

## LIVELIHOOD DEVELOPMENT OF SMALLHOLDER DAIRY FARMERS

CONTRACT NO: SAPP/PR/C/AOS/WONRICH



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## EXECUTIVE SUMMARY

Sri Lanka's struggle to be self-sufficient in dairy products since several decades shows a remarkable progress by reaching 45% of the total domestic requirement. A recent analysis reported that domestic dairy sector is in increasing trends in milking cow and dairy buffalo populations, and milk production over the years. The dairy sector in Sri Lanka receives government priority for development as its immense contribution to the food and nutrition security and smallholder livelihood support. The Ministry of Livestock, Farm Promotion, Dairy, and Egg Related Industries (MoLFDE) has a challenging task in achieving a target of a 100% increment of national dairy production by 2025. Some national level programs are in progress to support the dairy production focusing holistic value chain approach to ensure inclusive smallholder connected a market link.

Wonrich Dairy (Pvt) LTD is a well-established dairy processor with a well spread milk collecting network operating with 04 collecting / chilling centers established in Ambagaswewa, Rasnayakapura, Uduweriya, Kumbukgate. Wonrich process and market the diverse dairy products holding a sizable share of the local market despite the market competition. The company also support the small enterprises providing raw milk.

Smallholder Agribusiness Partnership Program (SAPP) is a national programme implemented under the Ministry of Mahaweli, Agriculture, Irrigation and Rural Development and jointly funded by the Government of Sri Lanka (GOSL) and the International Fund for Agriculture Development (IFAD). SAPP is the pioneers of developing pro-poor Public Private and Producer Partnerships (4P) to contribute smallholder poverty reduction and competitiveness. SAPP interaction with dairy sector had revealed that dairy sector value chains lack the required enabling environment to thrive in the system to provide win-win opportunities for players in the value chain.

SAPP in collaboration with the commercial partnership of Wonrich Dairies PVT Ltd, (the promoter entity) has implemented a dairy development project to improve the livelihood of smallholder dairy farmers. The project has been designed to address the issues of low productivity in smallholder dairy operation to increase the profitability and sustainable economic benefits in smallholder dairy farming. The Project is at its one year of project life, and the SAPP required assessing if the project is on track to meet its targets and whether any corrective actions are needed during the project time remaining.

A questionnaire-based one-visit survey was conducted during the period of May-July 2023. The project area was Kurunegala, Puttalam, and the western part of Anuradhapura districts including 440 smallholder farmer-beneficiaries. The Annual Outcome Survey (AOS) is intended to measure the performance due to project interventions in the value chain in response to the intended outputs, unintended outcomes, and intermediary outcomes and to have a quantitative and qualitative interpretation.

## **Extent of achievement in project goal**

### **Change of Asset Index**

The assets ownership of HH (asset index) was 74.4%, which is comparatively higher than the HHA of the baseline survey (62.7%). An increase in nominal monthly income over 20%, among female-headed beneficiaries were 78% while it was 68% of male. Overall, 71% of households experienced a surge in nominal income by over 20%. However, when considering the impact of inflation on real monthly income, 46% of females reported an increase of over 20% and while male counterparts received only 39% of them. In total, 41% of households reported a rise in real monthly income over 20%.

### **Total number of HH receiving project service by gender and youth**

Among the total number of 191 beneficiaries, 19 (10%) were dropouts and the total beneficiaries actively participate in the project was 172 (90%). Among the beneficiaries, 127 (73.8%) were male and 45 (26.2%) were females. In considering the status of youth, four (04) females and eight (08) males were included within the total of 172 beneficiary HH. Under the SAPP grant, 21 bush cutters, 72 grass choppers, 94 milking machines and 10 fodder plots has been provided while 44 bush cutters, 60 grass choppers, 51 milking machines and 22 fodder plots had been provided under SAPP credit facility. Among the beneficiaries, total of 120 (70%) participated at least one technical training during the period considered.

### **Percentage supported HH reporting an increase in monthly income by 20 -30 % by gender and youth**

Percentage of beneficiary HH reported increase in nominal monthly income over 20%, percentage of female were 78% while it was 68% of male. Overall, 71% of households experienced a surge in nominal income by over 20%. However, when considering the impact of inflation on real monthly income, 46% of females encountered an increase of over 20% and while male counterparts received only 39% of them. In total, 41% of households reported a rise in real monthly income by more than 20%. (Table 24)

### **Percentage of increasing average monthly income**

The estimated mean monthly income stood at Rs. 70,705, accompanied by a corresponding median of Rs. 58,325. This figure displays a substantial increment of Rs. 35,208 when compared to the baseline. This increase signifies an impressive surge of 99% in monthly income as opposed to the baseline. Nevertheless, when accounting for significant inflation, the real mean monthly income adjusts to Rs. 41,375, along with a median of Rs. 34,130. While this adjustment reveals a more moderate rise of Rs. 5,878 compared to the baseline, it is essential to acknowledge that this still indicates a significant positive shift. In fact, the inflation-adjusted growth of household monthly income was 17% (Table 23).

### **Percentage of growth in average monthly income derived from milk production**

The monthly income derived from milk production reached Rs. 48,676, indicating a substantial increase of Rs. 15,214 (45%) in comparison to the baseline (Table 28).

## **Extent in achievement of project outcomes**

### **Percentage of increase in average milk yield per cow of HH (L /cow)**

Lactation length of a cow ranged from 250 to 269 (Mean= 250) days as per the lactation and the estimated milk yield per lactation was 1125 kg/cow. Accordingly, estimated milk yield per cow was 4.0 kg per day. The percentage change with the baseline is not fair as the reported figure (13.96 L) is an overestimated, which is beyond the reality.

### **Percentage of HH reporting an increase average milk yield per cow**

Of the total sample studied, 90.3% reported an increase average milk yield per cow as per their opinion. 52.3 % reported an increase of over 20% average milk yield per cow. Further, 52 % of the beneficiary HH reported higher increase of 25-30% per cow production and 8% HH reported over 30% increase in average milk production per day.

By considering, the quantity sold, fed to calves, quantity used for value addition and the quantity consumed at home, the estimated milk production per HH dairy would be 20.4 kg. The number of cows in milk were 4.6 and accordingly, per cow production would be 4.4 kg/cow. The figure cannot be compared with the baseline, as the baseline figure reported was misleading.

### **Percentage of HH reporting an increase average milk production**

Average milk disposal per HH was 13.5 kg milk while milk production per HH per day varied very widely from 2-38 kg per day.

### **Percentage of increase in volume and value of sale of milk**

Average milk income per cow per lactation (250 x 4.0 x 150) was Rs.150, 000/=. Number of cows in milk (Non-Pregnant+ Milking+ Pregnant+ Milking) was 3.1 per household herd. Accordingly, average milk income per household was Rs.465, 000/=. The milk income is 60.5% of the total monthly income and thus, Rs. 279,000.

Cows, not in pregnant but milking stage were 33.3%. This indicates that their milk production is within three months after calving. Second category was the cow performing pregnancy while continuing milking stage (21.1%). This category might be in the stage within about 90-250 days of lactation. These two categories represent the percentage cows milking in the herd. Therefore, when these two categories add together, cows in milking stage were 54.4% of the cow herd and it is a considerably a good performance as in the ideal situation, percent cows in milking stage should be 70-80% of the herd.

### **Status of changes in average herd composition during last 12 months**

As per the farmers' perception on the status of herd behavior, a decrease in all animal types in the herd during last 12 months reported 36.9% of the farmers. Similarly, overall increase in all animal type reported was 29.9% while percentage of farmers reported no change in the herd was 33.2%. Low percentage of perception on increase and no change indicate that project must concentrate more on improving herd management practices

### **Percentage of HH reporting an increase volume and value of sale**

The number of cows in milk (Cows Non-Pregnant+ Milking+ Cows Pregnant+ Milking) was 4.6 cows per household. Accordingly, the average milk income per household was Rs. 71,093.75. The milk income is 60.5% of the total monthly income. The percentage of HH reporting increased volume of milk was 136 (79%)

### **Percentage (%) of HH reporting an increase in quality of milk**

Quality of milk was estimated based on the % Fat and SNF, as the information on microbial count cannot be obtained from single visit survey. Percent fat contents, it was high fat (4.6%) and it reveals that milk is free of adulteration.

### **Percent (%) HH reporting new or improved service, knowledge through project**

Among the beneficiary farms, 148 farms (86.1%) reported overall project interventions are useful in improving dairy business. Among the HH, 158 (91.8%) appreciated that training introduced new technologies to the project

### **Percentage of HH who practice evening milking**

Evening milking had not been practiced, as the evening milk is not accepted at the milk reception center due to absence of milk transport facility in the evening. Instead, farmers have been advised to milk the cows in the evening, to keep the milk in the refrigerator, and to bring the reception center in the morning separately with morning milk. However, many HH had no cooling facility. Moreover, as the milk yield in the evening is low farmers are discouraged to put effort to extract milk in the evening.

### **Percentage of HH who is involved in providing fodder /silage and other services**

In considering the feeding roughages, farmers used chopped maize stalk (15%), tree fodder (25%) or crop residues (3%). However, feeding silage (7%) was low even with encouragements. Tethered grazing method vs. feeding to silage had a negative relationship as the natural grass in lush form is available farmers opted to graze. Silage is used when the green forages are limited especially in the dry season.

However, Beneficiary farmers have realized that feeding cultivated fodder and chopped fodder tend to increase milk production

### **Outputs: achievements with the activities of the project**

#### **Percentage of farmers who received credit/grant for dairy farming by gender and youth by item (Milking machine/grass chopper)**

Project has the allocation of 30.6% of the total value for credit facility and 63% of farmers, regardless of gender, took credit for dairy related activities. However, when examining the breakdown by gender, it is observed that 57% of male beneficiaries availed themselves of such financial assistance, while a higher percentage of 86% of female beneficiaries utilized credit for improving their dairy business.

### **Number of training classes held by type (climate, financial literacy etc.)**

The number of beneficiaries participated for at least one session was 166 (96.5%). The preference on the topics of the training sessions conducted were ranked and accordingly, Dairy management ranked first. Machinery use, financial management, dairy technologies, and impact of climate change ranked as second, third, fourth and fifth respectively. One each of the training sessions had been conducted in central places on Dairy management, Machinery use, Dairy technologies, Impact of climate change and financial management.

### **Average number of participants per program**

Status of attendance to each training session organized by the project were clean milk production 149 (86.6%), household financial management and bank activity 123 (71.5%), climate change impact 92 (53.5%). One of the key reasons for discouraging participation was reported as the long-distance travel to training venue.

### **Status of attendance to the initial awareness sessions**

Participation in the formation of the producer organizations and project support distribution had poor participation while dairy technology-related training and initial awareness had increased participation.

### **Perception of the beneficiaries on the utility of the training sessions (% of farmers reported training is benefitted).**

When assessing the usefulness of the training on their dairy business, 123 (71.5%) beneficiaries assured training provided immense benefits.

### **Status of forage cultivation and utilization in feeding dairy cattle (% of farmers who has cultivated CO3/ fodder/ Gliricidia/ azolla /sorghum/maize)**

Among the project beneficiaries, 58 (33.7%) regularly maintained the cultivated fodder plot with improved fodder variety while 81 (47.1%) mostly depended on natural herbage. In addition, 33 (19%) cultivated short-term forages (fodder maize or sorghum) mainly feed the dairy cattle.

### **Status of regular supply of drinking water round the clock in the shed**

Mechanism for regular supply of drinking water round the clock had been established by 39 (22.7%) farmers but access to water is frequent in the night only as the herd is mostly in the field during daytime. In addition, some form of water supply was there with 102 farms while only 31 (18%) had no reliable water source. This indicates the importance of providing drinking water was well understood by the beneficiaries.

### **Status of machinery use (milking machine/grass cutters etc.)**

Among the beneficiaries, 142 (82.6%) regularly used the milking machine. The farmers using grass chopper 96 (55.8%) and bush cutter 79 (45.9%) demonstrated a positive relationship with average milk sale. Project support on machinery items of Grass chopper and milking

machine is appropriate, as the farmers have shown interest to acquire the other tools such as water pump and bush cutter through their own funds.

#### **Status of facilities available at cattle shed**

Summarizing records based on the personal observation by the enumerator suggested 118 (68.6%) beneficiaries had cattle shed with concrete / cement made floor, well drain, free of potholes. Animals had adequate space with congestion in 132 (76%) sheds. Drinking water supply was available in 142 (82.5%) sheds and the adequate ventilation was there in 133 (79%) sheds.

#### **Status of following project introduced practices in dairy production**

It was reported 138 (80%) of the beneficiaries had incorporated at least one of the key innovations introduced by the project, to their dairy activities.

#### **Perception of the beneficiaries on the service provided by the project**

In considering the perception on the overall project services 148 (86.1%) were reported as good and useful in improving dairy business.

