institutes in the areas, NGOs and public representatives of the local bodies. Then it works as a common platform for the members to discuss their problems with the responsible offices and political leaders.

5. Access to veterinary services.

Veterinary services are the most important factor in dairy farming and the FFS has strong linkages with Vs, LDI and other related officers in respect of veterinary services. In the opinion of officers it is easy for them to provide their services to the group of farmers rather than visiting individual farmer.

6. Organizing social events

Various social events are organized by the FFS to increase the unity of the villages.

7. Bulk purchasing.

The FFS purchases minerals, medicine and other equipment related to cattle farming in bulk and sell to the farmers at prices lower than the market price. It benefits the farmers directly and indirectly because the profit margin of the FFS goes to the revolving fund.

8. Bargaining power with the milk collecting companies

The society has bargaining power on price and rejection of milk as they work as a group.

According to observations, the FFS had covered most of the areas in dairy farming and it can be used as a model to other FFS too.

CHAPTER FOUR

Sustainability, Economic and Financial Viability of Dairy FFS

4.1 Introduction

The ultimate objective of the project is to increase the living conditions of the beneficiaries by improving family income in a sustainable manner. Economic viability of dairy farming and the sustainability of FFS are discussed in this chapter in order to do a better evaluation of the project. Accordingly, cost benefit analysis is used to measure the economic viability of dairy industry in the first part of the chapter and sustainability issues are discussed in the latter part of the chapter based on focus group discussions.

4.2 Cost and Return of Dairy Farming

The table 4.1 illustrates the cost benefit analysis of dairy farming in selected study locations. To calculate the cost of production of dairy farming, only variable costs were taken into consideration. The fixed costs such as building of cattle shed and purchasing of cattle were not considered when calculating cost of production due to lack of data. If the variable cost could be covered from the present revenue it is a good indicator of the viability of the dairy industry in the short run.

As dairy farming is a small industry, all the farmers in the sample do not hire labor in dairy farming activities. Farmers are able to manage dairy farming activities with their own labour or mixing with family labour without hired labour. The calculations of cost of production were done with and without adding values to the family labour to get an overview on viability of dairy farming activities.

The other main variable cost items were cattle feed, medicine and equipment. The cost item of cattle feed consists of concentrate feed, minerals, and vitamins and pasture management related costs. The cost item of medicine covers all the expenditure on disease management, tick and worms, AI and other cost related to the veterinary services.

The cost item of equipment and other covers all the expenditure on purchasing of equipment, transport, insurance, water and electricity related costs.

According to the table 4.1, on average in all the study locations, feed cost is the largest (78percent) cost item when calculating without adding values to the family labour. It is high as 88 percent in the Badulla district where the concentrate feed is highly used with intensive cattle farming system.

Further, the table 4.1 illustrates that the average cost of a herd in every study location per month is around Rs.2275.00 without imputed cost. The lowest value is

recorded from the Anuradhapura district due to the poor cattle management practices such as free grazing and lack of concentrate feeding. The highest cost of production of milk per herd is reported in the Badulla district where practising concentrate feeding is common in intensive cattle management systems.

Table 4.1: Average Cost and Return in Dairy Farming per Month

Item	K'gala	A'pura	M'gala	Badulla	Total
Labour (Family)/Herd(Rs)	17036	15072	17505	16223	16301
Cattle feed cost/Herd(Rs)	1985	706	1350	3474	1781
Medicine cost /Herd(Rs)	411	145	227	151	219
Equipment and other cost /Herd(Rs)	370	175	267	339	275
Average cost /Herd/M(without Imputed cost) (Rs)	2766	1026	1844	3964	2275
Average cost/Herd/M (with Imputed cost) (Rs)	19801	16098	19350	20187	18575
Average cost /L (without Imputed cost) (Rs)	8	4	6	12	7
Average cost /L (with Imputed cost) (Rs)	54	62	64	59	60
Average MP(L)/M/herd	367	261	302	342	311
Average price/liter(Rs)	50	49	50	50	50
Average gross income/herd/M(Rs)	18296	12852	15030	17030	15447
Net income without imputed cost/ Herd (Rs)	15530	11825	13186	13066	13173
Net income with imputed cost/ Herd (Rs)	-1506	-3246	-4320	-3157	-3128

Source: HARTI Survey, 2012

According to the calculation of cost and return, a household could gain a net return of Rs.13, 173/month as an average level without adding values to the family labour. It deferred from one study location to another based on average milk yield per month. The highest net return was recorded in the Kurunegala area where the highest average milk yield per month was recorded. The lowest net return without adding value to the family labour was recorded in the Anuradhapura district where the average milk yield was lowest among the study locations due to poor cattle management practices.

