Sub-Project:

Impact study on the socio-economic development of the microenterprises through environment friendly dairy farm

"Sustainable Enterprise Project (SEP)"

Impact Study

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Study Conducted By

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Acronyms:

IDF- Integrated Development Foundation
SEP- Sustainable Enterprise Project
PKSF- Palli Karma-Sahayak Foundation
ME- Micro- Enterprise
WQ- water quality
GoB-Government of Bangladesh
HES- Health and Environmental Safety
WHO- World Health Organization
DLS- Department of Livestock Services
BRAC- Bangladesh Rural Advancement Committee
BBS- Bangladesh Bureau of Statistics
NGO- Non-Government Organization
RDRS- Rangpur-Dinajpur Rural Service
TK- Taka (Bangladeshi currency)
ASA-Association for Social Advancement
YTC- Youth Training Center
ICT- Information and Communications Technology
CLSP- Community Livestock Service Provider
ToR- Terms of Reference
MoU- Memorandum of Understanding
SAS- Statistical Analytical Software
SEM- Standard Error of Mean
SE- Standard Error
Min- Minimum
Max- Maximum
AI- Artificial Insemination
GHG- Green House Gas
MOET= Multiple Ovulation and Embryo Transplantation

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and acknowledge the great inputs from the selected of the microenterprise (ME) households of Sustainable Enterprise Project (SEP) project implemented by Integrated Development Foundation (IDF) at the different upazila of Chattogram district. Besides, I am very much thankful to the PKSF for providing valuable feedback and instructions to finalize the impact study questionnaire for conducting the survey. Many thanks to Mr. Shah Alam, Co-focal and Zonal Manger; Ms. Nazmun Nahar, Documentation & Monitoring Officer; Project Manager; Mr. Sahazul Islam, Environment Officer; Mr. Iftaker Uddin Ahmed, of SEP of IDF part and his team members for their prompt communication and sharing the required information to make the study successful.

Finally, I acknowledge the contribution of Executive Director of IDF for selecting me a consultant for the impact study survey of the project, without his cooperation and valuable support the study could not be conducted. My heartfelt thanks go out to everyone who helped us directly or indirectly to complete this study.

The Author

Executive Summary

The study was conducted in the different unions of the 03 upazilas of the Chattogram district of Bangladesh from July to September 2023, implemented Sustainable Enterprise (SEP) project by Integrated Development Foundation (IDF) to understand the impact on the socio-economic development of the micro-entrepreneurs (MEs) through environmentally friendly dairy farm. A survey tool was developed by considering five modules including on the dairy farm and milk production and marketing scenarios. A total of 101 farm households (microentrepreneur, MEs (project beneficiary group, those who received benefit from SEP project of IDF), has covered in this impact study, the beneficiary's information was compared with the 96 non-beneficiaries (those were selected by IDF of baseline data). For impact study a random sampling method was used for collecting the data. The collected data consists of both the qualitative and quantitative and was analyzed using SAS, (2008) and Microsoft excel (2020) software.

Average number of surveyed households were ranging from 4.39 to 4.64 for the baseline and beneficiary groups and no significant differences were observed. The highest percentage (27 to 32%) of people between the aged group 11 to 20 years and the lowest percentage was above 60 years. It's noticed that the workable people's percentage (from 21 to 50 years old) was higher than other non-workable groups. The highest percentage (47 to 48.02%) of peoples has the educational level from 0 to 5 classes followed by 6 to 8 classes (22 to 24%). The main occupation for the peoples was agriculture, livestock (dairy) farming, business, crop production, job, small traders, and rickshaw/van puller. As per the number of respondents, it was found that 54 to 63% people have semi-pakka house from both group and the number of pakka house has increased significantly. Most of the peoples in both groups use septic tank/ slab latrine and no one use the hanging latrine and the open place/bush. It was also observed that only 2.97 to 3.06 % of respondents of uses rainwater as drinking water. About 60 to 67% people from both group drink water without applying any purifying method. However, the use of water filter has increased significantly. Very few numbers of people used solar (8.33 vs, 13.20% baseline vs, beneficiary) and biogas. The yearly average net income per household of beneficiary group was higher (BDT 6,125) than the baseline group (BDT 4,483), and more percentage of people's income coming from livestock (dairy) rearing, job, business, and crop production.

In the studied area the available genotype of cattle are mainly Holstein and Holstein crossbred due to its per capita higher milk yield. A total number of cattle per household varies from 5.62 to 7.40. About 46-92% household have improved dairy shed with well ventilation and the changes was more than 100%. Farmers clean their shed regularly with disinfectant, and mostly their animal shed was semi-pakka. The beneficiary farmers reared their cattle under intensive rearing system. Most of the farmer's dairy farm has electricity connection and less than 50% people under both groups checked their electricity connection regularly. Comparatively lower percentage of people used less cost light, fan, and transparent and heat tolerance material in their animal shed. The greater number of people of beneficiary group was responding that they fed roughage and concentrate feed to their cattle. For roughages mainly straw, green grass and few numbers of people fed green straw to their cattle. Some farmers also fed locally available grasses. Generally, cattle are grazed in grazing land 4.75±1.22 h for baseline and 5.33±0.71 h for beneficiary group, respectively. There were 66.07 to 91.14% farmers from both groups follow the regular vaccination and deworming schedule, to their animals. The beneficiary group farmers cultivated high yielding variety fodder and the numbers of fodder cultivation farmers has increases about 497%. The daily average milk yield for cows of baseline farmers was 9.63± 0.273 liter and for beneficiary group was 14.07± 0.254 liter. The highest lactation yield of cows was observed in beneficiary group (2996.89 ± 65.81 liter) than the baseline group (2189.20 ± 63.679 liter). Most of the respondent said that they checked their cows on routinely. Usually, farmers from both groups clean their cow before milking. They also clean the milking places and miller's hand after milking. The people from both groups preserved their cow's milk in a pot and they don't use any preservatives and foreign materials in the milk and farmers thrown spoilage milk. About 50% people sell their milk in the market and 50% sale their milk to the goala/ middleman at the farm gate. More than 83.33% farmers respondents said that they don't produce milk products only a few numbers produced dahi (yoghurt). Farmers used artificial insemination for their cows instead of natural service. The sources of frozen semen were BRAC (41.40%), DLS (41.75%) and milk vita (3.88%), respectively. When they use BRAC semen their service cost was higher up to 1000 Taka.

Only 33% of the respondent people from baseline and 75.47% from beneficiary groups people received training on feeder cultivation, rearing of cows, beef fattening, disease prevention, vaccination, vermi-composting, and environment. The training agencies was IDF and DLS, BRAC, YTC, ASA and RDRS and the duration of the training were ranging from 01 to 07 days. Among the agencies IDF has given more training to their members. In addition, a few numbers of people got training on preliminary treatments of animals. About 50% of the farmers from baseline group and 32.65% from beneficiary group farmers said that they are not able to apply their training knowledge to their farms.