## 1. INTRODUCTION

Sri Lanka is blessed with several different agro climatic zones within up-country, mid country and low country with the opportunity of having different production systems in line with each climatic condition. There are 125,294 registered dairy farms dominated by European and zebu crossed cattle. Demand for dairy products is steadily increasing and the present per capita availability has been 53 liters and 45% of the annual requirement is met through local production. Dairy production is heavily integrated with crop agriculture and the organic fertilizer from dairy is diverted to croplands while crop by-products are fed to cattle. However, with the increasing challenge of climate change impact, crop agriculture is on the uncertainty and therefore, dairying always acts as a cushion to accommodate the losses.

### 1.1. Smallholder Agribusiness Partnership Programme (SAPP)

Among the smallholder focus agriculture support programs, Smallholder Agribusiness partnership Programme (SAPP) is a leading program to uplift the smallholders by strengthening inclusive value chains through building up the partnership among stakeholders while creating an enabling environment to achieve win-win situation to all the actors in the value chain. The SAPP has been designed to contribute Sri Lanka's smallholders' poverty reduction and competitiveness. Its primary objective is to; sustainably increase household income and quality of family diet by establishing confirmed market for rural producers under Public Private Producer Partnership (4P) mechanism. Three (03) main components of the SAPP are on the access to commercial partnerships, Access to rural finance and Programme management and policy dialogue.

### 1.2. Livelihood development of smallholder dairy farmers

SAPP in collaboration with the commercial partnership Wonrich Dairies PVT Ltd, (the promoter entity) has been implemented a project to develop the livelihood of smallholder dairy farmers. This Project has been designed to address the issues of low productivity of smallholder dairy operation and worked to increase the sustainable economic benefits to the 440 dairy smallholders in Kurunegala and Puttalam districts.

### 1.3. Purpose of annual outcome survey

The project on “Livelihood development of smallholder dairy farmers through dairying” conducted by SAPP with the commercial partnership of Wonrich Dairies PVT Ltd is at its one year of project life, and the SAPP required an Annual Outcome Survey to assess whether the project is on the right track to meet its targets and whether any corrective actions are needed during the project time remaining.

The Annual Outcome Survey (AOS) is intended to measure the performance of the objectives due to project interventions in the value chain in response to the intended outputs and intermediary outcomes and to have quantitative and qualitative interpretations. In addition

to targeted outcomes, any unintended outcome because of the project interventions will also be revealed. AOS needs to be focus on the status in financing of the value chain and the involvement of the informal and formal financial markets while identifying prevailing barriers in accessing to finance by the beneficiary taking into gender and which level of the value chain is not attractive to the funding agencies. Therefore, client need a comprehensive AOS report and the output of the study should serve to review the current project implementation strategy to ensure whether the heading of the project to the right direction. For this, AOS results of the overall project need to align with relevance, effectiveness, efficiency, impact, and sustainability of the project in relation to the issues identified in the value chain are needed to be assessed.

#### **1.4. Objectives**

- i. To measure the positive and/or negative changes/outcomes taking place on relevant indicators at the household/farmer organization /agribusiness level

As per the first objective, understanding is that AOS to quantify the significant changes taken place in the beneficiary household level, farmer organization level and in their business model either positive or negative in line with established indicators.

- ii. To measure the significant changes of the function of dairy value chain: value chain development, inclusive business, gender and social inclusion, partnership in business (Productivity, production, and processing), access to inputs, information, technology, infrastructure etc. in line within project proposal.

As per the 2<sup>nd</sup> objective, understanding is to quantify the significant changes that occurred in different levels of the dairy value chain because of project interventions in line with given indicators. This must be performed with special emphasis on value chain development, inclusive business, gender and social inclusion, partnership in business (Productivity, production and processing), access to inputs, information, technology, infrastructure etc. in line within project proposal. Understanding suggests undertaking a detail analysis of the value chain changes.

- iii. To provide timely performance information so that corrective actions may be taken to implement the project activities, if required

As per the 3<sup>rd</sup> objective, understanding is to include the timely results in the AOS report in way to use them for further guide the project to review the implementation strategy and revisit if needed to achieve the expected output and outcome in the forward actions.

- iv. To provide early evidence of project success or failure

The 4<sup>th</sup> objective is AOS to provide evidence suggesting the status of the project whether the project is heading towards the success or failure.

- v. To provide the opinions on the achievements as felt by the direct beneficiaries of the project

Understanding is to provide evidence of perceived perception of the project beneficiaries on the achievements due to project interventions.

## 2. TECHNICAL APPROACH

### 2.1. Significant changes in value chain

The aim of the annual outcome survey (AOS) was to assess the progress at outputs and intermediate outcomes against the project interventions during the project period. In this context, deeper understanding of the value chain with details in gaps focused and the appropriate project interventions made is very crucial. For this, a broader network of the status of the dairy value chain needs to be revealed. Information on public, private and producer partnership throughout the value chain, shared responsibilities and agreed contributions of each stakeholder etc. and the development of results chains for each stage of the value chain were gathered. In addition, challenges hindering the progress affecting to each actor were also revealed.

#### 2.1.1. Sample survey for producer approach

A baseline survey had been conducted in the inception of the project in the project area pertaining to the DS divisions of *Rasnayakapura, Kubukgate, Maho, Polpithigama, Moragollagama, Ganewatta*. However, the project location had been extended to include 22 DS divisions and therefore, AOS was implemented to meet 191 beneficiaries distributed in the 22 DS divisions in Kurunegala, Puttalam and Anuradhapura districts (**Table 1**).

The reluctance in maintaining farm records by average dairy farmers resulting lack of reliable farm records was a challenge in assessing the progress of the production parameters. Therefore, alternative strategies were adopted in obtaining key information with adequate reliability. In this context, milk-purchasing agents were a strategic source of obtaining data on milk sales by the individual farmers as they maintain individual records for payment purposes. Therefore, it was a reliable source of data on milk sold by the beneficiary farmers in the project area. The general routes of disposing of surplus milk for sale were the private collectors, dairy co-operatives or collecting points of the organized dairy processing agents. In addition, some of the collection was disposed of through informal channels.

The questionnaire (**Annexure 1**) was designed to adapt the standard IFAD RIMS (Result and Impact Management System) to gather data. As per the indicators in the Monitoring and Evaluation Framework of the dairy projects of SAPP, percent increase in per cow production, per household volume of milk sold and their quality parameters need to be assessed. Therefore, milk-collecting points located as per the milk collecting routes were approached.

The beneficiary farmers were differentiated by verifying the list of beneficiaries provided by the SAPP with the name list of milk suppliers attached to the collecting point. Depending on the sample size, the number of beneficiaries selected from each milk collecting point (route) were decided. Also, beneficiaries were categorized based on the volume / weight of milk supplied / day. Changes in milk quality parameters (% Fat, % SNF, volume rejected etc.) which was an indicator in the AOS during past project period could also be able to be recorded from the milk collecting point. Dairy inputs such as dairy feed, vitamins, minerals etc. were channeled through their well-established milk collecting point network and therefore, that information also were able to collect from the collecting point. No specific-sampling method adopted, instead, whole sample used for the baseline were followed in the present survey.

### 2.2.2. Control group

Similarly, a list of non-beneficiaries in the project area provided by the SAPP was followed up to collect data for comparison of the performance of project beneficiaries. However, the attempt was not successful as the individuals on the list were mostly not dairy farmers and therefore, surveying on control group was abandoned due to the inadequacy of the sample. After verifying the list of project beneficiaries, each farm was visited individually by trained enumerators with a pre-tested questionnaire for the face-to face interview to collect in-depth data.

The collection of data and information on current performance in production, productivity, marketing, financing, profitability, and sustainability in line with performance indicators were done through the one visit survey as the total list of dairy farmers participated for the baseline survey. Conducting the survey was outsourced to the Lanka Bell Pvt Ltd to hire the enumerator team after providing further comprehensive enumerator training.

Wonrich supported the survey and communicated about the AOS to the farmers' organizations through field level officers to cooperate with the enumerators and provide necessary assistance. It was able to include data of all the farmers after assessing the consistency.

An electronic data collection system was employed, and Google formatted questionnaire was used by trained enumerators indicating geo-reference to each farmer visit. Collection of data and information on crosscutting activities were performed with progressive farmers, Women entrepreneurs, and Youth entrepreneurs. The consistency of data and verification were done with the help of field-level project officials.

**Table 1: Distribution of the survey sample**

Sr No.	District	DS Division	Gender	
			Male	Female
1	Anuradhapura	Palagala	6	2
2		Thambuttegama	2	4

3	Kurunegala	Ambanpola	13	5
4		Anamaduwa	1	0
5		Ehatuwewa	2	4
6		Galgamuwa	10	5
7		Gagewatta	1	1
8		Ibbagamuwa	2	0
9		Kobeigane	10	1
10		Kotawehera	4	0
11		Maho	12	2
12		Migalewa	6	0
13		Nikaweratiya	8	8
14		Pallama	1	0
15		Polpithigama	16	5
16		Rasnayakapura	7	5
17	Puttalam	Anamaduwa	8	6
18		Karuwalagaswewa	2	1
19		Mahakubukkadawala	2	2
20		Mundalama	3	2
21		Nawagaththegama	7	3
22		Pallama	6	6
<b>Total</b>			<b>129</b>	<b>62</b>

The survey sample used in the baseline was 191 beneficiaries distributed in three districts namely Anuradhapura, Kurunegala and Puttalam covering 22 DS divisions. However, in the present survey, 19 (10%) were compelled to exclude from the analysis due to either abundance of dairying or shifting from the original location from the given address. Accordingly, only 172 beneficiary households were considered for analysis.

### 3. STATISTICAL ANALYSIS

Descriptive statistics were adopted to describe the demographic, production, productivity, and disposal of products etc., (SPSS PC version 23). The Perception of the farmers on project interventions, delivery of inputs, measures taken for sustainability etc., was subjected to examine adopting Likert scale procedure. The Garret's ranking method was employed whenever the ranking of the preferences was needed.

#### 3.1. Household Asset Index

An asset index is any/a composite indicator such that the underlying indicators on which it is based reflect an individual or a household's ownership of a range of assets. In abstract terms, an asset index is any indicator  $A_i$  computed as a function of a set of underlying variables  $a_{ij}$ ,

where  $a_{ij}$  denotes household  $i$ 's ownership of asset  $j$ .  $A_i = f(a_{ij}) = f(a_{i1}, \dots, a_{im})$ . i.e.,  $A_i = a_{i1} + a_{i2} + \dots + a_{im}$ , where  $a_{ij} = 1$  if household  $i$  owns asset  $j$ , and  $a_{ij} = 0$  otherwise.

The household Asset Index (HHAI) estimated in this study is based on household's facilities and assets. HHAi for household  $i$  is a linear combination of individual asset score,

$$\sum_{i=1}^n (w_i * PC_i)$$

Where;

$W_i$  = Proportion for variance for factor  $i$  / Total variance explained  $i = 1, \dots, n$

$PC_i$  = Predicted factor score coefficients of  $i$

HHAI was standardized using the following formula given below.

$$\text{Standardized HHAi (SHHAi)} = (\text{HHAI}_j - \text{HHAI}_{\text{minimum}}) / (\text{HHAI}_{\text{maximum}} - \text{HHAI}_{\text{minimum}}) * 100$$

Asset variables were measured as the presence or absence of variables during the period of study. All household wealth assets were recorded as dichotomous variables (yes=1, no=0). PCA was applied to weigh the HHAi.

Principal components analysis (PCA) was employed to generate household asset-based proxy indices. Household asset components used for the estimation of HHAi is given in the table below. The variable "Floor" has been removed as there is no variation existing. The same variables used in the baseline survey analysis were used.

**Table 2: Key variables used in estimating HH Asset Index**

Variable	Key	
Land ownership of dwelling (A)	1=own by HH member	0= other
House ownership	1=own by HH member	0= other
Has bicycle ©	1=yes	0=No
Has motor bicycle (D)	1=yes	0=No
Three wheeler €	1=yes	0=No
Car (F)	1=yes	0=No
Van (G)	1=yes	0=No
Type of house roofing (H)	1=concrete, Asbestoses, Rooftile	0=other
Type house floor (I)	1=Brick, cement, ceramic tile terrazzo	0=other
No. of beds (J)	1= two or more beds	0=one or no beds

Principal source of drinking water (K)	1= Pipe water to yard, plot, tube well, protected well, within premises	0= unprotected well, rainwater, protected well outside premises, pond river
Principal source of cooking fuel(L)	1=Kerosene, LP gas, Biogas, Electricity	0=Firewood, saw dust, paddy husk
Quality of drinking water supply (M)	1= drinkable as it is	0=after boiling/ filtering
Has Radio (N)	1=yes	0=No
Has Television (O)	1=yes	0=No

<sup>1</sup>Household Income and Expenditure Survey 2016 Final Results.pdf (statistics.gov.lk)

### 3.2. Estimation of household income

#### 3.2.1. Household Income

As outlined by the Department of Census and Statistics, the definition for household income is “The income received either in cash (Monetary income) or in-kind (non-monetary income) by all the residents in a household. This includes not only wages and salaries but also all the other sources such as agricultural and non-agricultural activities, other monetary receipts such as pension, disability and relief payments, regular rental and remittance receipts and returns from businesses or ventures, investments, and any other irregular gains such as compensations, lottery wins etc.