The average labour wage/day in all the study locations was Rs.800 for males and Rs.600 for females. Based on this, the impute cost was calculated. When calculating the cost of production by adding value to the family labour, dairy farming is not an economically viable industry in all the study locations. Farmers are unable to cover

the cost of their labour from the return on dairy farming activities. This implies that the management practices of dairy farming activities have to be improved further to cover the cost of production of dairy farming as a viable industry. The project has to introduce cost minimizing methods and average milk production has to be increased. Especially the calving interval has to be reduced to have a continuous milk production. According to our observations due to poor veterinary services, unsuccessful AI was recorded in all the study locations at a higher rate causing lengthy calving intervals.

4.3 Sustainability of FFS

The sustainability of dairy FFS formed under the DZLiSPP is measured as,

1. Financial sustainability
2. Institutional sustainability
3. Sustainability on marketing

4.3.1 Financial Sustainability

To measure the financial sustainability of the FFS, several indicators were used such as revolving fund, bulk purchasing of inputs and arranging bank loan facilities. Data used in this section are based on focus group discussions held with FFS members.

Revolving fund

Revolving fund of any FFS is considered as the linking factor of the group. In the absence of a revolving fund farmers would not meet together and linkages may be weak. The original project idea in dairy FFS is to have a revolving fund with the amount of money granted to each FFS. Only 28 percent of FFS were recorded functioning a revolving fund in all the study locations. The survey revealed that the revolving fund successfully functions only in the Anuradhapura district. The FFS members in the Anuradhapura district had repaid the granted amount of money by the project to build cattle shed in ten installments. They had taken it again as a loan from the FFS to continue the building activities of the cattle shed or purchase a new cow. Gradually they had built the fund and it had used for the development of dairy farming activities. According to the survey, 73 percent of FFS in the Anuradhapura district recorded with functioning revolving fund successfully.

FFS were not recorded in the Monaragala district with the revolving fund functioning while in the other two districts it was very rare. The survey found a very successful FFS in Ravela in the Kurunegala district and it was the only FFS recorded with a functioning revolving fund in the Kurunegala district.

When a new member joining the FFS, some FFS had collected admission fee upon a common agreement of the all members. It may be Rs.50.00 or Rs.100.00 depending on the common agreement of the members. It is a onetime payment and it is linked

with the revolving fund. According to the survey, it was clear that the percentage of FFS having admission fee is higher in the Anuradhapura district because it had a positive relationship with the revolving fund.

Bulk purchasing

According to the structure of FFS, bulk purchasing of input is identified as a productive method for reducing cost of production. As discussed earlier, most of the FFS members have changed their attitudes and used concentrate feed, minerals and vitamin for their cattle. They usually buy these products via milk collecting company. If farmers practise bulk purchasing they could be able to get better benefits for the members by keeping profit margin to the FFS too. Only two FFS practised bulk purchasing as a cost minimizing method. In case of concentrated feed it may be difficult to practise bulk purchasing rather than buying from milk collecting companies due to transport difficulties. But the other high cost and high margin products could be purchased in bulk to reduce the cost and to keep profit margin to the FFS too.

Arranging bank loan facilities

Arranging bank loan facilities is one of the project interventions. According to the survey, only 18 percent of FFS could able to arrange loan facilities for their members. This is a limiting factor and this situation had caused the collapse of some FFS. It was experienced in Siyambalanduwa area in the Monaragala district where FFS had been formed with the newcomers to the industry. They had no cows before engaging in the project and they had relied on credit facilities of the project. Due to some reasons, loan facilities had not been linked with the FFS and most of the members gave up dairy farming activities. The sheds and other facilities provided by the project were not in use as a result of not linking credit facilities with the FFS.

This situation had resulted in non-functioning of FFS in the study areas. In Anuradhapura and Monaragala the situation is better than in Kurunegala and Badulla districts where nearly 54 percent FFS had linked with the credit facility provided by the project. In the Badulla district it was only 9 percent and most of the farmers had expectations of getting loans to purchase good quality cows.

According to the survey, the project has granted a significant amount of money to each FFS at the initial stage and only few FFS had made use of it as a revolving fund to achieve financial sustainability. According to the view of FFS members, the project had not created awareness among the farmers on financial sustainability and future prospects. With regards to financial sustainability, only few FFS (28%) could be identified as sustainable FFS and the fund of FFS is growing to a satisfactory level.