About 50% of the farmers from baseline and 76.24% from beneficiary group farmers rearing their cattle under the separate shed. About 50% of the respondents said that their cattle encounter the wild animals/birds and children. Farmers separated their sick animals from healthy one and the vaccinated them. When their animal died from any diseases, most of the people of both groups buried it. From both group most of the people said that there is a health risk if they do not wash their hands after touching animals and before preparing or eating food. For the washing of hands, about 50 to 83.74% people used soap with water, and very few numbers of people used water and ash for washing their hands. However, the health safety issues for workers and animals has increased positively. More than 50% people among the respondents from both groups said that they have arranged for personal protection equipment (PPE) for their workers on their farm. Furthermore, IDF through SEP project have also facilitated for more farmers using PPE.

About 97% of the respondents of baseline group and 87.13% of beneficiary group peoples said that natural disaster happened due to the change of climates in their areas. Furthermore, about 89.19% of the respondents from the baseline and 76.14% of the beneficiary group people said the milk yield of cows were fluctuated with the fluctuation of ambient temperature.

As per the respondents, of the baseline group farmers, only 3.39% have a generator in their dairy farm and from the beneficiary farmers, 22.77% farmers have generator in their farm. Nearby 64.81% and 59.68% of baseline and beneficiary group farms do not have a separate arrangement to separate manure and urine in their dairy shed. About 29.73% peoples of the baseline and 42.37% from the beneficiary group uses cowdung as a fuel.

Among the respondents, 84 to 95% people from both groups buy their animals, mainly once a year and they buy animals from local market and small traders, Bepari/Faria and wholesale market. The people of buy their animal feed from the local market and wholesale market. The higher percentage of the beneficiary group people sells their animals to the Bepari/Faria, small traders, whereas the highest percentage of baseline group farmers sell their animals to the small traders. Among the constraints of selling the animals most of the respondents' people said that low price, distance of markets, Bapari/Faria interference and transportation. The people sell the raw milk, and the milk price depends on volume only and the average price per kg milk is Taka 57.74. There is a milk processing plant (Milk-Vita) at the studied area and the IDF also have a milk chilling plant. About 50% people respondents from both groups said that they knew the name of the milk processing technique, which is pasteurization of milk.

IDF also developed some farmers by providing soft loans, training, and other logistic supports as a business venture for perineal fodders (Napier and German grasses), milk products producers, vermi composting and biogas producers. They are running this business in a profitable manner.

The IDF provided soft loan and grant for ecofriendly dairying and among the respondents about 94% (95 out of 101) people from the beneficiary group taken loans from the IDF and average loan was BDT 216494.8±17953.57 per household and remaining people taken loan from the bank, other NGOs, and relatives. For disbursing loan and grants from IDF people have not suffered anything. Mostly it was seen that both the woman and men take care for their animals and do take active participation with all the related activities. The physical activities of the project were: non- revenue generating activities; initiatives to increase Eco-labeling and access to premium market; capacity building at office; and capacity development of MEs. Most of the studied parameters shown its positive values and it can be found that the implemented project has the positive impact.

Key words: Activities, establishment, livelihood, impact, and project.

1. Introduction and Project Background

In Bangladesh, dairy production characterized by small-scale operations, integrated with crops farming and other off-farm activities. Dairying is considered as a major source of nutrition, poverty alleviation, employment generation, women empowerment and food and nutrition improvement of the people. And people are mostly interested in Holstein genetics for commercialization as Holstein cows' produces more milk than other genotypes, usually a cow produces 10 to 35 liter milk per day (Khan et al. 2012; Chando et al., 2021; Das et al. 2022) and this genotype dominated the country's milk production in Bangladesh.

For sustainable and continuous production of milk and calves, to express the full genetic potential of a cow, adequate environment should be maintained by providing proper housing, balance and proper feeding, and routine vaccination against the common infectious diseases (and maintain the routine and regular deworming program (Khan, 2020). The house should keep free from any dirt and clean it regularly. The ration of the cow should contain both roughage and concentrate. In the ration the roughage and concentrate ratio should maintain at least 3:1 on a dry matter (DM) basis. In the roughage, feed staff should include both straw and green grasses (Khan, 2020). If possible, the cows should allow for 4 to 6 hours grazing in grazing land, which promote the cow to be normal and healthy; in addition, the cow does not need any extra exercise. If the cow is in a stall-feeding condition, they should maintain the proper balance ration and nowadays people are using total mixed ration (TMR). Without the cultivation of high yielding variety (HYV) fodders (for example, perennial: Napier (*Pennisetum purpureum*), Para (*Brachiaria mutica*), German (*Echinochloa polystachya*), Ruzi (*Brachiaria ruziziensis),* Stylo *(Stylosanthes guianensis*); seasonal: maize (*Zea mays*), cowpea (*Vigna unguiculata*), Shorgam (*Sorghum vulgaris*), Oat (*Avena sativa*) the farmers are not able to supply continuous green grasses for their cows and the scarcity of green grasses will remain throughout Bangladesh. If the farmers could cultivate the HYV fodders after feeding their cows, the excess fodders they can preserve as silage and hay for the lean season for supplying green grasses throughout the year. However, adequate training with proper guidelines is essential for fodder cultivation and feeding of cows. Nowadays, mechanistic system is replacing the traditional backyard system and it's found that it is profitable. However, on farm mechanization and associated research is required at university and research organization level.

In addition, the improve genetics produce more milk with fewer cows, reducing the amount of greenhouse gas (GHG) emission per kg of milk. Artificial Insemination (AI) allows the farmers to breed bulls and cows with superior genes to increase milk production in a safe environment. IN addition to AI other reproductive technique such as multiple ovulation and embryo transfer (MOET) can also plays role to increase the superior genetics. Dairy cows can utilize byproducts of different industries or farms as mix feed. Cows can be eating byproducts that humans cannot eaten, such as citrus pulp, almond hulls, and more, that reduces our food waste going into landfills. These byproducts are also beneficial to the cows, providing their needed energy for milk production. Furthermore, dairy farming can also contribute to the crop production that is the manure itself is also used as a natural fertilizer for crop production. This nourishes the soil health. Dairy farmers have taken advantage of modern technology to create a more sustainable system. Farmers may install solar panels to create energy for the farm. Using naturally found resources like the sun, wind and–especially on a dairy farm–manure, farmers can help power lights, milkers, fans and more. Some of that power may even be used in farmers' communities.