Staying consistent with the methodology adopted during the baseline survey, the definition was employed to ascertain the parameters of household income. Moreover, for a more precise evaluation of the genuine effects on household income within the scope of this project, it became imperative to factor out the influence of inflation on key indicators. To address this, the actual value of the indicators was approximated by adjusting for price inflation, a procedure carried out using the National Consumer Price Index.

#### 3.2.2. Computation of the Deflator

Generally, an increase in income and expenditure levels over a period could be attributed to two factors: the rise in the average income itself and the increase in the general price level (Inflation). Inflation is a measure of the rate at which prices for goods and services are rising over time. In Sri Lanka, it is measured using the National Consumer Price Index (NCPI) and Colombo Consumer Price Index (CCPI), these track changes in the prices of goods and services consumed by households.

During the period 2019-2022, the inflation rate in Sri Lanka reached its highest level in September 2022, at 73.7%. This means that the prices of goods and services had increased by more than 70% over the course of three years. This high level of inflation can have a significant

impact on the nominal income and expenditure levels of households. For example, if a household's nominal income increases by 10%, but the inflation rate is 15%, then the household's real income has decreased by 5%.

To account for the impact of inflation, it is necessary to adjust nominal income and expenditure levels by using a deflator. A deflator is a measure of the price level each year relative to a base year. In this study, the base year is 2019. The deflator for 2022 was calculated as follows:

$$\text{Deflator for 2022} = \text{NCPI for 2022} / \text{NCPI for 2019}$$

The computation of the average NCPI for 2019 and 2022 is given below.

**Table 3: Average NCPI for the years 2019 and 2022**

Months	2019	2022
Jan	127.3	166
Feb	126.7	167.8
Mar	126.4	172.7
Apr	127.3	190.3
May	128.7	208.7
Jun	129.2	231.5
Jul	129.4	244.4
Aug	129.7	250.4
Sep	130.6	256.2
Oct	131.9	256.9
Nov	132.9	256.3
Dec	135	256.3
<b>Average</b>	<b>129.59</b>	<b>221.46</b>

Source: *Movements of CCPI & CCPI Core (2013=100).xls (statistics.gov.lk)*

The NCPI for 2022 was 221.46, and the NCPI for 2019 was 129.59. Therefore, the deflator for 2022 is 1.71. This means that, to compare nominal income and expenditure levels in 2022 to those in 2019, they must be divided by 1.71. This will adjust them for the impact of inflation. The use of a deflator is important for ensuring that nominal income and expenditure levels are comparable across different time periods. It also allows us to measure the real impact of inflation on households.

The use of the NCPI as a deflator is not without its limitations. The NCPI is a national index, and it may not be perfectly representative of the price changes experienced by households in the Matale and Anuradhapura districts. Additionally, the NCPI does not consider changes in the quality of goods and services.

Despite these limitations, the use of the NCPI as a deflator is a useful tool for adjusting nominal income and expenditure levels for the impact of inflation. It allows us to make more accurate comparisons of household welfare across different time periods.

Garret’s ranking method was employed in ranking the preferences especially; to rank most affected income sources.

## 4. RESULTS AND DISCUSSION

The survey sample consisted of 172 project beneficiaries distributed in 22 DS divisions of Anuradhapura, Kurunegala and Puttalam districts. About 90% of the respondents to the questionnaire were HH beneficiary persons indicating the high reliability of the responses given to the questions. All the beneficiaries were full-time crop farmers having their own lands. Out of the project beneficiary households surveyed it was found that 26% (n=45) were female while dominating male counterparts as 74% (n=127). The survey revealed four (04) women beneficiaries were heading their families due to migration, death, or permanent disability of the male counterpart. The spouse of other 41 female beneficiaries were doing off-farm work as a livelihood. The total number of HH receiving project service by gender and youth is summarized in the **Table.4**. The project services include credit, grant, technical training, and extension facilities.

**Table 4: District- wise distribution of beneficiaries and their gender status**

District	No. of HH	Gender of HH head	
		Male	Female
Anuradhapura	10 (5.8)	4 (3.1)	6 (13.3)
Kurunegala	121 (70.4)	97 (76.4)	24 (53.4)
Puttalam	41 (23.8)	26 (20.5)	15 (33.3)
<b>Total</b>	<b>172 (100)</b>	<b>127 (100)</b>	<b>45 (100)</b>

*\*Within parentheses are percentages*

The receipt of project service in Anuradhapura district, out of 10 beneficiaries 4 were males while it was 97 males and 24 females in Kurunegala district. In Puttalam district, it was 26 males and 15 females. The low representation of the females among beneficiaries must be addressed to reveal the hindrance.

### Status of reaching SAPP Credit facility for beneficiaries

Beneficiary households had received technical tools, cattle sheds, and fodder plots in terms of SAPP credit (**Table 05**)

**Table 5: Farm tools, cattle sheds and fodder plots received under SAPP credit**

Purpose of credit	Number of HH	Per cent total
Bush cutter	18	10.5
Grass chopper	45	26.2
Milking machine	83	48.3
Shed construction / Improvement	59	34.3
Fodder plot	82	47.7

Survey revealed that bush cutter was extensively used for harvesting both natural and cultivated fodder and the limited use of grass chopper and milking machine due to high electricity cost. Credit facility for shed improvement especially for floor and the drains were appreciated by the beneficiaries. Fodder cultivation mostly in poor state due to lack of irrigation and fencing.

### Receipt of project facility from SAPP and promoter support

Source of financing in acquiring tools and facilities were from the grants and credit from SAPP, promoter and own funds (**Table 06**). SAPP grant and credit are particularly for grass chopper, and milking machine. Farmers themselves have shown interest to acquire bush cutter by their own funds probably, it is crucial in harvesting forages. Majority of the beneficiaries had acquired the facilities through their own funds. Similarly, water pump and cattle shed had received priority in acquiring through their own funds.

**Table 6: Source of finance for acquiring farm facilities**

Facility	Mode of finance (No. of HH and (%))			
	SAPP grant	SAPP loan	Promoter support	Own finance
Fodder cultivation	0	82(48)	30(17)	60 (35)
Water pump	2(1)	2 (1)	11(7)	157(91)

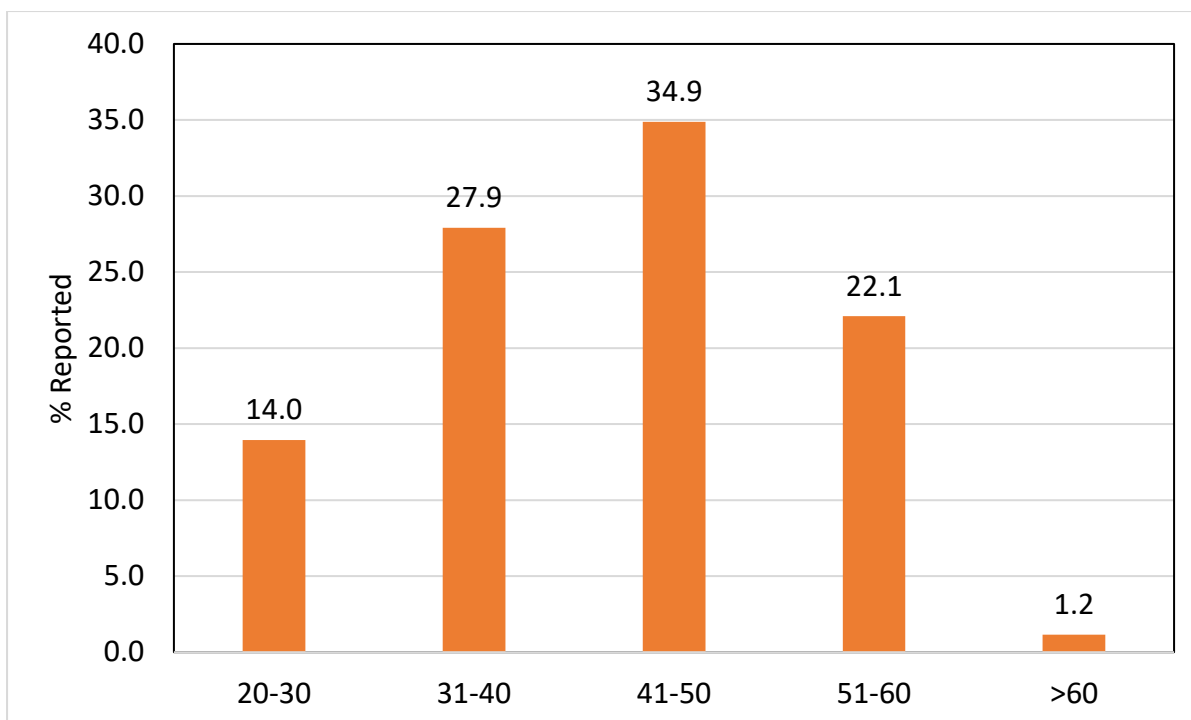
Water tank with stand	8(4)	3(2)	2(2)	159(92)
Bush cutter	21(12)	44(26)	16(9)	91(53)
Grass chopper	72(42)	60(35)	24(14)	16(9)
Milking cans	0	0	21(12)	151(88)
Milking machine	94(54)	51(30)	23(13)	5(3)
Cattle shed	20(12)	44(26)	9(5)	99(57)

\*Values within parenthesis are percentages

Mean age of HH beneficiaries was 42 years (range 20-72 years) and Median age was 43 indicating beneficiaries are rather young and energetic to function in agricultural activities (**Table.7** and **Figure.1**). As per the baseline survey, mean age of HH was 46 years with a range of 17-65 years indicating a minor deviation. Awareness of the age distribution is important in planning training and communication activities.

**Table 7: Age distribution of the Beneficiaries**

Age category (Years)	Frequency	
	No. of Beneficiaries	Percentage
20-30	24	14
31-40	48	28
41-50	60	35
51-60	38	22
>60	2	1
<b>Total</b>	<b>172</b>	<b>100</b>



**Figure 1: Status of age distribution of the beneficiaries**

The majority of the HH (72%) had family members of a 4-5 range while 19% HH had 2-3 members. The data reveals the smaller family size in the beneficiary families. Dairy entrepreneurship is very labor intensive, and the smaller family size could be a challenge in the future expansion of the dairy as a business.

**Table 8: Average family size of the beneficiary families**

Family member category	No. of HH	Percentage (%)
2-3	32	19
4-5	124	72
5-6	16	9
172	172	100

Age distribution of the young members of the families is presented in **Table 8** and the majority represent the age category of over 19 years. This information is worth using in planning family nutrition programs.

**Table 9: Age distribution of the children in beneficiary HH**

Age category (Years)	Frequency	Percentage
<5	53	12.1
6-11	98	22.3
12-18	119	27.1
>19	169	38.5
<b>Total</b>	<b>439</b>	<b>100.0</b>

The number of dependents to the beneficiary was investigated (**Table.9**) and it was revealed that a total of 543 members were present in 172 HH with a mean of 3.0 number of family members.

**Table 10: Status of dependents to the beneficiary in the family**

No. of dependents to head of HH	Frequency	Percentage
No Dependents	7	4.1
1-2	31	18.3
3-4	114	67.5
5-6	16	9.5
7-8	1	0.6

The study investigated how the beneficiaries were organized at the rural level as a group. Most of them were members of the milk collection center-based society.

**Table 11: Status of membership in a farmer organization**

Farmer organizations	Frequency	Percentage
Marketing grp (Milk collection center)	107	62.2
Milk Collecting center-based society member	31	18.0
Producer (farmer) group (PO)	6	3.5
None (not belong to any)	28	16.3
<b>Total</b>	<b>172</b>	<b>100</b>

The inclusion of their social category as per the perception of the beneficiaries were investigated and revealed most of them responded that inclusiveness to the middle-class category.

**Table 12: Perception of the beneficiaries on inclusion of the social category**

Social category	Frequency	Percent
Rich	1	0.6
Middle class	123	71.5
Poor	47	27.3
Extremely poor	1	0.6
<b>Total</b>	<b>172</b>	<b>100</b>

The indirect benefits due to the project were investigated and the spouse had benefits in acquiring knowledge through training programs.

**Table 13: Other direct SAPP beneficiaries of the family**

Family member	Frequency	Percentage
None	61	35.5
Daughter	2	1.2
Son	10	5.8
Spouse	97	56.4
<b>Total</b>	<b>172</b>	<b>100</b>

The livestock farms must be registered in the range veterinary office and a registration number must be taken. This was revealed that almost half of them have not been registered and this must be taken the attention of the Dept. of Animal Production and Health.

**Table 14: Status of registration at range veterinary office**

Status	Frequency	Percentage
Registered	80	46.5
Not Registered	92	53.5
<b>Total</b>	<b>172</b>	<b>100</b>

The participation of the beneficiaries in project activities during the last 12 months was investigated (**Table.15**) to determine how active the beneficiaries are. Participation in the formation of the producer organizations and project support distribution had poor participation while dairy technology-related training and initial awareness had increased participation.