4.3.2 Institutional Sustainability

Under institutional sustainability, attention was paid to the unity of FFS and the linkages of FFS with the VS officers and other line departments, NGOs and any other livestock related service providers.

Conducting of meeting

The purpose of FFS is to cluster farmers into a unit and share their knowledge and experience with each farmer. To achieve this purpose, conducting of regular meetings is necessary. According to the survey, only 20 percent of FFS conducted regular meetings on a prefixed day to share their knowledge and future plan. Farmers face many issues in dairy farming activities especially on veterinary related services, marketing and cattle management practices etc. The FFS should be a common place to seek positive answers for these problems. By conducting regular meetings farmers may be able to solve their problems gradually. The survey found some positive cases in Kurunegala and Anuradhapura area where few FFS had conducted regular meetings with the presence of VS, LDI, Divisional Secretariats (DS) and project officials. It had worked as a common platform for all the FFS members to discuss their problems as well as common issues. The *Rawaela* FFS in the Kurunegala district is a very good example for conducting such regular meetings.

Table 4.2: Categorizations of FFS by the Project

District	Category of FFS (percent of total in Districts)				
	A	B	C	D	E
Kurunegala	24	13	25	21	17
Anuradhapura	8	29	21	16	19
Badulla	9	31	42	18	0
Monaragala	4	3	9	3	80.87*

*non- categorized

Source: District project office records- DZLiSPP

Another 46 percent of FFS had conducted meetings irregularly. It may be once in two months, three months or six months. Normally FFS had conducted meetings until the building activities of cattle shed started. During that period field facilitator of the project had visited the FFS frequently and given instructions on building of cattle shed. After the building activities of cattle shed is over, attention of the facilitator has waned, thus farmers do not conduct meetings and give up most activities related to the FFS. On the other hand, most of the FFS do not have a revolving fund. The farmers argue that there is no point in conducting meetings on regular basis without having any matter worthy of discussing. There is a lack of linkages with project officer and veterinary services to achieve the project objectives. Field facilitators continue to create FFS rather than considering the sustainability of the

existing FFS. As a result, 34 percent of the FFS had never conducted meetings after the initial meeting.

When considering the present status of conducting meetings and the year of initiation of the FFS, it was found that 50 percent of the FFS that started in 2008 had stopped conducting meetings. In some FFS, the money granted by the project for the purpose of building cattle shed also remained in bank account without being utilized for a time. Wannammaduwa, Thirappane in Anuradhapura district are good examples for such FFS. As stated earlier, 36 percent of the FFS that started in 2011 conducted regular meetings due to the frequent visits of the field facilitator while the cattle shed building was progressing.

The table 4.2 illustrates the categorization of FFS by the project. In Monaragala it was not done at all and 81 percent FFS remained non- categorized when the data were received. According to the table, 37 percent of FFS in Kurunegala and Anuradhapura and 40 percent in Badulla belonging to the A & B category indicate higher performances. On the other hand, 37 percent of FFS in Kurunegala and 35 percent FFS in Anuradhapura belonging to D & E category indicate lower performance. In these FFS the unity of the FFS is very weak and in the case of E category FFS are not functioning at all.

Annual general meeting and change of office-bearers

The Annual General Meeting and changes of office-bearers is a good indicator of the functionality of FFS. According to the survey, only 10 percent of FFS recorded having an annual general meeting and only 15 percent had changed their office-bearers by the vote of members. It is a good indication that most of FFS do not function as a group and they are weak in terms of collective activities.

Connection of FFS with officers as a group

To manage dairy farming in a profitable manner, the connection with officers of veterinary related services is very essential. In this section attention was paid to get information on connectivity of the office-bearers of the FFS with the Government and non-government organizations. According to their view, only 10 percent of FFS had high connection with the responsible officials in government and non-governmental sectors. Sixty percent of the FFS had little or weak relationship with the officials and the rest of the 30 percent had no connection with the above mentioned officers as a group. It was highlighted in the Anuradhapura district where 47 percent of FFS had no established connection with the officers to cater to their requirements.

Training

FFS had received training on building of cattle shed, cattle management practices and growing of grass. According to the survey, 88 percent of FFS had received some form of training. The larger portion of FFS (38 percent) had received training on building of cattle shed. The training and awareness programme had effected positively to improve the cattle management practices within the area.