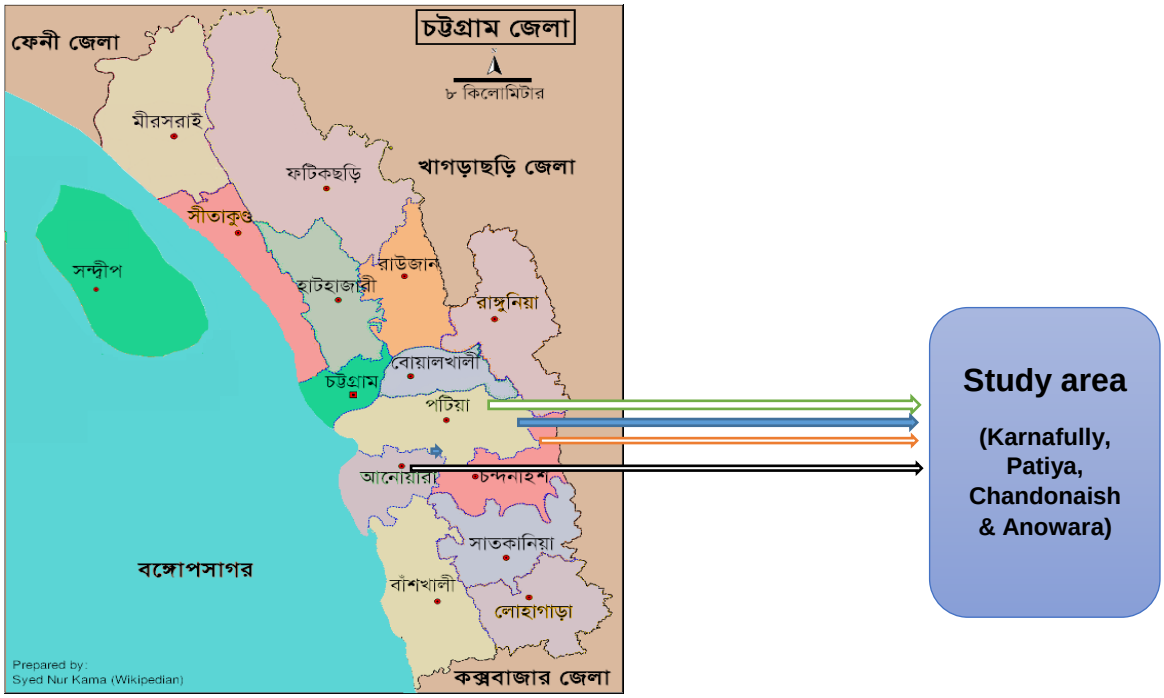
Sustainable Enterprise Project (SEP) project is jointly financed by Palli Karma-Sahayak Foundation (PKSF) and World Bank. The objective of the SEP is to increase the adoption of environmentally sustainable practices by targeting the microenterprises (ME) of dairy farmers. SEP has selected 30 lead districts as the project working area to demonstrate the project impact on different sub-sectors. The project prioritizes a selected number of polluting microenterprise business clusters and supports the expansion of innovative economic activities conducive to a more sustainable environment.

Integrated Development Foundation (IDF) has been implemented this sub-project in Patiya, Anowara, Chandanasih upazilla under the Chattogram district of Bangladesh. This sub-project was conducted for 03 years from June 2020 to June 2023. This sub-project supported to the MEs to achieve global goals of the main SEP project. This sub-project activity was implemented in the business clusters of dairy farm sub-sector to improve the overall business and the environment of the MEs.

The IDF has initiated a study through a consultant to investigate the impact of the business, financial, and environmental conditions on microenterprises, entrepreneurs, and their ventures in the dairy sector. The project was supported by a baseline of data, which allowed us to evaluate the program impact and compare what transpired before and after its implementation. The impact study assesses whether a program improved outcomes for its participants/ beneficiary's. Furthermore, the study builds an understanding of whether a program unambiguously improved the outcomes that it intended to improve. Therefore, the impact study was undertaken with the following purposes and objectives.

2. Project implementation locations

The study was conducted in the different unions under the 04 upazila (Karnofully, Patiya, Chandanaish and Anowara) of Chattogram district of Bangladesh from July 2023 to September 2023.



3. Purpose of study

The impact study assesses was conducted with a view whether the IDF supported project builds an understanding of improved the outcomes that it intended to improve.

The following objectives were considered under the purpose of the study

4. Objectives of the Impact Study

The impact study was conducted with a view to obtaining a snapshot assessment of the improvements in the business, economic, environmental, and climatic conditions of the dairy microentrepreneurs who participated in the project activities so that the changes related to the project interventions and their progress could be evaluated.

The following are the specific objective of the SEP project

- To increase adoption of environment friendly dairy production practices and safe milk production.
- To improvement of dairy waste management at cluster.
- To reduction in mortality and morbidity of farm animals.
- To awareness raising on environmental promotion at dairy production, processing and marketing clusters.

Overall objective:

To undertake the extent to which the project has achieved its objectives at the end of the project.

Specific objectives:

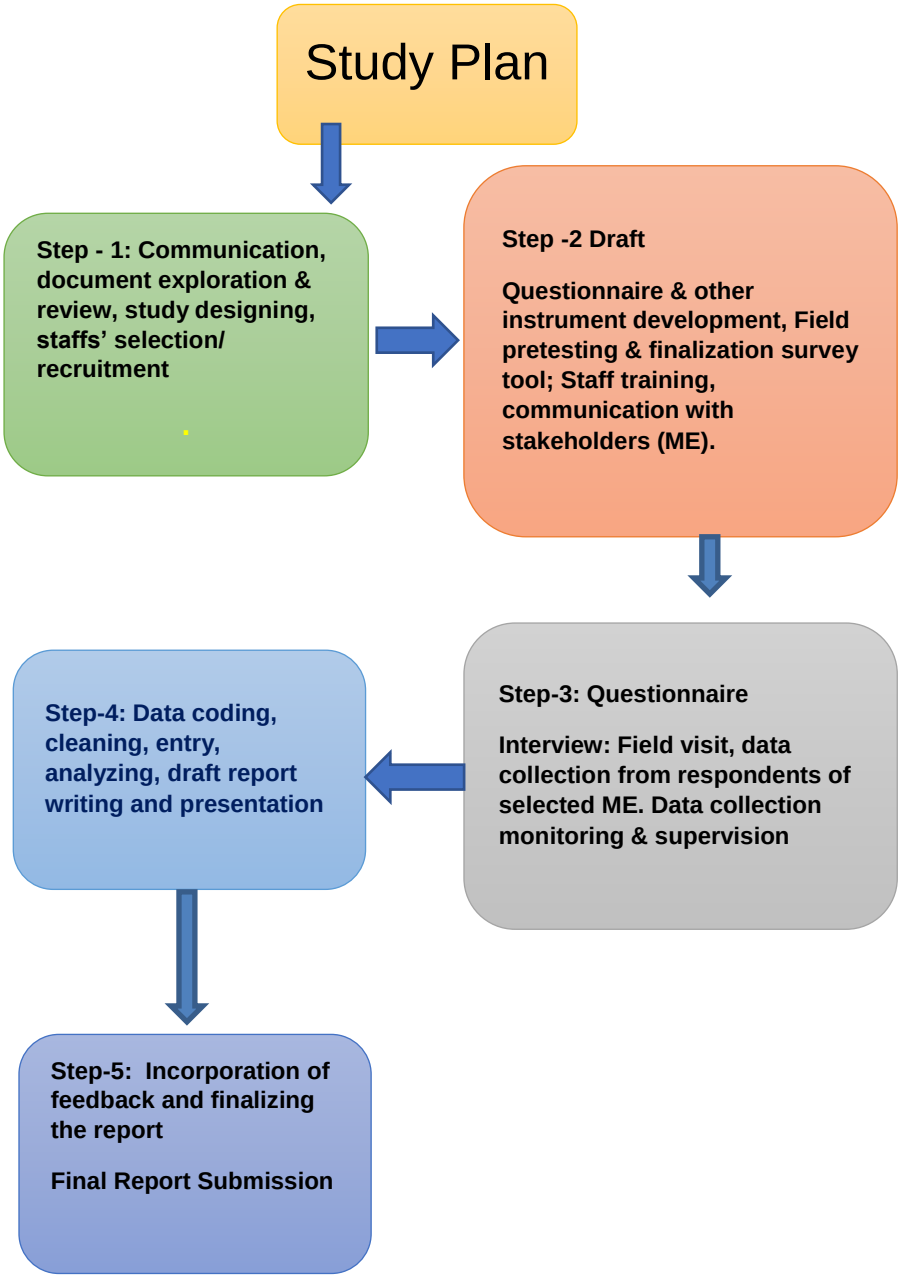
- ❖ To measure the results level changes.
- ❖ To evaluate the social, economic, and environmental impact due to sub-project interventions.
- ❖ To assess the level of satisfaction of various categories of project participants with services provided by the project.
- ❖ To assess the anticipated changes due to capacity development supports like, certification, training, branding, and marketing, etc.
- ❖ To draw lessons learned and good practices for replication and provide recommendations for continued project interventions and scaling it up.

5. a) Scope of Work for the Study:

The study team developed a detailed activity plan for the study according to the ToR. The study entails following scope of assignment:

- Review of the secondary data/relevant literature and project document available.
- Develop methodology including study plan and key questions to be answered.
- Development of data collection tools which contains questions related to the socio-economic aspects and relevant adaptive environmentally sustainable indicators like, air, soil, water quality, health, and environmental safety issues (HES), waste management and climatic problems of the project and finalize the tools in consultation with IDF and PKSF (instruments to assess the current scenario).
- Pre-testing of the research tools in one or two communities and adaption and re-appropriation of the tools.
- Training of the enumerators / data collectors.
- Fieldwork for data collection.
- Collect, clean data and preparation it for analysis.
- Share data analysis plan with IDF and PKSF.
- Data punching in Microsoft Excel and analysis of data using widely recognized statistical software like, SAS (2008) and Microsoft Excel (2020).
- Analyze data and present it to the project team before preparing the draft report.
- Develop Table of Contents (ToC) for approval and prepare a first draft of the report and presentation of the draft for feedback
- Incorporate feedbacks and finalize the report.

5. b) Study Design:



Detail Work Plan:

Indicative time frame (180 days upon signing of contract)

SL #	Activity	Time duration	Date of completion	Remarks
1	Contract signing	-	-	Depends on IDF authority
2	Survey tools development, literature compilation and desk review	7 days	07/07/2023	
3	Household interview/survey in the targeted stakeholder	8 days	15/07/2023	
4	Focus group discussion	5 days	20/07/2023	
5	Interview with key stakeholders	5 days	27/07/2023	-
6	Data collection by household interviewing	5 days	30/07/2023	
7	Data entry, cleaning and analysis	11 days	10/08/2023	-
8	Submission of draft report	10 days	25/08/2023	-
9	Incorporation of feedback and finalizing of draft	5 days	30/08/2023	
10	Final Report Submission	-	27/11/2023	-

6. Methodology

A total of 101 households from a numerous number of unions like Shikolbaha, Boro Uthan, Char Lakkha, Char Patharghata, Julda, Kachuri, Kasiasi, Kusumpura, Kolagaon, Kharana, Jangalukhain, Jiri, Dakhinbhurshi, Dalghat, Baralia, Batikhan, Sobhandandi, Habilah Dwip, Kelishahar, Haidgaon, Chahara of Kornuphully and Patiya upazila; Bairag, Barshot, Raypur, Battali, Borumchora, Barkhain, Anowara, Chatori, Poroikora, Haidhor, Juidondi of Anowara upazilla of Chattogram district was surveyed from July to September 2023. The study team collected data from the above selected locations which covered the project area.

Both desk reviews of existing literature of the project and collects the primary data from the project sites to understand the current situation on socio-economic development of the micro enterprises (MEs) of the environmentally friendly dairy farm. The survey questionnaire contained questions under 5 modules on dairy farms. In module 1, (i) demographic and socio-economic information, (ii) living condition, safe water, sanitary and fuel, land ownership and operation, income and expenditure of the family; In module 2 (status of animal production, processing and marketing), livestock statistics, rearing of animals, feeds and fodder for dairy cattle, availability of feeds and fodder for animals throughout the year, milk production characteristics of different breeds, measurements taken before and after milking of the cows, handing of cow's milk, breeding related information; In module 3, training, extension and other related activities in livestock rearing (training on livestock and farmers opinion on the livestock technology training courses); In module 4, environmental factors in dairy sub-sector (animal environment and social safety, health safety issues of workers in the animal farm, climatic factors, air, water and sound pollution; In module 5, (opportunities for livestock entrepreneurs and value chain development (marketing and value chain (livestock farming))) on dairy farm and milk production; sources of investment of livestock; credit facilities and women's participation on dairying. At the same time consultation meeting held by project team members of IDF to understand the specific needs of project management as well as donor to develop survey tools (survey questionnaire). The project documents reviewed as a source of secondary information and other available secondary data reviewed along with a briefing with project personnel. In this survey mixed method was used both for qualitative and quantitative method followed includes the following-

- MEs Household Survey: 101
- Baseline Survey: 96

6.1. Sample Design:

A random sampling approach was undertaken in the selection of impact study samples. The number of participants in a study was adequate, to be able to determine any important differences (outcome measures) of the study groups.

The research team consulted together with the IDF team repeatedly to analyze the scenario virtually to come into a precise decision about sample design and sample size. Regarding sample size, the research team consulted with representatives of the IDF and PKSF for defining the number. Therefore, concentration has been given to collect the necessary and relevant qualitative and quantitative primary information/data from the targeted stakeholders.