**Table 15: Status of participating project activities during last 12 months**

Project Activity	Status of participation			
	No	Percentage (%)	Yes	Percentage (%)
Forming Producer Organizations	118	68.9	54	31.1
Initial awareness	61	35.2	111	64.8
Project support distribution	142	82.8	30	17.2
Dairy technology-related training	120	69.7	37	52

It was investigated whether beneficiaries have good contacts with field staff especially for technical matters. The survey revealed that most of the beneficiary farmers (nearly 75%) meet the project staff occasionally.

#### **Status of capacity building, participation and rate of adoption**

The status of participation for capacity building programs and adoption of learnt innovations are shown in the **Table. 16** Although participation for technology sessions were high, technology adoption rate is rather discouraging.

**Table 16: Status of project organized training sessions and adoption of technology**

Capacity building sessions	Avg. No. of sessions participated	Range	No. HH attended	%
No. of project organized trainings attended by HH	3.6	0-15	166	96.5
No. of learnt innovations incorporated into dairy activities	1.7	0-10	138	80

The types of training sessions and participation status is shown in the **Table.17** Accordingly, conservation of feeds has shown least adoption indicating the need for further attention on this.

**Table 17: Status of participation on training sessions**

Training session	Status of participation	
	Number	Percentage (%)
Clean milk production	149	86.6
Household financial management and bank activity	123	71.5
Climate change impact	92	53.5
Management of household transactions within the income received	152	88.4
Dairy nutrition and improved feeding	123	71.5
Status of participation of spouse in HH financial management decisions	155	90.1
No. of HH made changes in the farm to adapt /mitigate the impact of climate change		
<ul style="list-style-type: none"> <li>Adapt suitable waste disposal method</li> </ul>	89	51.7
<ul style="list-style-type: none"> <li>improve ventilation in shed</li> </ul>	85	49.4
<ul style="list-style-type: none"> <li>Adopt loose-barn system</li> </ul>	62	36.0
<ul style="list-style-type: none"> <li>More access to drinking water,</li> </ul>	39	22.7
<ul style="list-style-type: none"> <li>Conservation of animal feed/ fodder</li> </ul>	10	5.8

When ranking the preference on training sessions, dairy management ranked the top while impact of climate change on dairy production ranked the least.

**Table 18: Ranking of training sessions as per the preference**

Training session	Rank of preference
Dairy management	60 (1)
Machinery use	35 (2)
Dairy technologies	3 (4)
Impact of climate change	1 (5)
Financial management	23 (3)

Adoption of the technology into dairy production depends greater extent on the encouragement and the follow up by the project staff. Table 19 indicate the status of contacting field staff by the farmers.

**Table 19: Frequency of contacting project field staff**

Status of contact	Frequency	Percentage (%)
Frequently	24	13.9
Occasionally	128	74.6
Rarely	16	9.0
Never	4	2.5
<b>Total</b>	<b>172.0</b>	<b>100.0</b>

The perception of the beneficiaries on the project benefits received during last 12 months was inquired and revealed that most of them satisfied on the benefits (**Table.20**)

**Table 20: Status of perception on satisfaction on project benefits received**

Perception	Frequency	Percentage (%)
Highly satisfied	13	7.4
Satisfied	142	82.8
Neutral	13	7.4
Dissatisfied	4	2.5

The usefulness of the expected impact of the project benefits (**Table.21**) was investigated and most of them were aware of the expected benefits.

**Table 21: Status of impact of the project**

Status	Frequency	Percentage (%)
Highly	87	50.8
Marginally	6	3.3
Moderately	71	41.0
Very Highly	8	4.9
<b>Total</b>	<b>172</b>	<b>100.0</b>

The usefulness of the technical tools introduced by the project as one of the interventions (**Table.22**) was investigated and most of the beneficiaries highly rated the usefulness.

**Table 22: Status of project introduced technical tools and guidance**

Technical Tool	Highly useful	Useful	Moderately useful	No comment	Not useful
Milking machine	51 (29.5)	104(60.4)	8 (4.9)	6 (3.3)	3 (1.6)
Bush cutter	21 (12.3)	59 (34.4)	8 (4.9)	82 (47.5)	2 (0.8)
Grass chopper	21 (12.3)	90 (52.5)	6 (3.3)	51 (29.5)	4 (0.8)
Dairy related technologies	23 (13.1)	103 (59.8)	10 (5.7)	30 (17.2)	6 (3.3)

Among the interventions, nine selected interventions were considered to measure the impact or whether the beneficiaries have adopted in their farming. Highest adoption rate of the interventions was machine milking, night feeding and chopping fodder before feeding respectively (**Table.23**).

**Table 23: Status of adoption of project introduced technologies**

Technology introduced	Aware but not yet tried	Not aware	Succeeded but limitation prevent adoption	Tried but not success	Well-adopted	Total
TMR	18	58	72	3	21	172

Chopping before feeding	24	31	72	1	44	172
Azolla and tree fodder feeding	27	34	89	8	14	172
Night feeding	21	14	71	3	63	172
Maintain herd to 70% or more cows in milk	21	28	78	1	44	172
Loose-barn housing	24	32	80	6	30	172
Early weaning of calves from mother	31	30	75	4	32	172
Silage preparation technology	35	59	62	6	10	172
Milking by machine	20	11	49	7	85	172

The status of family income and the family youth contribution and their participation in dairy related activities were investigated (**Table.24**). It was revealed that most of the families had no other member earning to contribute to the family budget in support of beneficiary HH head. Among youth members in the family, male youth contributed more than the female counterparts.

**Table 24: Status of contribution for family income**

Status	None	one member	Two members
No. of family members involve in income earning other than dairy	124 (72.1)	32 (18.9)	15 (8.2)
Contribution of family youth to family budget - Male	119 (68.9)	39 (22.1)	14 (7.4)
Contribution of family youth to family budget- Female	149 (86.9)	16 (9)	7 (4.1)

Youth participation in Dairy related job- Male	125 (73)	42 (24.6)	4 (2.5)
Youth participation in Dairy related job-Female	142 (82.8)	28 (16.4)	1 (0.8)

\*Values within parenthesis are percentages

#### 4.1. Change of Asset Index

Five Principal Components (PCs) were retained, and the proportion of variance explained is presented in the **Table.25**

**Table 25: Principal component Analysis on Asset Index**

Sr. No.	Eigen value	Difference	Proportion	Cumulative
1	1.96293	0.24053	0.151	0.151
2	1.7224	0.34483	0.1325	0.2835
3	1.37757	0.07752	0.106	0.3895
4	1.30005	0.24331	0.1	0.4895
5	1.05674	0.05589	0.0813	0.5707
6	1.00085	0.0313	0.077	0.6477

The **Table.26** presents the estimated component scores and HHA1.

**Table 26: Estimated component scores and HHA1**

Variable	PC1	PC2	PC3	PC4	PC5	PC6
Land Ownership	-0.09	0.16	0.66	-0.14	0.16	-0.07
House ownership	0.88	0	-0.06	0.07	0.09	-0.05
Has Bicycle	0.01	0.11	-0.15	-0.03	0.82	-0.01
Has Motor Bike	-0.07	-0.28	0.27	0.07	0.6	-0.07
Has Three-wheeler	0.06	0.54	0.05	0.02	0.15	-0.51
Has Car	0.05	-0.18	-0.07	0.63	0.21	0.22
Has van	-0.91	-0.08	-0.03	-0.03	0.03	-0.01
Roofing	0	0	0	0	0	0

Floor	0	0	0	0	0	0
No. of beds	-0.01	0.11	0.06	-0.02	-0.01	0.88
Source of drinking water	0.13	-0.07	0.76	0.19	-0.16	0.17
Source of cooking	-0.02	0.8	0.1	-0.01	-0.09	0.14
Quality of drinking water	-0.08	-0.08	-0.42	-0.67	0.11	0.26
Has Radio	-0.18	0.42	-0.12	0.59	-0.17	-0.16
Has TV	0.49	-0.28	0.11	-0.22	-0.24	0.02

The calculated HHAI was 74.4% which is higher than the HHAI of the baseline survey (62.7%). Since the HHAI conceptually ranges from 0 to 100%, houses and the conditions of these farmers are relatively good and improved over the evaluation period. The higher the value, the better the house conditions and facilities. As already examined in the above sections, these houses can access basic needs such as water and electricity. The conditions of the houses including floor, roofs and rooms are also relatively good.

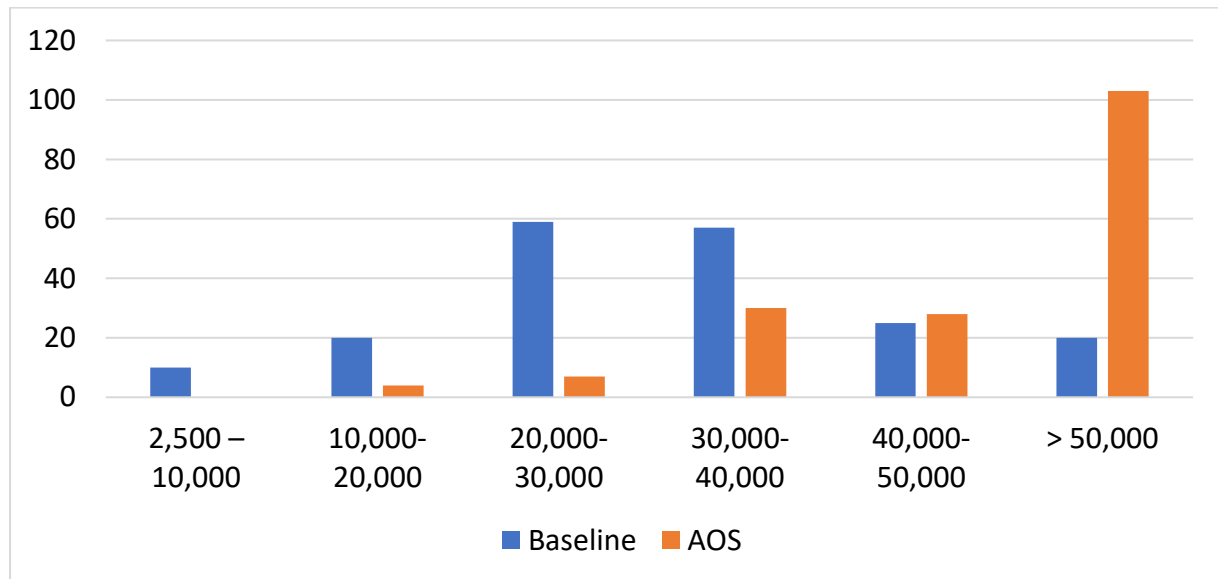
The aim of the project was to contribute to increase in the monthly income of the participating household by minimum of 20-30% level with the project intervention. The **Table.27** indicates the household monthly income in nominal term, in comparison to the baseline in 2019. It shows a significant increase in HH income.

**Table 27: Change of monthly income with the project interventions**

Monthly Nominal Income	Baseline – 2019 Amount (Rs)	AOS - 2022/2023 Amount (Rs)	Change	
			Amount (Rs)	%
Monthly HH income (Mean)	35,497	70,705	35,208	99%
Monthly HH income (Median)	35,000	58,325	23,325	67%

The estimated mean monthly income stood at Rs. 70,705, accompanied by a corresponding median of Rs. 58,325. This figure displays a substantial increment of Rs. 35,208 when compared to the baseline data. This increase signifies an impressive surge of 99% in monthly income as opposed to the baseline. This upward trend in HH monthly income reflects the positive outcome of the project interventions. It suggests that beneficiary farmers have experienced significant growth in their nominal income, which is attributed to various factors, including the rise in average milk production, increased milk prices, and growth in other sources of income.

**Figure.2** demonstrates the shift in income level when compared to baseline. It shows the significant shift in income from low to high categories.



**Figure 2: Status of monthly income level in households; a comparison with baseline**

The estimation of HH monthly income distribution across different income categories highlights that a significant segment of households, initially belonged to the income range of Rs. 20,000-30,000 and 30,000 - 40,000. However, at the AOS survey, it was evident that over 70% of households surpassed the Rs. 50,000-income range. These findings indicate a noticeable shift in income distribution, with an increase in higher-income households while declining the number within middle-income range.

#### **4.7. Estimation of Real average monthly income**

The AOS results for household income were deflated to 2019 in order to remove the inflationary effect (Refer to the methodology section for the details of computation of deflator).

Accordingly,

Deflated mean HH Income = 70,705 / 1.71= Rs. 41,375

Deflated median HH income = 52,750 / 1.71 = Rs. 34,130

**Table 28: Comparison of Real average monthly income**

Monthly Income	Baseline – 2019	AOS - 2022/2023	Change	
			Difference	Percentage (%)
Monthly family income – (Mean)	35,497	41,375	4,964	17%
Monthly family income (Median)	35,000	34,130	868	-2%

As shown in the **Table.28**, the real average income, after adjusting for inflation still shows an increase of over 17%, indicating that the rise in income is not solely attributed to inflationary factors. Other factors, such as an increase in milk production and sale or improvements in other income-generating activities, likely to contribute for the overall growth in income. This suggests positive developments in the economic conditions and income-generating opportunities for the beneficiary households.

#### **4.8. Status of HH increased in monthly income by 20%**

The Table 29 indicates the breakdown of the percentage of supported households reporting an increase in monthly income, both in nominal and real terms, categorized by gender.