4.3.3 Sustainability on Marketing

According to the survey, only 38 percent of FFS had strong connections with the milk collecting company as a group. All the group members agreed to sell their milk production to the selected company and if the price and other services are not satisfactory, all the members shift to another company as a group. In this manner the bargaining power increases and they are able to secure a better deal with the selected company. Most of the FFS (56 percent) had the connection with the milk collecting company on individual basis and not as a group. Farmers sold their milk as they wished and they had limited connection with milk collecting companies. In this case the bargaining power of the individual is very minimal. The rest 6 percent of FFS had no connection with the milk collecting companies and they sell their milk production to the private milk collectors or agents of the milk collecting companies. The connection with milk collecting company as a group was stronger in the Monaragala district compared to the other study locations because the project had linked two or three FFS to one milk collecting centre and it works as a small federation at village level. Hence the providing of marketing facilities has improved in the Monaragala area compared to the other study locations. In the Badulla district, private milk collectors play a major role and the connection of all the members of FFS as a group is lower than that of the other study locations. Out of the total sample 48 percent of the FFS had provided evening milking facilities to the members and it has become an advantage to the members to increase the daily milk production.

As a result of the FFS clustering as a group and maintaining contacts with the milk collecting companies, the companies had provided chilling facilities for milk at evening time. That is another advantage of linking with the milk collecting companies as a group and the company has agreed to pay the extra electricity charges of the milk collecting centre.

In focus group discussions it was found that most of the FFS (66 percent) were satisfied with the price they received from the milk collecting companies. Rest of the FFS had problems with the price they received especially; they claimed that the pricing mechanism was not transparent.

CHAPTER FIVE

Findings, Conclusion and Recommendations

5.1 Findings and Conclusion

Out of the 207 selected FFS members 45 percent practised dairy farming as the primary occupation. The rest of the farmers (55 percent) practised it as a secondary occupation while being engaged in some other income earning activity. Most of female FFS members (59 percent) practised dairy farming as the primary occupation. Dairy farming has become a primary income source for the female farmers who are engaged in family activities as well.

The survey found that 50 percent of FFS members had experience on cattle farming for over ten years. Another 24 percent of FFS members had experience of 6-10 years. Thus it is very clear that most of the FFS members have had traditional knowledge on cattle farming. On the other hand, the survey revealed that 84 percent of the FFS members who joined the project were practising dairy farming before attending the FFS.

The project has changed the mentality of farmers to some extent and led them into productive dairy farming by moving away from maintaining unproductive large herds that did not yield milk. It is highlighted in Kurunegala, Anuradhapura and Monaragala area where the farmers had sold their local breed low yielding cows in order to purchase high yielding cows of improved breeds. As a result, the average herd size has decreased in all the study locations except in Badulla.

The survey found that only 36 percent of the FFS members had been maintaining any form of cattle shed to provide housing for the animals before the project was initiated. The majority of cattle shed (62 percent) maintained by farmers before the project intervention was in the primitive design, which consists of only a shelter over the cattle, thus falls into the informal category. The condition of cattle shed has improved in all the study locations as a result of project intervention. According to the survey, in the control group 40 percent of farmers had maintained cattle sheds and out of them 30 percent was categorized as formal, 37 percent semi formal and the rest 33 percent informal. The condition of cattle shed is comparatively better in FFS sample than of the control group. Especially, the percentage of informal category in FFS sample was 23 percent and it was 33 percent in the control group. As a result of engaging in project activities, 86 percent of selected FFS members had received funds and material for building cattle sheds. Another 11 percent of FFS members had benefited by other project/s or Government funds via VS office to build cattle sheds. Almost all the FFS members had received basic training on building cattle sheds. According to the field observation, it was clear that most of the farmers had built the

cattle shed according to their own plan although a plan was given by the Provincial Department of Animal Production and Health.

The survey found that only 17 percent of the FFS members had received credit facilities from the project to purchase cattle. In the Badulla district, 98 percent of FFS members had not linked with the credit programme. According to the survey, only 16 percent of FFS members were newcomers to dairy farming and most of the new farmers joined the FFS with the idea of purchasing animals by obtaining credit facilities from the project. The project had failed in certain areas in linking farmers with credit programme and as a result, some of the new farmers had given up dairy farming, consequently the sheds built with project funds are left unutilized.

The improvement in feeding of pasture and fodder is visible in all the study locations after the project intervention. Farmers have shifted from free grazing and tethering systems into mixing of tethering and cut & feed system. Training and use of cattle shed has had a positive impact on these improvements.