6.2. Sample Size:

A total of 101 ME (project beneficiary group, those who received benefits from the SEP project through IDF) during this impact study have been covered. Previously 96 households' data (baseline information, those farmers were selected by IDF as project beneficiary's), was used for comparison the impact of the project.

6.3. Study Tool Development and Orientation:

Considering the following important points and target respondents, questionnaires were developed. To prepare the questionnaire, the following issues considered based on the study aims and objectives.

- Deciding what are the right questions to put in a questionnaire as the need of the study objectives.
- This survey questionnaire contains both open and close ended questions and drafted it by the consultative discussion meeting of 10 to 15 participants from Chattogram Veterinary and Animal Sciences University (CVASU) and sufficient thought and inputs were given to develop the questions that was incorporated in the first draft.
- After drafting the questionnaire there was field tested in several targeting geographical locations and very important adjustments were addressed and finalized the survey tool.
- This survey tool was shared with the project concern personnel of IDF and PKSF for comments and feedbacks. Their valuable comments were addressed, and the survey tool was finalized based on their feedback.
- Then the team submitted the developed final questionnaire to the IDF authority for final approval.
- The approved final questionnaires executed at field level study using ICT tool.
- The Key Informant Interview (KII) and in depth interview the same were shared with IDF authority for taking the final approval that was used for taking qualitative and quantitative data interview from MEs.

6.4. Quality Control Mechanism of Data Collection:

Appropriate follow-up mechanisms put in place to ensure that the data is collected, verified, and submitted according to the approved schedule. After data collection all filled questionnaires and field notes of Key Informant Interviews (KIIs) is registered through ICT service. The collected data were exported and processed for analysis into the computers under careful supervision. It ensured the quality data at all levels through following measures:

- Organized training as well as an orientation session for the data collectors on principles and method of data collection, including best possible quality data collection and taken measures to minimize non-sampling errors.
- Spot-check the field force of Data Collectors and recall them, if needed and checked that all filled questionnaires (100%) by the respective expert/consultant.
- In-built mechanisms in the checklist/schedules to cross-check consistency of the responses.
- Close supervision of the work of the data collectors.
- Random checks on the work of the data collectors.
- Edition of filled questionnaires every evening to find out the omissions, non-response, and irrelevant answers.

- Feedback from supervisors, monitoring & follow up as well as Project Manager (PM) and solution for bottlenecks, as and when arisen.

Picture A, B: Survey questionary development workshop; C, D: Training of data collector; and

E, F: Data collection by the data collectors

7.6. Statistical Analysis

The collected data were compiled and scrutinized in Microsoft Excel and the data was analyzed using SAS software (SAS, 2008) considering the effects of survey data. The mean differences in the quantitative variables were compared using ANOVA. Means showing significant differences ($P<0.05$) were separated by least significant difference (LSD) test ant 5% level of significance (Steel et al. 1997).

Picture E1, F1: Farmers are rearing Holstein genotype cows

Picture G: Green grass (Napier), H-L: The survey team leader visited eco-friendly dairy farms with project officers.

7. Results and Discussion

7.1. Module 1:

7.1.1. Section A: Socio-Economic and Demographic Information of Households

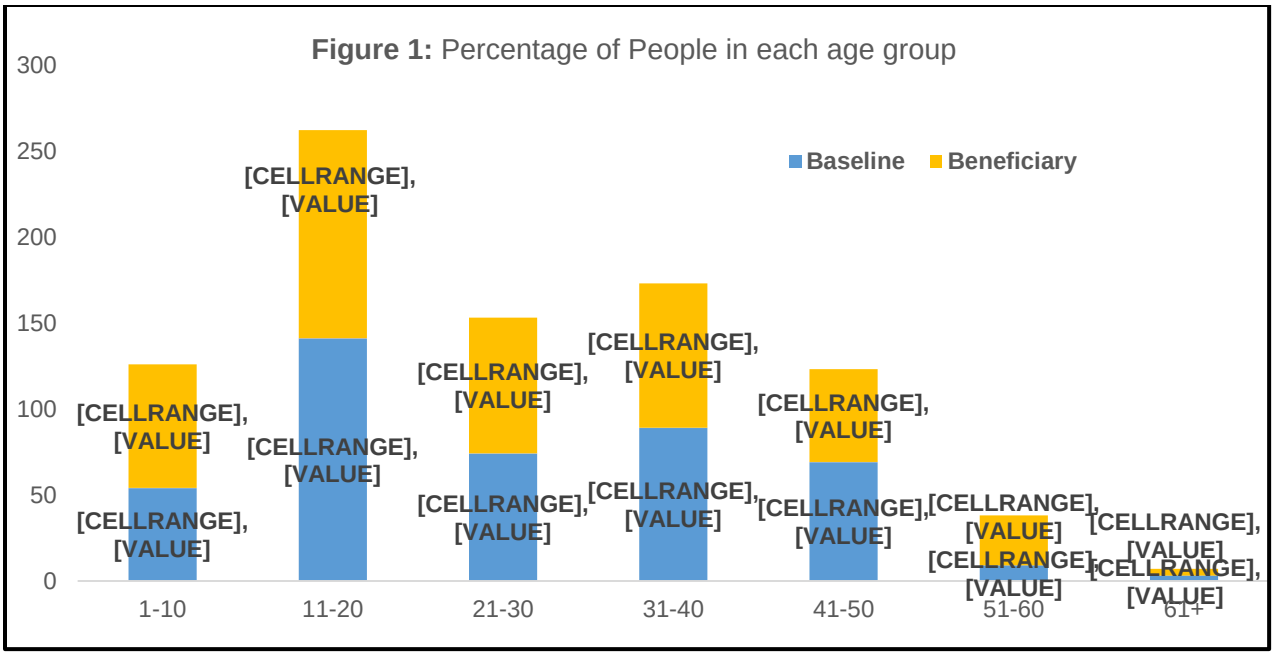
A total of 101 ME households (project beneficiaries) for impact study were interviewed. Previously surveyed 96 households' data (baseline information) was used to know the impact of the project. The population demography in the study area is presented in Table 1. Average no of households' ranges from 4.29 to 4.64 and no significant differences were observed between the baseline information and beneficiary groups households. Among the responded percentage, the male was higher than females in all the three groups and married percentage was also higher in the baseline (55%) than the beneficiary groups. The percentages of increased and decreased between gender and marital status was not significant.