**Table 29: Status of reporting HH income increase over 20% and gender perception**

Particulars	(%)
Percentage of beneficiary HH reported increase in monthly income (Nominal) over 20%	71
- % by Male (Beneficiary)	68
- % by Female (Beneficiary)	78
Percentage of beneficiary HH reported increase in monthly income (Real) over 20%	41
- % by Male (Beneficiary)	39
- % by Female (Beneficiary)	46

The percentage of beneficiary HH reported an increase in nominal monthly income over 20%, percentage of female were 78% while it was 68% of male. Overall, 71% of households experienced a surge in nominal income by over 20%. However, when considering the impact of inflation on real monthly income, 46% of females encountered an increase of over 20% and while male counterparts received only 39% of them. In total, 41% of households reported a rise in real monthly income by more than 20%.

These findings indicate that a significant proportion of beneficiary households have enjoyed a notable growth in their monthly income, both in nominal and real terms. It is worth noting that while a slightly lower percentage of male beneficiaries reported an increase in real income compared to nominal income, a higher percentage of female beneficiaries experienced an increase in real income. This suggests that factors beyond inflation, such as improvements in income-generating activities or project targeted support programs, have immensely contributed to the income growth among the beneficiary households.

#### 4.9. Source of HH Income and Average Income

**Table 30** Indicates the findings on source of household income and the average income, categorized by the source of income, for both the baseline period in 2019 and the AOS period in 2022/23. It also demonstrates the corresponding changes in average income.

**Table 30: Status of reporting HH income increase over 20% and gender perception**

Source of HH Income and Average Income	Baseline – 2019		AOS – 2022/23		Change in Average income	
	Average income Rs	Per cent HH	Average Nominal income Rs	Per cent HH	Amount Rs	Percent
Livestock (dairy) management	33,462	96.3	48,676	98.36	15,214	45
Backyard Poultry	N/A	N/A	3,967	7.38	N/A	N/A
Paddy Cultivation	12,375	25.1	22,960	50.82	10,585	86
Wage earning (Private Sector)	N/A	N/A	37,056	22.13	N/A	N/A
Other agriculture earning activities (Other Crops)	5,450	1.0	27,421	8.20	21,971	403
Inland fishery	24,333	1.6	31,667	2.46	7,334	30
Tea cultivation	5,250	1.0	N/A	N/A	N/A	N/A

Plantation crops	N/A	N/A	15,888	10.66	N/A	N/A
Self-employment	13,378	23.6	19,833	4.92	6,455	48
Pension	N/A	N/A	12,000	0.82	N/A	N/A
Other financial assistant	N/A	N/A	2,962	13.93	N/A	N/A

The monthly average income from milk production in nominal terms has surged to Rs. 48,676, making a significant increase of Rs. 15,214 or 45% when compared to the baseline figures. However, when accounting for substantial inflation, the real average monthly income derived from milk production adjusts to Rs. 28,484 reflecting a decrease of Rs. 4,978 or -15% in comparison to the baseline. Further, more than 98% of households are generating income from livestock management in the dairy sector, making it the most dominant source of income among the respondents. Other notable income sources include Paddy cultivation (50.8%) and wage earning in the private sector (22%).

Additional sectors like Paddy cultivation, other agriculture, Inland fishery, and Self-employment have also displayed a rise in monthly earnings compared to the baseline. Table 8 further unveils certain income sources that have minimal representation in terms of the number of households involved. Specifically, income sources like Tea cultivation, Pension, Inland fishery, Self-employment, and Livestock Management (Backyard Poultry) exhibit low percentages or data that is not available. It's crucial to recognize that due to the limited participation of households in these sources, their impact on the overall average household income might be relatively minor or negligible when contrasted with the other sectors outlined in Table 25.

These findings shed light on the fluctuations in average income across different sectors. It's vital to acknowledge that the increase or decrease in average income could be influenced by various factors, including shifts in market conditions, government policies, or changes in production and labor patterns.

#### **4.10. Monthly expenditure**

The household monthly expenditure is a crucial aspect to understand the financial dynamics of the beneficiaries. The Table 31 provides insights into the baseline period of 2019 and the AOS period of 2022/23. It shows the count and percentage distribution of different expenditure ranges, highlighting the changes in household spending patterns over time.

**Table 31: Household Monthly Expenditure (Nominal)**

Monthly Expenditure	Baseline – 2019*		AOS –2022/23	
	Count	%	Count	%
Total average monthly HH expenditure	28,257		54,831	
2,500 – 10,000	13	6.8	3	1.7
10,000- 20,000	88	46.1	8	4.2
20,000- 30,000	55	28.8	16	9.2
30,000- 40,000	28	14.7	33	19.2
40,000- 50,000	6	3.1	29	16.7
> 50000	1	0.5	83	49.2
<b>Total</b>	<b>191</b>	<b>100</b>	<b>172</b>	<b>100</b>

\*Extracted from Baseline report

In the initial baseline period, a majority of households allocated their monthly expenses within the range of Rs. 10,000-20,000, constituting 46.1% of the total. This was followed by the range of Rs. 20,000-30,000, which accounted for 28.8%. However, only a small proportion of households fell into higher expenditure brackets, such as Rs. 40,000-50,000 and above Rs. 50,000, together making up less than 4% of the total count.

In the subsequent AOS period, noticeable shifts in expenditure patterns come to light. The percentage of households within the Rs. 10,000-20,000 expenditure range decreased to 4.2%. Conversely, there was an upswing in households within higher expenditure ranges. For example, the range of Rs. 40,000-50,000 expanded to 16.7%, and the category above Rs. 50,000 experienced a substantial surge, reaching 49.2%.

The overall average monthly household expenditure has nearly doubled from Rs. 28,257 to Rs. 54,831 in nominal terms. When adjusted for inflation, the real average monthly household expenditure (Rs. 54,832/1.71) amounts to Rs. 32,085, signifying an approximate 14% increase in real spending. These alterations in the distribution of expenditure patterns suggest a movement towards higher spending levels among beneficiary households in the AOS period. This implies an enhancement in financial stability or an elevated capacity to afford increased expenses, potentially indicating positive advancements in income levels or shifts in lifestyle preferences.

#### 4.11. Categories of HH Expenditure

The **Table.32** presents the categories of household expenditure, comparing the baseline period of 2019 with the AOS period of 2022/23. It includes the average expenditure in Rs, the percentage of households within each category, the count of households, and the change in expenditure.

**Table 32: Categories of Household Expenditure**

Categories of HH Expenditure	Baseline – 2019*		AOS – 2022/23		Change	
	Average Expenditure Rs.	% Responded HH	Average Expenditure Rs.	%	Amount Rs.	%
Food, fruits, beverage, other food commodities	12,148	100	28,074	100	<b>15,926</b>	<b>131</b>
Transport/ fuel for own vehicles	4,725	81.2	5,892	89	<b>1,167</b>	<b>25</b>
Education/ Training	5,704	38.7	7,923	69	<b>2,219</b>	<b>39</b>
Health (Medicine and Consultation of Doctors)	1,909	91.6	3,511	76	<b>1,602</b>	<b>84</b>
Alcohol and Smoking	1,214	16.8	6,600	4	<b>5,386</b>	<b>444</b>
Gambling	0	0	-			
Loan Interest Payments	1583	3.1	13,119	52	<b>11,536</b>	<b>729</b>
Rental	1	1				
Electricity	1001	100	2,598	89	<b>1,597</b>	<b>160</b>
Water	356	9.4	2,275	50	<b>1,919</b>	<b>539</b>
Clothes, Jewelry etc.	1168	31.4	2,500		<b>1,332</b>	<b>114</b>
Communication (Land phone, Mobile, Internet)	658	93.2	2,550	57	<b>1,892</b>	<b>288</b>
Insurance	2,500	1	2,308	5	<b>-192</b>	<b>-8</b>

Entertainment etc.	833	3.1	1,417	20	<b>584</b>	<b>70</b>
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*\*Extracted from Baseline report*

Food, fruits, beverages, and other essential food commodities formed a considerable segment of household expenses in both the baseline period and the AOS period. During the baseline period, the average expenditure within this category stood at Rs. 12,148, encompassing the entirety of households, which was equivalent to 100% of the total. In the subsequent AOS period, this expenditure surged to Rs. 28,074, still representing 100% of households. This signifies a notable rise of Rs. 15,926 in food-related expenditure. When accounting for the impact of inflation, the real average household spending in this category reaches around Rs. 16,428. This denotes an almost 35% increase in real expenditure, indicating an enhancement in the purchasing power of smallholders.

A similar trend is observed across all other common household expenses, which have experienced substantial growth compared to the baseline. These expenses include items such as electricity, water, transportation, healthcare, loan interest, and so forth.

#### **4.12. Status of dairy income**

The opinion of the beneficiaries on the dairy income after the project support was investigated (**Table.33**) and among the beneficiaries 20.5% (n=35) reported increase in dairy income by 16-25% while 31.1% (n=54) reported no change in dairy income.

**Table 33: Status of increase in dairy income with project support**

Percent (%) as range	Frequency	Percent (%)
No increase	54	31.15
2-5	10	5.74
6-10	16	9.02
11-15	9	4.92
16-25	35	20.49
26-40	11	6.56
41-50	28	16.39
51-60	1	0.82
61-75	4	2.46
76-100	4	2.46

The status of family income during the present year compared to previous year was reported and the highest frequency (48) was for “no change” in income while 37 beneficiaries reported 41-50% increase in their income.

**Table 34: Status of increase in family income compared to previous year**

Percent increase in monthly income	Frequency	Percent (%)
No increase	48	27.9
2-10	21	12.3
11-20	24	13.9
21-30	18	10.7
31-40	13	7.4
41-50	37	21.3
51-60	4	2.5
61-100	7	4.1

The monthly income earning (28.7%) among beneficiaries were investigated (**Table.34**) and was revealed highest frequencies were Rs. 12,000-20,000 followed by Rs. 41,000-50,000 (22.1%).

**Table 35: Status of monthly income earning**

Income range (Rs)	Frequency	Percent (%)
12000-20000	49	28.7
21000-30000	25	14.8
31000-40000	18	10.7
41000-50000	38	22.1
51000-60000	9	4.9
61000-70000	13	7.4
71000-80000	3	1.6
> 81000	17	9.8

In considering the status of family expenditure (**Table.35**) revealed that Rs. 21,000-30,000 expenditure categories had the highest frequency (68) followed by Rs. 11,000-20,000 expenditure categories (39).

**Table 36: Status of family expenditure among beneficiary families**

Expenditure range	Frequency	Percent (%)
<10000	27	15.6
11000-20000	39	23.0
21000-30000	68	39.3
31000-40000	15	9.0
41000-50000	14	8.2
51000-60000	3	1.6
>61000	6	3.3

#### 4.13. Dairying as a livelihood

Dairy farming is the key livelihood and is a sustainable income source for the smallholders in the village communities. The marketable outputs in dairy production in addition to fresh milk are sale of surplus animals for breeding, culled animals with low production, bull calves and cattle manure. The income of these outputs is always hidden. When the animals were sold out, new productive animals are taken into the herd. Maintaining a bull for breeding purposes is not a common practice as the Artificial Insemination (AI) service is available island wide.

Following table demonstrates the overall performance of cows in the surveyed area. Cows not pregnant but milking stage were 20%. This indicate that their milk production is within three months after calving. Second category was the cow performing pregnancy while continuing milking stage (12.4%). This category might be in the stage about within 90-250 days of lactation. The third category is the Non milking with progressive pregnancy. These cows are added up to the milking category within two months. These three categories represent the percentage cows in milking in the herd. Therefore, when these three categories add together, cows in productive stage were 51.5% and it is a considerably satisfactory performance as in the ideal situation, percent cows in milking stage should be atleast 70%. Cows that are non-milking and non-pregnant stage represent 8.1% and they are unproductive and must be culled and replace the herd with female calves (8.1%).

**Table 37: Herd composition of the beneficiary farms**

Animal type	Mean	Median	Range	Total	Percent (%)
Heifers (<6 m) (number.)	2.3	2.0	0-16	283	24.0
Non-Pregnant + Milking (number.)	1.9	2.0	0-10	234	19.8
Pregnant +Milking (number.)	1.2	0.0	0-25	147	12.4
Pregnant +No milking (number.)	1.8	1.0	0-17	225	19.1
Non pregnant +Non milking (number.)	0.8	0.0	0-12	96	8.1
Female calves (number)	0.8	0.0	0-7	96	8.1
Bull calves (number)	0.8	0.0	0-4	100	8.5

When the herd converted into the standard animal units, it is 7.7 units. No. of cows in production stage was 4.9 cows and 0.8 cows per herd is unproductive. No. of dependent animal units per herd was 2.8 cow units indicating higher rate of dependence impacting on the cow productivity.

According to the **Table.37**, as per the farmers' perception on the status of herd behavior, a decrease in all animal types in the herd during last 12 months reported by 36.9% of the farmers. Similarly, overall increase in all animal type reported was 29% while percentage of farmers reported no change in the herd was 37.2%. A low percentage of perception on increase and no change indicate that project must concentrate more on improving herd management practices.