Significant improvement of maintaining own grassland could be observed only in the Kurunegala district out of all the study locations. CO-3 (Coimpatur-03), a variety of Napier has been introduced to dairy farmers in the Kurunegala area by the project officers with the help of VS officers and it has become popular among farmers who have access to water even in the dry season.

On average in all the study locations, only 36 percent of FFS members had used concentrate feeding as a main component of cattle feeding before the project intervention and it has increased to 78 percent after joining the project. In terms of location, nearly a 60 percent increase could be observed in Kurunegala and Monaragala in the use of concentrate feed. Still in the Anuradhapura district tethering and free grazing is highly used as a feeding method of cattle and the usage of concentrate is comparatively low.

The survey also found that on average in all the study locations, only 45 percent of FFS members had used AI as a cattle breeding method before the project intervention and it has increased to 76 percent after being involved in the project. The percentage of using AI service after intervention of the project has significantly increased in the Kurunegala and Monaragala areas where natural mating was predominant. Farm level training and awareness program on cattle breeding has directly influenced this situation.

An increased practice of vaccination can be seen in all the study locations after attending FFS. It has a significant impact on Kurunegala, Anuradhapura and Monaragala areas where the vaccination of animals is very important. According to VS and LDI, the conducting of vaccination programme was made easier when farmers gathered in groups. Especially, in the Kurunegala area some FFS had provided

transport facilities to the officers to conduct the vaccination programme and the FFS had given more priority to the members.

Difficulties in finding good quality animals or non-availability of good animals are major problems faced by farmers regarding obtaining cows of higher genetic potential. They have had upgraded animals especially through Artificial Insemination (AI) and from other farmers. But there is a high demand for animals with high milk production from the farmers in every area.

Lack of follow-up action by the project officials could be found as a limiting factor in all the study locations. The project has given the targets to Field Facilitators forming a number of FFS during every year. They are following targets rather than considering the sustainability of FFS. As a result of that, 50 percent of the FFS started in 2008 were not functioning well. Further, the survey found that 34 percent of the FFS had never conducted meetings after the initial meeting.

Accessibility of veterinary service is poor in most of the project areas due to various reasons. Artificial Insemination (AI) is the most popular animal breeding method used by the farmers. Rearing of bulls to be used for natural mating is very rarely practised. Absence of a proper AI service on time and higher service charges are the main problems faced by farmers in most areas.

On average, in all the study locations only 27 percent of FFS member were satisfied with the extension services they received before the project intervention and it has increased to 51 percent after the intervention indicating a positive impact on the project. Only 36 percent of farmers were satisfied with the extension services they received in the control group in all the study locations.

Record maintaining on daily farming activities has increased in all the study locations after the project intervention and it is limited only in terms of AI related records. Only 15 percent FFS members had kept records on dairy farming before the project and it has increased to 60 percent after the project intervention. In control group, only 19 percent farmers had kept record on dairy farming activities. Keeping records on cost and return on dairy farming was very rare in all the study locations before and after the project.

Huge competition between milk procurement and processing companies to attract and retain dairy farmers in all locations is clearly observable. Formation of dairy farmers' organizations to collect raw milk and provide services through these organizations is the popular way followed by many milk collecting agencies and companies. Grouping farmers as FFS was a major benefit for the farmers when building linkages with the company. Payments for milk are made according to the price chart formulated by the respective company or agency. Lactometer reading and SNF (Solid Non-Fat) content are the criteria used to formulate the price list. In all

the project areas the linkages with the Milk Company and collection of milk are at a commendable level.

According to the survey, only 27 percent farmers had practised evening milking before the project intervention. The project intervention is not at a satisfactory level in this regard especially in the Anuradhapura area. Only 17 percent FFS members who had not practised evening milking had started practising it after attending FFS.

The study found that, on average in all the study locations, feed cost is the largest (78 percent) cost item when calculating without adding values to the family labour. It is as higher as 88 percent in the Badulla district where the concentrate feed is highly used with intensive cattle farming system. The average cost of a herd in all the study locations per month is around Rs.2275.00 without imputed cost. The lowest value is recorded in the Anuradhapura district due to the poor cattle management practices such as free grazing and lack of practising concentrate feeds. The highest cost of production of milk per herd is reported in the Badulla district where the most of the farmers practise concentrate feed as an intensive system.