Table 1: Population demography

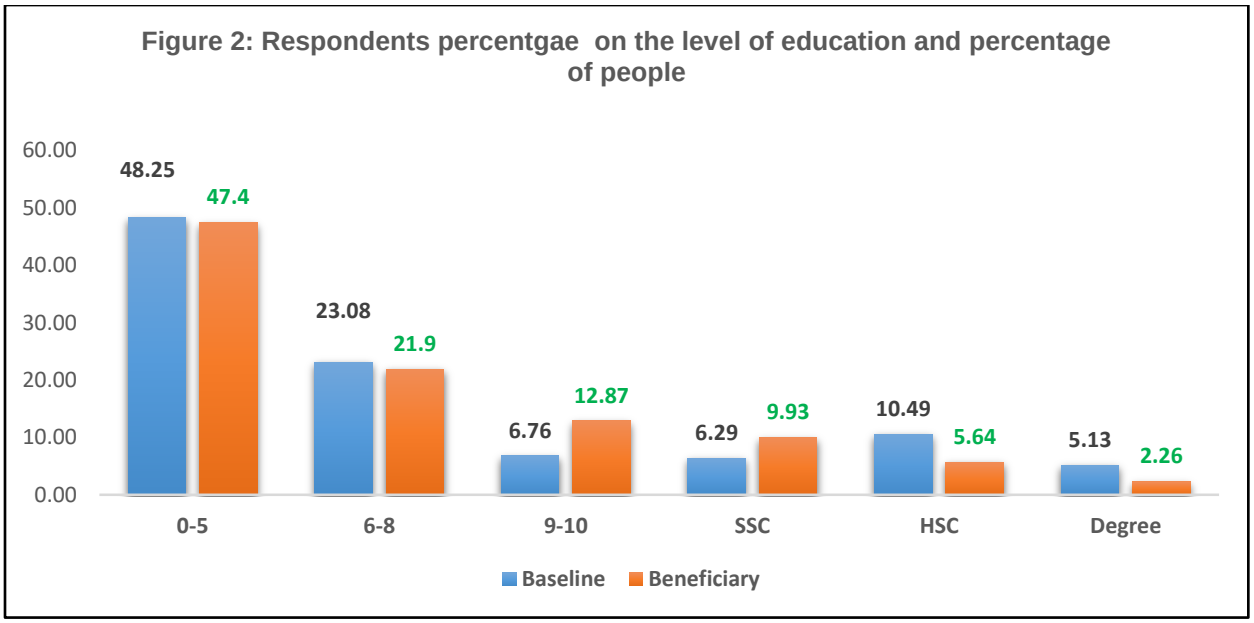
Traits	**Criteria**	**Baseline data**	**Beneficiary group**	**P-Value/ Changes after intervention (%)**
Average no of people/household	Number	4.64±0.109 (96)	4.39±0.103 (101)	(+) 0.24
Gender	Male (%)	57.88 (248)	55.30 (245)	(-) 4.46
	Female (%)	43.11 (188)	44.69 (198)	(+) 3.67
Marital status	Married (%)	45.64 (199)	47.40 (210)	(+) 3.86
	Unmarried (%)	54.36[b] (237)	52.14[a] (231)	(-) 4.08

Parenthesis indicates the number of respondents

The baseline information and beneficiary groups ages of the studied household are shown in Figure 1. Figure 1 showed that the highest percentage (32.12%) of people were among the aged group 11 to 20 years and the lowest percentage of people were aged above 60 years of age and age from 21 to 50 years of ages was more in number. That is more workable people ages 21-50 years of age) are available in the studied areas.



The percentages of people on the education level irrespective of sex for baseline data and beneficiaries of the studied households are presented in Figure 2. Figure 2 showed that the highest percentage (48.02%) of peoples have the education 0 to 5 classes followed by 6 to 8 classes (23.57%) and degree or more educated person's percentage was very low (4.85%). An d 9 to 12 classes, educated people are moderate percentage. Usually, up to 5 classes, student goes to government primary school, registered primary school, non-formal primary education, madrasah, kindergarten and other community school. Although the illiterate person's number was lower, and the gradually lower number of people was found with the increasing number of education level. This figure is like the other parts of Bangladesh (Saha and Biswas (2015) and Khan et al. (2020) and BES (2021).



The primary occupations of both groups of peoples are shown in the Figure 3. This Figure 3 indicated that the highest percentage of student among the respondents was found in both groups. On the other hand, the highest percentage of people was a housewife, service holder, rickshaw / van puller and livestock farmers and livestock cum agricultural farmers were seen higher % under the beneficiaries than the baseline data. The number of dairy farmers on the beneficiary group was higher than baseline and it's indicated that the project activities have positive impact. On the other hand, skilled labor, pretty traders, and farmer's percentage under baseline group was higher. No people were involved with poultry rearing, milk traders, butcher, and boatman.

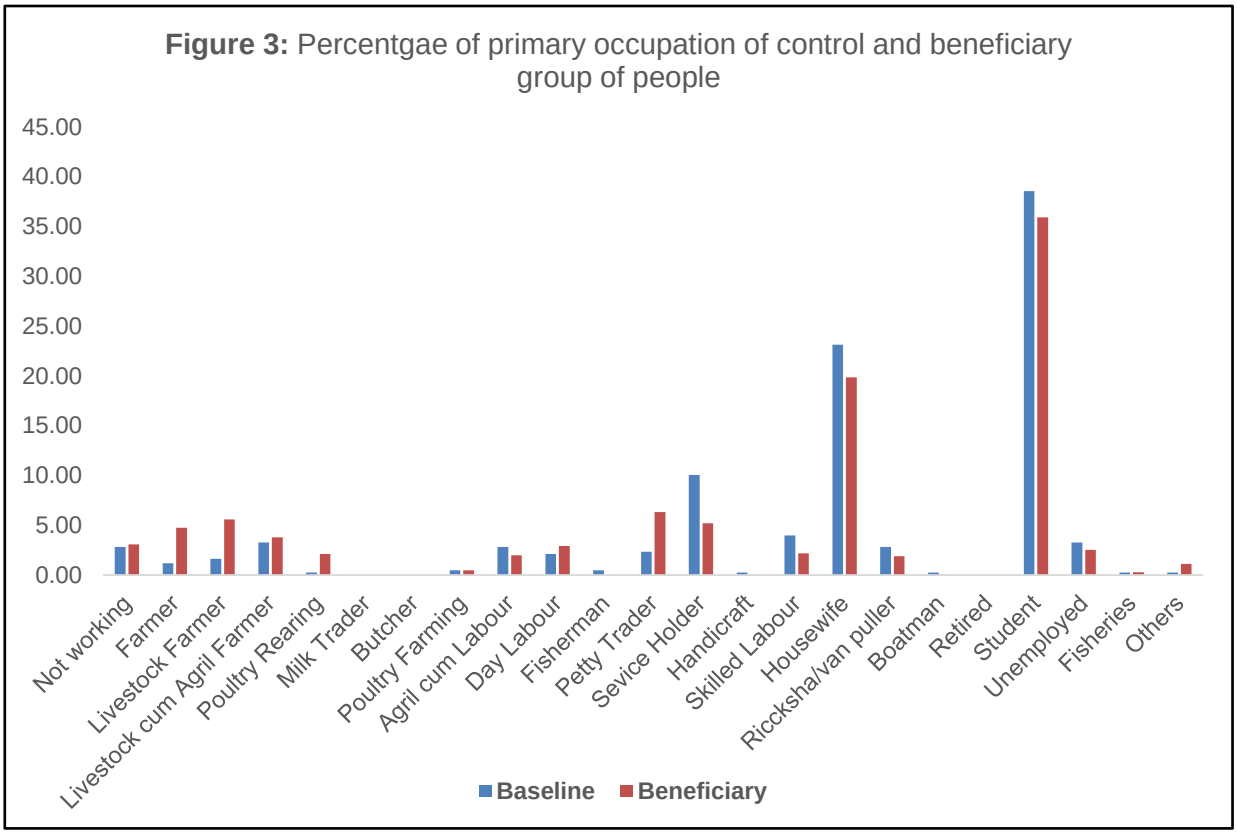


Figure 3: Percentgae of primary occupation of control and beneficiary group of people