**Table 38: Status of change of milk cows during last 12 months**

Animal type	Decreased		Increased		No change	
	No.	%	No.	%	No.	%
Milking cows	61	35.2	45	38.5	66	26.2
Preg. Cows	48	27	62	35.2	62	36.9
Non-pregnant cows	51	29.5	42	24.6	79	42.6
Total herd size	59	34.5	49	28.4	64	37.2
Overall	209	32.0	169	29.0	187	39.0

As per **Table 3**, natural fodder as the main roughage was the most popular practice reported in 114 farms (66.4%). Chopping before feeding is practiced in 50% of the farms.

**Table 39: Feeding status**

Status of practice	Yes		No	
	No. of farms	%	No. of farms	%
Natural fodder as main roughage	114	66.4	58	33.6
Cultivated fodder as main roughage	82	47.5	90	52.5
Chopping before feeding	86	50	86	50
Feed TMR	56	32.8	116	67.2
Feeding silage	1	0.8	171	99.2
Feeding Azolla	8	4.9	164	95.1
Feeding dry roughage /Legumes	17	9.8	155	90.2
Own a grass chopper	83	48.4	89	51.6
Used grass chopper during last 7 days	68	39.3	104	60.7
Grass chopper in working condition	83	48.4	89	51.6
Own cultivated fodder land	56	32.8	116	67.2
Irrigate fodder plot	80	46.7	92	53.3
Cultivate Maize	7	4.1	165	95.1

#### 4.14. Feeding commercially purchased feeds

Commercially purchased concentrate feeds are fed when the milk production exceeds 5kg milk per day. Nutrients present in grasses and legume roughages can support the nutritional requirement to body maintenance and to produce 5 kg milk. When the roughage quality is very poor or milk production of the cows exceed 5kg a day need to feed concentrate feeds. In general, commercial feeds are expensive and represent a higher percentage of feed cost. Table indicate the present status feeding commercially purchased concentrate feeds. However, as per the **Table.40**, farmers offer concentrate feed mostly for cows on non-pregnant milking stage. Cows in other stages, heifers and calves were offer very marginal amounts of feed indicating the project attention is needed to improve the situation.

**Table 40: Commercially purchased Concentrate feeding**

Animal Type	Status of feeding concentrate feed			
	No feed	1-2 kg	3-4kg	>5kg
Heifers	121	38	3	10
Non pregnant + milking	96	39	16	21
Pregnant +milking	106	32	13	21
Pregnant +non-Milk	117	27	10	18
Non pregnant +Non milk	140	23	4	6
Female calves	148	21	3	0
Bull calves	147	21	4	0

Some farmers mix their own feed requirement to cut down the cost of feed without purchasing commercial feed. However, as per the **Table.40**, offering own mixed feed to animals were very marginal.

**Table 41: Status of feeding animals with own mixed feed**

Animal Type	Status of feeding own mixed feed			
	No feed	1-2 kg	3-4kg	>5kg
Heifers	131	28	4	8
Non pregnant + milking	106	32	16	18
Pregnant +milking	107	31	10	24
Pregnant +Non-Milking	124	23	7	18
Non pregnant +Non milking	138	11	7	16
Female calves	148	16	10	0
Bull calves	148	20	4	0

The status of feeding herd with industrial by-products such as Rice bran beer pulp etc. helps to cut down the cost without effecting the production. However, as per the **Table.41**, such practices seem not common.

**Table 42: Status feeding cows with industrial by-products**

Animal Type	Status of feeding industrial by-product feed	
	No feed	1-2 kg
Heifers	155	17
Non pregnant + milking	136	36
Pregnant +milking	135	37
Pregnant + non-Milking	138	34
Non pregnant +Non milk	154	18
Female calves	163	9
Bull calves	160	12

#### 4.15. Status of milk production

The average milk production per household herd was 13.5 kg per herd with a vast variation of 2-38 kg. As per the baseline results, milk production levels had been 13.96 kg per cow per day in high season which is a overestimated figure.

**Table 43: Status of average milk production in household cow herd**

Mean (kg) milk yield/ day	13.5
Median (kg)/day	12
Minimum (kg/day)	2
Max (kg/day)	38
<b>Total (kg/day)</b>	<b>1480</b>

*Baseline figure: 13.96 kg average milk production/ per herd/day*

The fat % of selected beneficiaries were inquired and majority had the level of 4.6. It is a considerably good level.

**Table 44: Variation in fat percentage**

Range	Frequency	%
2-4	34	72
4-5	3	6

>5	10	21
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The estimated average milk production per cow considering the volume suckled by calf and the volume extracted, it was 4.6 kg per cow per day (**Table 44**). This figure cannot be compared with the baseline, as the given figure (13.96 L /cow per day) in the baseline is overestimated figure.

**Table 45: Status of per cow milk production (kg) per day**

Parameter	Unit	Value
Mean	kg/HH/day	4.6
Median	kg/HH/day	4
Minimum	kg/HH/day	2.3
Maximum	kg/HH/day	8

As per the perception, 52.3 % reported an increase of over 20% average milk yield per cow (**Table.45**). Further, 52 % of the farmer population reported higher increase of 25-30% per cow production and 8% HH reported over 30% increase in average milk production per day.

**Table 46: Percentage of HH reporting an increase in average milk yield per cow**

Percentage changed	Frequency	Percentage (%)
No Change	16	9.3
15% increased	26	15.1
20% increased	64	37.2
25% increased	36	20.9
30% increased	16	9.3
<30% increased	14	8.1
<b>Total</b>	<b>172</b>	<b>100.0</b>

#### 4.16. Estimation of Lactation length

Although standard lactation length under well maintained and balanced fed cows are generally 305 days of a year as the 60 days are kept the cows dry before the next calving. However, lactation length is varying widely and the length is less than 305 days in practical

situations. The reasons are poor cow nutrition and cow health, environmental factors, and inherent cow factors.

In the present study, number of cows in milk varied from 52 to 7.2 heads per herd (**Table 47**). When the cow productivity increases, the lactation length should approach to standard length (305 days). Present study revealed minor variation of the lactation length from 250-264days against the number of calving of the cow. Although there is an increasing trend of the lactation length when the number of calving increases but the limitation of data available does not permit for further analysis. Lactation length of the cows in more than 4 calving follow the similar trend. Comparison of the status with baseline cannot be made as the lactation length of the cows has not been reported.

**Table 47: Estimation of Lactation Length**

Status of lactation in herd	No. of cows in surveyed sample	No. of cows per HH (Mean $\pm$ SD)	No. of days in milk (Mean $\pm$ SD)	No. of milk days expected more (Mean $\pm$ SD)	Estimated Lactation length (Days)
Cows in 1st lactation	480	6.9 $\pm$ 2.4	87 $\pm$ 10	170 $\pm$ 16	257 $\pm$ 30
Cows in 2nd lactation	468	7.2 $\pm$ 0.5	136 $\pm$ 10	128 $\pm$ 23	264 $\pm$ 32
Cows in 3rd lactation	492	5.2.9 $\pm$ 2.6	172 $\pm$ 18	97 $\pm$ 30	269 $\pm$ 36
Cows in 4th lactation	473	6.9 $\pm$ 1.5	176 $\pm$ 32	78 $\pm$ 13	254 $\pm$ 49
Cows more than 4 lactation	356	6.4 $\pm$ 1.25	150 $\pm$ 16	100 $\pm$ 16	250 $\pm$ 20

Lactation Length: 258.8 $\pm$ 7.66, Range 250-269

#### 4.17. Estimation of average milk yield and income

Lactation length of the cows in the study area varied from 60 -300 days with more concentration on 180-270 days. **Table.48** is to demonstrate the variation in average lactation length as per the parity categorizing them into four lactation periods. As per the **Table.48** lactation length of a cow ranged from 250 to 269 (Mean= 250) days as per the lactation and the estimated milk yield per lactation was 1125 kg. Accordingly, estimated milk yield per cow

was 4.5 kg per day. In comparison to the baseline per cow milk yield, the figure given in the baseline was over ambitious (13.96) and therefore, cannot be compared.

Average lactation length irrespective of stage of lactation has been  $250 \pm 5$  days (range 250-269 days). Average purchase price per kg milk at the milk collecting center is Rs. 150.00.

The estimated milk production per cow irrespective of the parity, was 4.5 kg/cow. Accordingly, average milk income per cow per lactation ( $250 * 4.5 * 150$ ) was Rs.168, 750/= . As per the **Table.48**, number of cows in milk (Cows Non-Pregnant+ Milking+ Cows Pregnant+ Milking) was 3.5 per household. Accordingly, average milk income per household was Rs. 71,093.75. The milk income is 60.5% of the total monthly income.

## 5. CONCLUSION

WONRICH dairy Pvt Ltd, the dairy business entity as the processing and marketing player of the value chain are continued to play a crucial role with the partnership of SAPP and the smallholder dairy producers ensuring the sustainability. Strong farmer network developed by the project have created multiple benefits to both approaching farmers and to link with the market and input supplies. Effective project interventions have impacted the growth of the dairy as a business, but a strengthening of strong and close monitoring & evaluation system is crucial if to exploit the optimum benefits to the beneficiaries.

## 6. RECOMMENDATIONS

- Low representation of the females among beneficiaries must be addressed to reveal the hindrance and to take corrective measures.
- Dairy entrepreneurship is very labor intensive, and the smaller family size could be a challenge in the future expansion of the dairy as a business. Therefore, appropriate technology and the technical tools must be introduced wherever possible to minimize the dependence on manual labor.
- The age distribution of the children of the families are considered, the majority represent the age category of 12-18 years and over 19 years. This information is worth in planning family nutrition programs.
- The number of dependents to the beneficiary was revealed as 3 members on average. They can be directed to other income earning sources to ensure self-sustainability.
- The beneficiaries were organized into a social group based on the Milk collecting center irrespective of other social groups. Therefore, extension activities must be focus to the milk collecting center.
- Almost half of the beneficiaries had not been registered in the respective VS offices. As the government benefits and vaccinations are generally diverted through range VS office, unregistered beneficiaries are mostly neglected. Therefore, attention is needed to register all the beneficiary dairy farms.

- Beneficiaries meet the project support staff occasionally and therefore; actions have to be taken to facilitate them to meet very regularly to obtain the optimum benefits of the interventions.
- Among the interventions, highest adoption rate was machine milking, night feeding and chopping fodder before feeding respectively. A need of an In-depth study is suggested to reveal the factors causing hindrance on the other interventions.
- Mean dairy income from per day estimated was Rs. 1622.53 and this low earning may lead to leave dairy farming. Therefore, programs to productivity improvement such as value addition are suggested.
- No. of dependent animal units per herd was 2.8 cow units indicating higher rate of dependence impacting on the cow productivity. Therefore, attention on the productivity improvement in dairy cows is very crucial.
- Natural fodder has been utilized as the main roughages irrespective of cultivated fodder introduced as an intervention. Therefore, action must be taken to improve the feeding quality of natural fodder.
- The status of feeding concentrate feed is mostly for cows on non-pregnant milking stage. Cows in other stages, heifers and calves offer very marginal amounts of feed indicating the project attention is needed to improve the situation.
- The average milk production per household herd was 13.5 kg with a vast variation of 2-38 kg milk. As per the baseline results, milk production levels had been 13.96 kg per day indicating that total daily production of the herd had no significant increase and therefore, project attention is anticipated to the issue.
- The number of cows in milking stage were 69% and it is a considerably higher performance as in the ideal situation, percent cows in milking stage should be 80%. Further increase in per cent cows in milk need attention to improve productivity of the herd.
- The AOS revealed minor variation of the lactation length from 250-269 days against the number of calving of the cows. Although there is an increasing trend of the lactation length when the number of calving increases but the limitation of data available does not permit for further analysis. Therefore, further study and analysis is suggested to have better estimation of the lactation length.
- The estimated milk yield per lactation was 1125 kg. Accordingly, estimated per day milk yield per cow was 4.5 kg per day. As this is an estimated figure, a deeper study with more data is suggested at the end year survey.
- Overall productive cows of the cow population in the surveyed area were 51.3% with follower population (heifers and female calves) of 32.1% indicating a satisfactory performance with project interventions. However, 8.1% unproductive cows and 8.1% bull calves must be culled to improve the herd productivity.

## 7. LIMITATIONS

- Information on the indicators measured in the AOS were mostly not reported in the baseline report thus limiting the comparison.
- Beneficiary farm locations have dispersed in a wider area in the project area making difficult to meet them individually.
- Among the total list of 191 beneficiary addresses of 19 (9.9%) beneficiaries, have either abandoned dairying or shifted to unknown address and therefore, AOS statistical analysis was based on total of 172 beneficiaries.
- Non-beneficiary (Control group) survey: The list of non-beneficiaries comprising 30 names and addresses, provided by the SAPP was belonged to Puttalam, Ambanpola, Maho, Polpithigama, Periyamaduwana, Thirappane and Kotawehera DS divisions. The survey team reported and then verified and noted that the individuals included in the list were not either dairy farmers or they have abandoned dairying long ago. Therefore, adequate data was not able to collect under non-beneficiary for analysis.