According to the calculation of cost and return, a household could gain a net return of Rs.13, 172/month as an average without adding values to the family labour. It differed according to the study location based on the average milk yield per month. The highest net return was recorded from the Kurunegala area where the highest average milk yield per month was recorded. The lowest net return without adding value to the family labour was recorded in the Anuradhapura district where the average milk yield was the lowest among the study locations. When calculating the cost of production by adding value to the family labour, the dairy farming is not an economically viable industry in all the study locations.

Non-functioning of a revolving fund is identified as a limiting factor for the sustainability of FFS. A revolving fund functions in only 28 percent of FFS in all the study locations. According to the survey, only 20 percent of FFS conducted regular meetings on prefixed day to share their knowledge and future plan. Another 46 percent of FFS had conducted meetings irregularly. The rest 34 percent of FFS had never conducted meetings after the initial meeting. The present status of conducting of meetings with the start of this year, it was found that 50 percent of the FFS started in 2008 had not conducted meetings at all. They do not totally function as FFS. Further, there are instances that the money granted to FFS for the purpose of building cattle shed remaining in the bank without being utilized. Wannammaduwa, Thirappane in Anuradhapura district are example for such FFS.

The survey found that only 38 percent of FFS had proper connection with milk collecting companies as a group. All the group members agreed to sell their milk production to the selected company and if the price and other services are not satisfactory all the members agree to move to another company as a group. In this manner the bargaining power increased and they are able to have a better deal with

the selected company. Most of the FFS (56 percent) had connections with the milk collecting company at individual level and not as a group.

According to the survey, only 18 percent of FFS could arrange loan facilities for their members. This is a limiting factor and this situation had led to the collapse of some FFS.

In conclusion, it is observed that dairy farming is a high potential area as an alternative income generating avenue and its potentials are limited due to non-availability of high yielding cows and veterinary services on time. Individual performance of the FFS members in cattle management practices has increased in all the study areas after attending FFS activities. The group performance of FFS as a unit is lacking in all the study areas and needs to be strengthened to achieve sustainability in the post- project period.

5.2 Recommendations

1. It is recommended to form FFS during the first part of the project's lifecycle and during the second part it should consider on sustainability of the FFS. Formation of FFS at the end of the project is useless because there is no time for FFS to become sustainable.
2. Activating a revolving fund is very important since it develops linkages among the members of the FFS.
3. By motivating FFS for bulk purchasing of input and other materials FFS could reduce the cost of production and maintain a welfare fund for the benefit of the members.
4. Two or three FFS could be linked to one milk collecting centre as in the Monaragala district rather than providing milk collecting centers to each FFS. The research team observed that certain milk collecting centers are not functioning well due to short supply.
5. It is advisable to link social mobilization programme with FFS to change the attitude of the farmers to take part in group activities.
6. FFS should be reformed before linking with the federation by appointing efficient office-bearers. It is recommended to carry out financial auditing for all the FFS before linking with federation because the money granted by the project remained in bank accounts without being utilized for the intended purpose.
7. Regular follow- up service covering all the FFS should be established using field facilitators until the FFS flourish rather than forming FFS to increase the number.

8. It is recommended to have a common plan when building cattle sheds and farmers should be motivated to build sheds accordingly. Some sheds built using project funds in all the study locations were not up to the standard.
9. One or two farmers from each FFS can be trained as leader farmers to fill the lack of veterinary services and lead FFS members with novel technologies.
10. Establishment of breeding farm within FFS could provide good quality animals to the members at low rates. The project could provide more facilities to such selected farmers and animals could be distributed in rotation.

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ANNEXES

Annex 1: Age Distribution of Selected Dairy FFS Members by Study Location

Age Range	Kurunegala		Anuradhapura		Monaragala		Badulla		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
20 ≤ 30	1	2.4	5	7.4	8	17.0	4	8	18	8.7
30 ≤ 40	10	23.8	23	33.8	12	25.5	14	28	59	28.5
40 ≤ 50	17	40.5	21	30.9	13	27.7	16	32	67	32.4
50 ≤ 60	11	26.2	16	23.5	10	21.3	11	22	48	23.2
60 ⁺	3	7.1	3	4.4	4	8.5	5	10	15	7.2
Total	42	100	68	100	47	100	50	100	207	100

Source: HARTI Survey, 2012

Annex 2: Sex Distribution of Selected FFS Members

Sex	Kurunegala		A'pura		Monaragala		Badulla		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Female	12	28.6	33	48.5	22	46.8	27	54.0	94	45.4
Male	30	71.4	35	51.5	25	53.2	23	46.0	113	54.6
Total	42	100	68	100	47	100	50	100	207	100

Source: HARTI Survey, 2012