The living condition, safe water use, sanitation, and fuel use by the people in studied areas and the changes after implementation of the project are presented in Table 2 and Figure No 4, 5 and 6, respectively. Table 2 indicated that all respondent people have their own house. The structure of the main dwelling house (recorded by observation) the beneficiary group households was better than the baseline data. As per the number of respondents, it was found that 63.27% people have semi-pakka house and changes was negative on the from baseline to beneficiary group but the pakka/ building households' percentages has increased 126.47%. In the case of sanitary facilities, it was observed that most of the peoples in both baseline and beneficiary group uses septic tank/ slab latrine and no people use the hanging latrine and the open place/bush, and this type of latrine used percentages has increased 2.05%. On the other hand, the use of pit latrine has decreased 50%. The source of fuel for cooking, the use of wood,

bamboo, tree leaves and biogas showed positive changes from the baseline data These figures indicated the positive impact of the project.

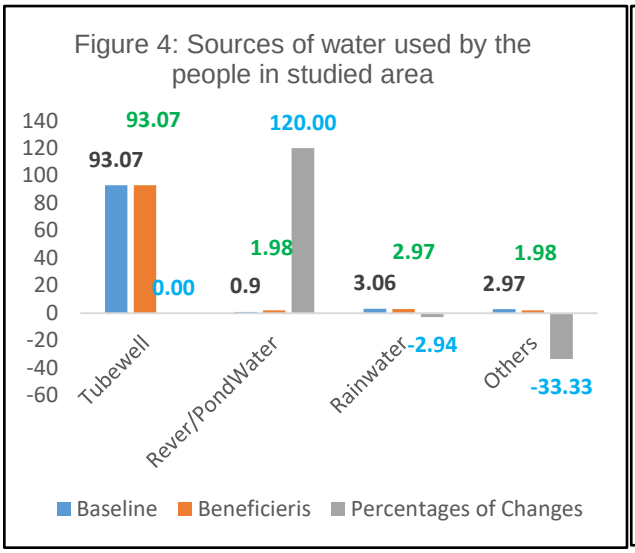
Table 2: Information about living condition, safe water, sanitation, and fuel use

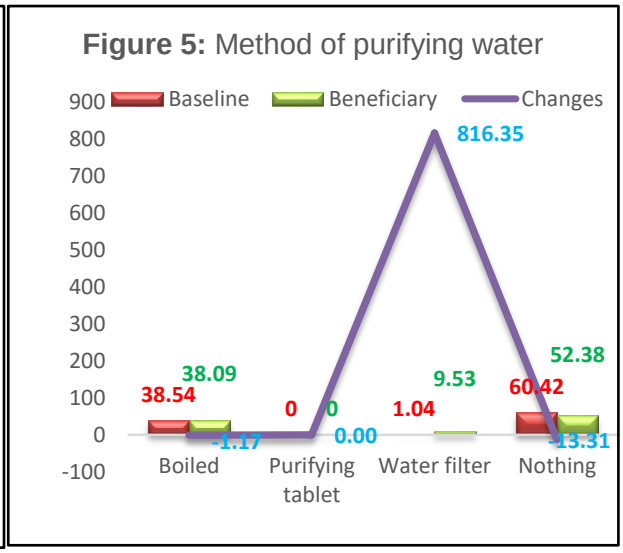
Questions	Response	Baseline	Beneficiary group	Changes after intervention
Ownership of House	Own	100 (96)	100 (101)	0.00
	Rented	0	0	0.00
Structure of main dwelling house (record by observation)	Thatched/straw	4.08 (4)	1.98 (2)	(-) 51.47
	Golpata	1.04 (1)	1.98 (2)	(+) 90.38
	Tin/CI Sheet	25.51 (25)	28.71 (29)	(+)12.54
	Semipakka	63.27 (62)	53.47 (54)	(-) 15.49
	Pakka/Building/Tile	6.12 (6)	13.86 (14)	(+) 126.47
Sanitation (latrine) Facilities	Septic tank/Slab latrine	95.05 (96)	97.03 (98)	(+) 2.08
	Pit latrine	3.96 (4)	1.98 (2)	(-) 50.00
	Hanging latrine	0.99 (1)	0.99 (1)	0.00
	Open place/bush	00	00	
Source of Fuel for Cooking (Multiple)	Wood	30.11 (36)	31.68 (32)	(+) 5.21
	Bamboo	10.22 (19)	11.88 (12)	(+) 16.24
	Jute stick	5.38 (10)	1.98 (2)	(-) 63.20
	Cow dung	4.84 (9)	5.94 (6)	(+) 22.73
	Tree leaves	2.69 (7)	3.94 (4)	(+) 46.47
	LP Gas	46.24 (86)	41.58 (47)	(-) 10.08
	Biogas	0.54 (1)	2.97 (3)	(+) 450.00
	Electricity	0.54 (1)	0.54 (1)	0.00