## ANNEXTURES

### Annexure 1:

Annual Outcome survey: Livelihood development of smallholder farmers with dairying as the main income

Geo-reference No. of HH	
Questionnaire Sr. No.	
Date of survey	
Enumerator Name	
Enumerator Contact No.	

#### 1. Household Identification and target inclusion

1.1. Name of respondent and relationship to beneficiary	
1.2. Name and address of the SAPP beneficiary	
1.3. NIC #.	
1.3. Age of the SAPP beneficiary (Yrs)	
1.4. Gender of the SAPP beneficiary	
1.5. Gender of HH head	
1.5. Total no. of members in the family	
1.6. No. of children in the HH	
<ul style="list-style-type: none"> <li>• 1.6.1. 0-5 years</li> </ul>	
<ul style="list-style-type: none"> <li>• 1.6.2. 6-11 years</li> </ul>	
<ul style="list-style-type: none"> <li>• 1.6.3. 12-18 years</li> </ul>	
<ul style="list-style-type: none"> <li>• 1.6.4. 18 and over</li> </ul>	
<ul style="list-style-type: none"> <li>• 1.6.5. Total no. of dependents to head of HH</li> </ul>	
1.7. Any form of group membership (mark appropriate)	
<ul style="list-style-type: none"> <li>• 1.7.1. Milk collection center based society member</li> <li>• 1.7.2. Producer (farmer) group (PO)</li> <li>• 1.7.3. Other group member</li> <li>• 1.7.4. None (not belong to any society)</li> </ul>	
1.8. Ethnic group (Sinhalese / Tamil / Muslim / other)	
1.9. Beneficiary contact No.	
1.10. Perception of current economic status of HH as per the respondent (Rich =1, Middle = 2, Poor = 3, Extreme poor =4)	

1.11. Any other direct SAPP beneficiaries in family (a. Spouse, b. Son, c. daughter, d. other	
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\*Tick appropriate

## 2. Status of Farm registration

	Status	Response
2.1	Registered with DAPH (Yes/No)	
2.2	If yes, Registration No.	
2.3	Milk sale card No.	
2.4	Name of milk collecting center where milk is supplied	
2.5	Veterinary range	
2.6	GN division	
2.7	The name of the VCM covering beneficiary cluster	

## 3. Status of participation in the project activities

3.1	Since when has your household dairy included with SAPP project activities (No. of months)	
3.3	In which of the following project activities you (or any member of your household) have participated during the past 12 months?	
3.3.1	<ul style="list-style-type: none"> <li>Formation of Producer Organization /society ) Yes / No</li> </ul>	
3.3.2	<ul style="list-style-type: none"> <li>Initial awareness, Training, demonstration Yes / No</li> </ul>	
3.3.3	<ul style="list-style-type: none"> <li>Project support distribution meeting Yes / No</li> </ul>	
3.3.4	<ul style="list-style-type: none"> <li>Dairy technology related training programs Yes/ No</li> </ul>	
3.3.5	<ul style="list-style-type: none"> <li>Other (specify) Yes / No</li> </ul>	
3.4	How often do you meet project staff (i.e. VCM or RPC (a. Frequently, b. Occasionally, c. Rarely d. Never	
3.5	How satisfied are you with the project activities? 1- Highly satisfied, 2-Satisfied, 3-Nether satisfied nor dissatisfied 4- Dissatisfied, 5-Highly dissatisfied	
3.6	Did your participation in project activities impacted for a significant improvement on your livelihood? a. Very Highly, b. Highly, c. moderately, d. marginally e. no improvement	

## 3.7. How useful the technologies introduced by the project?

Technology	Highly useful	Useful	Moderately useful	Marginally useful	Not useful
1. Milking machine					
2. Bush cutter					
3. Grass Chopper					
4. Dairy related technologies					
5. Other					

3.8. What is the level of adoption status of different technologies introduced by the project?

1	Technology	Level of adoption*
2	Feeding TMR	
3	Chopped forage feeding	
4	Azolla and tree fodder feeding	
5	Night feeding	
6	70% or more cows in milk	
7	Loose barn housing	
8	Early weaning of calves from mother	
9	Silage making	
10	Use of milking machine	

\*1. Not aware, 2. Aware but not yet tried, 3. Tried but not success, 4. Succeeded but limitation prevent adoption, 5. Well-adopted

#### 4. Livelihood status

4.1	What is the main source of income impacting the family most? (Select main three as per the highest to lower order)	
	a. Livestock (Dairy / goat /Pig/Poultry) (Select appropriate)	First highest
	b. Crop farming (Rice, tree crop, cash crops,)	2 <sup>nd</sup> highest
	c. Off-farm earning (outside working)	
	d. Regular job wages	3 <sup>rd</sup> highest
	e. Own enterprise	
	f. Pension	
	g. Welfare allowances	

	h. Other		
4.2	How many HH members involve in other livelihood income earning jobs?		
4.3	How many youth of family members contribute to family budget?	Male	Female
4.4	How many youth of family members involve in dairy related income earning job?		
4.5	What is the approx. % of increased income from dairying per month due to project support?		
4.6	What is the % of increase in total monthly income compared to previous year		

## 5. Source of income and expenditure

5.1.Principal source of family income (Please choose from the below list)	Monthly income (Rs)
Livestock farming (Dairy)	
Poultry farming	
Moringa	
Cinnamon	
Paddy rice	
Plantation crops	
Wage earning	
Other Crops	
Inland Fishery	
Self-employment	
Financial Assistance/ Social welfare benefits (i.e. <i>Samurdhi</i> , , Other allowances)	
Pensions	
Other (Specify)	
<b>5.2. Details of Expenditure</b>	<b>Monthly expenditure (Rs)</b>

Food related items	
Transport and fuel	
Education/ Training	
Health related	
Loan Interest Payments	
Rental	
Electricity	
Water	
Clothes, Jewelry etc.	
Communication (Telephone, Mobile, Internet, etc.)	
Insurance	
Entertainment etc.	
Alcohol and Smoking	
Others (Please Specify)	

#### 6. Food security of HH

6.1	How many times your HH consumed animal protein source during last 7 days? (Daily /2-3 times / 4-5 times, None)	
6.2	Do your children consume home produced dairy products regularly? (a. very often, b. once in way, c. Occasionally, d. Not at all)	
6.3	How many time your HH consumed fruits during last 7 days	
6.4	How many time your HH consumed least preferred food during last 7 days	
6.5	How many time your HH consumed food limiting portion size during last 7 days	
6.6	How many time your HH consumed less than 3 meals /day during last 7 days	
6.6	Over the last 12 months, was there any period(s) during which you were not able to provide 3 meals per day for your household (Least food availability period)?	
6.7	What is the period your HH experience economic hardship	

6.8	Do you believe project supported dairy business helps you maintain food security? 1. Very highly, 2. Highly, not sure, 4. Insignificantly, 5. Not at all	
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#### 7.Land tenure

7.1	Total productive land area legally owns to Household (ha)	
7.2	Land area allotted for fodder cultivation and dairy	
7.3	Do you practice tenant farming (farming land of other household)?	
7.4	If Yes, what is the size of tenant farming (acres)?	

#### 8.Dairy farming: changes in production and herd composition

Sr. No	Particulars	Count
8.1	Heifers (>6 m) (number.)	
8.2	Non-Pregnant+ Milking (number.)	
8.3	Pregnant +Milking (number.)	
8.4	Pregnant +No milking (number.)	
8.5	Non pregnant +Non milking (number.)	
8.6	Female calves (number)	
8.7	Bull calves (number)	
8.8	Did the no. of cows in milk changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)	
8.9	Did the no. of cows in pregnancy changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)	
8.10	Did the status of herd size (No. of cows) changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)	
8.11	Did the no. of cows in non-pregnant changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)	

#### 9.Current status of Feeding roughages (Please mark as √)

	Roughage Type	Grazing	Cut green	chopped Maize /sorghum	crop residue	Tree fodder	TMR	Silage
9.1	Heifers (>6 m)							
9.2	Non-Pregnant+ Milking							
9.3	Pregnant +Milking							
9.4	Pregnant +No milking							
9.5	Non pregnant +Non milking							
9.6	Female calves							
9.7	Bull calves							
9.8	Did the status of daily feeding of cultivated fodder changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)							
9.9	Did the status of feeding chopped fodder changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)							

TMR= mixed of chopped green +Conc. +Minerals, (Tree fodder = Gliricidia, Ipil, Acacia etc.,)

#### 10.Utilization of cut fodder and natural fodder

Sr. No.	Question	Response
10.1	Do you feed cut and carry natural fodder regularly? Yes / No	
10.2	Do you feed cultivated cut fodder regularly? Yes / No	
10.3	How many bushes of cultivated fodder harvested per day?	
10.4	Do you chop the fodder regularly? Yes / No	
10.5	Do you own a grass chopper? Yes / No	
10.6	Does the grass chopper is working condition? Yes / No	
10.7	Did you use grass chopper during last 7 days? Yes / No	
10.8	Approx. quantity of left-over grass removed per day (kg)	
10.9	Do you practice TMR feeding? Yes / No	
10.10	What is the quantity of fodder (kg) and concentrates (kg) used per day?	
10.11	Do you own a land with cultivated fodder? Yes / No	
10.12	Do you irrigate the fodder plot in regular intervals? Yes / No	
10.13	What is the quantity of daily collection of natural fodder from outside sources (kg)	
10.14	What is the quantity of cultivated fodder offer to cows for daily feed from your own fodder plot? (kg)	
10.15.	Do you feed silage? (Yes /No)	
10.16	If yes, quantity fed to total herd/day? (kg)	

10.17	Do you feed Azolla in the daily ration? (Yes / No)	
10.18	Do you sell fodder / planting materials / silage? (Yes / No)	
10.18	What is the status of feeding cattle with cultivated fodder during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)	
10.19	Did you cultivate Maize / Sorghum for cattle feeding? Yes/No	
10.20	Do you have at least one Azolla pond at your dairy premises?	
10.21	Do you feed dry fodder or dry legumes in daily ration?	

#### 11. Feeding status of concentrate feed and mineral

11.1	Feeding material	Heifers (> 6 m)	Non Preg.+ Milking	Preg.+ Milking	Preg.+ Non milkin g	Non preg+N on milking	♀ calv es	♂ calv es	
11.2	commercially purchased mixed feed (kg/animal/day)								
11.3	Own mixed feed (kg/animal/day)								
11.4	Industrial by-products (C'poonac, Rice bran, Beer pulp,(g/animal/d)								
11.5	Mineral with feed (g/animal/d)								
11.6	Mineral separately (g/animal/d)								
11.7	Did the feeding status of concentrate feed and minerals changed during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)								

#### 12. Breeding performance of heifer cows in current herd

Sr No	Parameter	Number	*Status of change compared to previous year
12.1	No. of heifers calved 1 <sup>st</sup> time		
12.2	Av. age at first heat sign (m)		
12.3	Av. age at 1 <sup>st</sup> service (m)		
12.4	Av. no. services/conception		
12.5	Age at 1 <sup>st</sup> calving (m)		

12.6	No. of female calves born		
12.7	Av. calving interval of old cows (d)		
12.8	Which of the above breeding parameters had greater change during last 12 months due to project interventions.? (Choose serial number of the parameter)		

\* a. Increased, b. No change, c. Decreased

### 13. Capacity building (Training, demonstration, awareness programs for project farmers)

No.	Question	Response
13.1	How many of the project organized, technical training programs you have attended?	
13.2	How many topics of training sessions you can recall ?.	
13.3	What topic is most attractive? (1. Dairy management, 2. Machinery use, 3. Dairy technologies, 4. Impact of climate change, 5. Financial management)	
13.4	How many learnt innovations incorporated into your dairy husbandry?	
13.5	Did you receive at least one training on clean milk production? (Yes /No)	
13.6	What is the most required training subject area you feel useful?	
13.7	Did you receive training on household financial management and bank activity? (Yes /No)	
13.8	Do you manage household transactions within the income you received? (Yes /No)	
13.9	Do you feel your knowledge on dairy farming, financial management and climate change had a change during last 12 months compared to previous year (Yes /No)	
13.10	Does your spouse participate in making household finance management decisions? (Yes /No)	
13.11	Are you able to save at least Rs 6,000 /month out of all earnings (Yes /No)	
13.12	Did you attend awareness training on climate change impact? (Yes /No)	
13.13	Do you know at least one factor of climate change impact affecting dairy farm operation (Yes /No)	
13.14	What are the changes made in the farm to adapt /mitigate the impact of climate change (a. Adapt suitable waste disposal	

	method, b. improve ventilation in shed, c. adopt loose-barn system, d. more access to drinking water, e. conservation of animal feed, f. other)	
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#### 14. Status of production and disposal of milk

Parameter		Response											
14.1	Average milk volume sold/day before the project intervention (L)												
14.2	Milk sold during last 12 months*												
Month		12	11	10	9	8	7	6	5	4	3	2	1
Lt													
%Fat													
14.3	Volume of milk sold yesterday												
14.4	Highest volume of milk sold/day during peak period												
14.5	Milk fed to calves yesterday												
14.6	Quantity used for value addition yesterday												
14.7	Quantity consumed at home yesterday												
14.8	% Fat of milk sold yesterday												
14.9	Lactometer reading of milk sold yesterday												
14.10	Time period between two consecutive milking (hr.)												
14.11	Whether suckling allowed at beginning of milking												
14.12	To whom you supply milk? (a. Promoter company center, b. village collector, c. informal market, 4. other...)												
14.13	Time taken to reach collection center after milking (min.)												
14.14	Are you satisfied with the present marketing channel in terms of price and payment frequency? Yes / No												
14.15	Was your milk got rejected at least one time during last month? Yes/No												
14.16	Do you feel that your milk volume sold was changed during last 12 months compared to previous year? (a. Increased, b. No change, c. Decreased)												

\*Check with milk card

#### 15. Are you engaged in any of the following value creation activity below?

Activity	Yes	No
Cooling of raw milk		
Boiling milk		
Curd making		
Yoghurt		
Cheese, Paneer making		

Flavored milk production		
Ice-cream preparation		
Other (Specify)		

#### 16. Provision of drinking water for cattle

No.	Question	Response
16.1	Do you provide drinking water facility at the shed premises?	
16.2	What is the source of water to the shed?*	
16.3	Does the water is accessible to cows all the time ?	
16.4	How many times you provide water per day?	

\*Tap born, manually supply by buckets

#### 17. Present Lactation length

	Length of Lactation	No. of days in milk	No. of milk days expected more	Reason for discontinuation if any
17.1	Cows in 1 <sup>st</sup> lactation			
17.2	Cows in 2 <sup>nd</sup> lactation			
17.3	Cows in 3 <sup>rd</sup> lactation			
17.4	Cows in 4 <sup>th</sup> lactation			
17.5	Cows more than 4 lactation			
17.6	Heifers in 1st time calved			
17.7	Do you feel lactation length of cows changed with project intervention during last 12 months compared to previous year (a. Increased, b. No change, c. Decreased)			

#### 18. Land extent cultivated with improved fodder

Sr No.	Land type	No. bushes / Area (ac) cultivated with fodder crops
18.1	Own land (ac.)	
18.2	Relative's land (ac)	
18.3	Neighbor's land (ac)	
18.4	Other land (Specify)	
18.5	No own lands/Landless	

#### 19. Disposal and addition of animals

Sr. No.	Animal Type	Available to dispose (no.)		New addition to the herd (No.)		Remarks
		for breeding	for cull	No.	Age (m)	
19.1	Heifer calves					
19.2	Bull calves					
19.3	cows					
19.4	Heifers					

## 20. Use of machinery and equipment

Sr No	Machinery	Whether In use at present (Yes/No)	Procurement method		
			Under loan	Granted	Own
20.1	Grass (bush) cutter				
20.2	Grass chopper				
20.3	Milking machine				
20.4	Water pump				
20.5	Cooling device				
20.6	Other				

## 20. Status of receiving project inputs

Sr No	Question	Response
21.1	Did you receive at least one unit of milk can(s) or other utensils? Yes /No	
21.2	Do you utilize them regularly? Yes /No	
21.3	How many cans / utensils received?	
21.4	Do you utilize temporary plastic containers in carrying milk? Yes /No	
21.5	What is the specific purpose of utilizing cans at present? a. milk transport, b. collecting water for shed work, c. HH use d. other	
21.6	Did you receive credit support for shed improvement? Yes / No	
21.7	Is it for new construction or renovation of the shed?	
21.8	What is the main renovation done? (a. Expansion, b. Roof, c. Floor, d. draining, e. convert to loose barn method)	
21.9	How many animals accommodate inside shed in night?	
21.10	At present how many are kept outside shed during night?	

## 22. Proportion of income sources other than dairy husbandry

<b>Sr No</b>	<b>Question</b>	<b>Scale from 1-5</b>
22.1	Rice and vegetable crops	
22.2	Plantation crops (Tea, C'nut, Cinnamon, Rubber etc.,	
22.3	Highland and cash crops (Betel , turmeric, ginger, banana etc.,	
22.4	Off-farm earnings	
22.5	Earning by other family members	
22.6	Pension, welfare allowances	
22.7	Other (specify)	

### 23. Perception of the beneficiaries

<b>Sr No</b>	<b>Condition</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree nor disagree</b>	<b>agree</b>	<b>Strongly agree</b>
23.1	Accessibility to credit from bank is trouble free					
23.2	Repayment is comfortable with adequate return from dairy production					
23.3	Project supported package of financial services received					
23.4	Project provisions of machinery / equipment/ Utensil etc., are used frequently					
23.5	Milk production and dairy income significantly increased with project intervention					
23.6	Milk quality (%Fat, Lactometer reading) improved with project intervention					

23.7	Present average calving interval in cows is 12 months					
23.8	Contents of training programs useful to improve dairy farming					
23.9	Trainers are good and dialogues are easy to understand					
23.10	Training introduced new technologies by the project					
23.11	New technologies user-friendly and easy to adopt					
23.12	Vet service for breeding and health purposes in the area is appreciable					
23.13	Milk sale money is timely paid and no delay					
23.14	Promoter company support in input supply is appreciable					
23.15	Dairy feeds and mineral are easily accessible					
23.16	Good dairy animals are available for purchase					
23.18	Project is helpful in organizing milk sale.					
23.19	SAPP inputs received are useful					
23.20	Monthly income increased by minimum of 20% due to increase in milk volume as a result of project support					

23.21	Overall project interventions are useful in improving dairy business					
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24. Decision making power for women and men in the household

Sr No	Question	Male	Female
24.1	Head of HH		
24.2	Person receiving and utilizing income		
24.3	Person participating in project meetings, trainings etc.		
24.4	Whether participate in Person making HH decisions on financial management (Yes / No) tick		

25. Assets ownership (Personal observation by Enumerator)

<b>25.1.Land Ownership of the dwelling (Please v tick)</b>		<b>v</b>
Owned by Household Member (Deed)		
Rent/Lease Government Owned	Urban Development Authority	
	Municipal Council/ Provincial Council	
	National Housing Development Authority	
	State Permit	
Rent/Lease Privately Owned		
Undivided Land		
Temple Permits		
Estate Land		
Occupied Free of Rent		
Encroachment		
Other (Please Specify)		
Area of the Land - Farm Land (Acres)		
Other Land (Home Garden, Bare Land, etc.)		
<b>25.2.House Ownership</b>		
Owned by Household Member (Deed)		

Rent/Lease Government Owned	Urban Development Authority	
	Municipal Council/ Provincial Council	
	National Housing Development Authority	
	State Permit	
Rent/Lease Privately Owned		
Owned by the Estate manager		
Occupied Free of Rent (Relatives' or Friend's House, etc.)		
Other (Please Specify)		
<b>25.3. Insurance status</b>		
Life Insurance		
Vehicle Insurance		
Machinery Insurance		
Agriculture Insurance		
Livestock Insurance		
Other (Please Specify)		
<b>25.4.Type of vehicles owned</b>	<b>Number of units</b>	<b>Purpose of the vehicle *</b>
Bicycle		
Bike		
Three-wheeler		
Truck/ Lorry		
Car		
Van		
Tractor		
Other (Please Specify)		

**\*a. Home personal use, b. for hiring, c. to transport own goods, d. Agriculture purposes**

## 25.5. Housing and Infrastructural Facilities

Condition of beneficiary house (Tick appropriate)							
Roofing	Tick	Floor	Tick	Walls	Tick	No of Bed	Tick
Cadjan		Earth/sand		Plank/Metal sheet		One	
Straw		Mud/wattle & daub		Mud/earth		Two	
Cardboard		Cow dung		Cadjan		Three	
Metal sheets		Wood		Rough wood/planks		Four	
Aluminum Sheets		Brick/cement		Pressed soil blocks		Five	
Concrete		Ceramic tiles		Cement block/stone		Six and above	
Asbestos		Terrazzo		Brick plastered			
Roof tile		Carpets		Brick without plaster			
Roof wood		Cement paved		Other (Specify)			
Other (Specify)		Other					

25.6.Principle Source of Drinking Water Supply	Tick	25.12.Sanitation	Tick
Protected well		No proper facility	
Unprotected well		Latrine with Open Pit	
Rainwater collection		Improved Closed Pit Latrine	
Pond, River or Stream		Squatting Pan Toilets	
Tanker, Bowser, Tractor		Commode Facilities	
Tube Well		<b>Location of the Latrine</b>	
Tap born		Inside the House Premises	
Public Tap		In the Yard	
Other (Please Specify)		Other (Please Specify)	

<b>25.7.Quality of Drinking Water Supply</b>		<b>25.13.Principal Source of Cooking Fuel</b>	
Drinkable as it is		Firewood	
Drinkable after boiling		Saw/Dust/Paddy Husk	
Drinkable after filtering		Charcoal	
Drinkable after boiling and filtering		Kerosene	
Not suitable for drinking		LP Gas	
<b>25.8.Principal Source of Lighting</b>	<b>Tick</b>	Bio Gas	
Electricity – National Grid		Coal/Lignite	
Kerosene		Electricity	
Solar Power		Other (Please Specify)	
Bio Gas		<b>25.14.Entertainment devices</b>	<b>Tick</b>
Other (Please Specify)		Radio	
<b>25.9.Source of Solid Waste Disposal</b>	<b>Tick</b>	Television	
Sold to transporters		<b>25.15.Communication</b>	
Divert to fodder/crop lands		Fixed Line Telephone	
Dispose dumping within Premises		Mobile Telephone	
Composting Solid Waste		Fax Fixed Line	
Other (Please Specify)			
<b>25.10. Cultivation Tools Used (Multiple Answer)</b>			
Collected by Local Authorities			
Mamoty / Hand Spade		<b>25.16.Other Household Facilities</b>	<b>Tick</b>
Animal drawn plough	<b>Tick</b>	Refrigerator	
Tractor drawn plough		Rice Cooker	
Power tiller		Oven/ Microwave Refrigerator	
Weeders		Iron	

Harvester		Fan	
Other (Please specify)		Air conditioner	
<b>25.11. Status of accessing facilities</b>		Desktop/ Laptop Computer	
Good road networks to transport? Tractor drawn plough	<b>Tick</b>	Printer / Scanner	
place for training facility			
Availability of rice processing and storage facilities			
Availability of Agrarian authority managed Irrigation Facilities			
Availability of nearby Schools			
Availability of nearby Health Care Facilities			
Access to Facilities			
Internet connection facility? (Nanasala, Communication Centers)			
Evacuation Points in case of emergency (Natural Disaster)			

26. Shed condition (Personal observation by Enumerator)

Item	Response	Remarks
Floor is concrete / cement made, well drain, free of potholes (Yes / No)		
Animals have adequate space, not congested Yes / No		
Drinking water freely available, clean Yes / No		
Ventilation inside the shed is in good condition		
Floor is free of dung / urine not accumulated disposed proper manner Yes / No		
Milking machine is in use and maintain properly Yes / No		
Grass chopper is in use and maintain properly Yes / No		

27. Financial support for dairy activities

<b>Main source of financial resources for dairy activities</b>	<b>(Rate 1 – 3 based on priority)</b>	
Personal (own deposits and funds)		
Borrowing from Relatives and friends		
Monthly saving		
Loans		
Other (Specify)		
Have you received a concessionary loan from SAPP? (Yes/ No)		
<b>If Yes, Please provide the following details</b>		
Name of Bank		
What is the branch ?		
Date of loan received	Month	Year
Name of Bank		
Total Loan amount - Rs.		
Loan repayment period (no of months)		
What is the average value of loan installment?		
Is the installment mentioned above including a contribution to your savings ?		
If yes, what is the monthly amount set aside for savings from the installment?		
Have you fully settled the above loan? (Yes / No)		
If No, what is the outstanding loan amount?		
If NO, What is the count of overdue installments?		
Do you face difficulties in settling the loan taken? (Yes / No)	Yes/ No	
if yes what are reasons ?		
Has this project enhanced your understanding of the services provided by banks and the connection you have with them?	Yes/ No	

On a scale of 1 to 5, where 1 is "Very Dissatisfied" and 5 is "Very Satisfied," how would you rate the satisfaction with the services provided by the financial service provider/Bank?

**28.State the financial source for procuring (Please tick appropriate)**

Description of the investment	Mode of finance				Remarks
	SAPP grant	SAPP loan	Promoter support	Own finance	
Fodder cultivation					
Water pump					
Water tank with stand					
Bush cutter					
Grass chopper					
Milking cans					
Milking machine					
Cattle shed					

**29. Labour Usage - Dairy activities**

Type of workers	Male	No. hrs./d	Female	No. of hrs./d
Family members Unpaid				
Hired workers				
Honored labour				

**30. Cost of production (CoP)**

Activity	Monthly expenditure
Transport cost	
Electricity	
Labour (hired)	
Fodder	
Fuel	
Concentrate feed and minerals	

Breeding (AI cost)	
Medicine	
Other, (Please Specify)	

### 31. Record Maintaining

<b>Status of maintaining records</b>	<b>Yes</b>	<b>No</b>
Workers records		
Individual cow records		
Breeding/fertility/reproduction record		
Milk production records		
Milk sales records		
Animal Sales Records		
Recurrent expenditure		