Parenthesis indicates the number of respondents

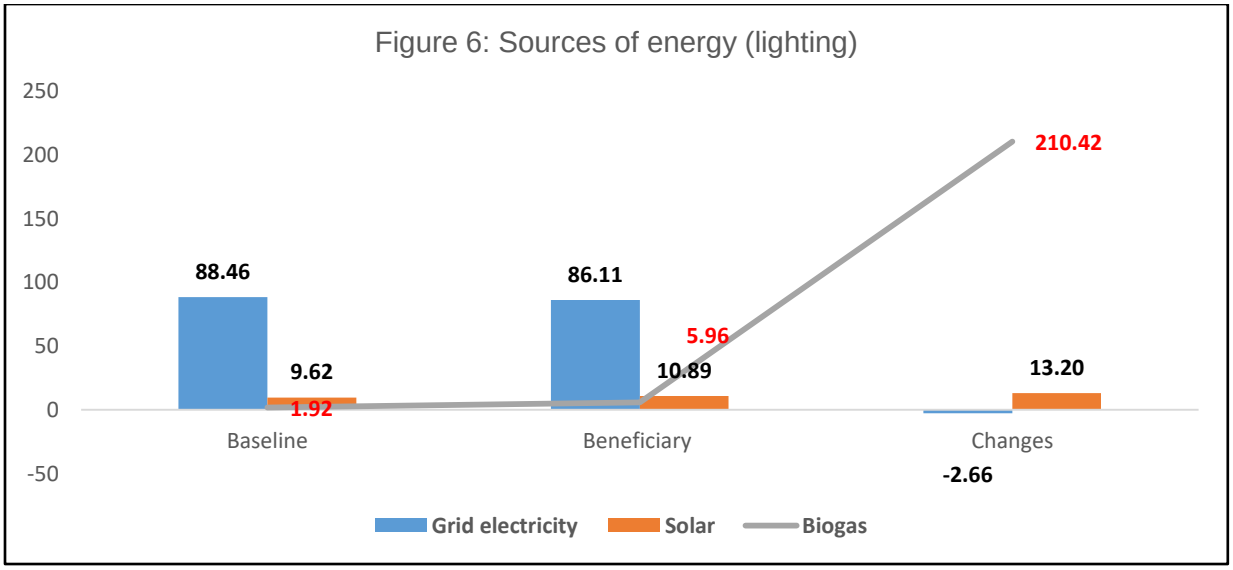
Most of the respondent people from both groups used water from a tube well as drinking water (Figure 4). It was also observed that only 3.06% baseline people which was higher than beneficiary people and the changes was negative (-2.94%). In case of the method of purifying the drinking water, most of the people (50 to 60%) from both group drink water without applying any purifying method and they do not use fitkriri (hydrated potassium aluminum sulphate) or any purifying tablet in their drinking water. Furthermore, it was observed that the more percentage (38%) of people from the group boiled their drinking water but uses of water filter has increased in beneficiary group than baseline and the changes was very high (+816%). The use of LP gas, as cocking in each group was higher (42 to 46%) than other fuel sources (Table 2). The

rainwater was a good source of drinking water as it does not require further treatment. These results presented in Figure 4 and 5 indicated the positive impact of the project.





The sources of energy that is, lighting and other purposes are used by the respondent is shown in Figure 6. The Figure 6 indicated that most of the people (86 to 88%) from both group uses grid electricity for their sources of energy. Very few numbers of people used solar (9.62% vs 10.89%, baseline vs. beneficiary). And biogas was used by only one people from the baseline (1.92%) and 3 from (5.96%) from the beneficiary group and the changes was higher (210%), which indicated that the people has established more biogas plant by the supporter of the project. In comparison the baseline and beneficiary group it was seen that the living conditions of the beneficiary people has increased and indicated the positive impact of the project.



The total land ownership and operation of people in the studied areas and the changes after implementation of the project is depicted in Table 3. Own homestead land, agriculture/crop land,

pond partly or owned and mortgage was not differed significantly between the control and beneficiary group (Table 3). However, the baseline group has significantly more land than the beneficiary group. On the other hand, the beneficiary group has significantly more land for share crop in and agriculture land than the baseline people. This might be the cause the beneficiary group is rearing more lumber of milking cows than the baseline group.

Table 3: Land ownership and use of lands

Description	Baseline			Beneficiary group		
	Average (deci)	Min (deci.)	Max (deci.)	Average (deci)	Min (deci)	Max (deci.)
Homestead land owned	9.76 ± 4.29 (96)	1	33	10.78±0.725 (101)	4	60
Agriculture/ Crop land owned	34.00^{a} ± 17.88 (49)	20	121	44.61^{b}±3.02 (51)	10	120
Pond owned or part, if family owned	9.73 ± 13.38 (33)	2	80	14.62±2.28 (37)	8	80
Mortgage in	27.50 ± 6.33 (16)	15	40	37.5±2.04 (34)	20	60
Lease-in	28.60 ± 9.69 (15)	16	40	36.0±2.94 (20)	20	70
Share crop in	31.28^{a} ± 6.53 (18)	20	40	53.0^{b}±13.19 (5)	15	80
Grazing land	15.79 ± 9.47 (19)	2	40	19.61±1.06	10	40
Fallow land	25.38^{b} ± 14.33 (8)	8	15	15.5^{a}±2.75 (6)	6	23
Total Land (deci)	182.04^{b}±81.90 (96)	6	220	108.80^{a}±4.71 (101)	16	178
Source and availability of irrigation						
Rainwater				7.25 (5)		
Deep tube well				88.41 (61)		
River water	7.69			4.35 (3)		

Legends: deci= decimal, Parenthesis indicated the number of respondents; Average value = Mean ± SE (standard Error); Min= Minimum; Max = Maximum.
Means with different superscript a and b differed significantly at $P<0.05$.

The household income and expenditure of the people in the studied areas from different sources (e.g., agriculture, livestock, business, and job) and the changes after implementation of the project are presented in Table 5. The yearly average income per household of beneficiary group was higher (BDT 663,343) than the baseline group (BDT 472,944). More percentage of people's income coming from livestock agriculture followed by livestock rearing and others. It was found that income from livestock, business and others differed significantly ($P<0.05$) between baseline and beneficiary group. Other income includes remittance of foreign, however, very few numbers of households fallen in this category. Furthermore, it was seen that poultry and fisheries sector contributes less income and thus, there is plenty of scope to increase the poultry, and fisheries production in this area. A similar trend of income of rural people was reported by Khan et al. (2020) and Jamal Uddin et al. (2010). The main expenditures of both groups of peoples were food, expenditure for livestock rearing, fuel/electric, travel, communication (mobile costs), cloth and children's education and health care cost. Most of the costs were similar for both groups of people. However, the payment of the loan and the instalment of the loan was differed significantly between the baseline and beneficiary group, and it was the more expenditure for the beneficiary's group as they are paying loan instalment to the IDF. Furthermore, the expenditure of livestock rearing has increased from baseline to

beneficiary group. The total net income per households of beneficiary group was more (BDT 6,125) than the control group (BDT 4,483) for the control group but not statistically differed significantly. These might be due to the beneficiary group of people earn more income from livestock rearing than the baseline group of people.

Table 4: Income and expenditure (Bangladesh Taka) per households

Item	Baseline	Impact	SEM	P-Value
Income/ year (Taka)				
Income from crop production	70,705 ± 4832.68 (96)	71,897 ± 6280.19 (58)	609.75	0.064
Income from livestock rearing	77,118[b] ± 4659.69 (94)	147,043[a] ± 9023.18 (93)	1345.35	0.002
Income from fisheries	33,636 ± 2295.34 (33)	37,514 ± 5379.91 (35)	1,963.29	0.051
Income from poultry	-	-		
Income from business	131,429[b] ± 40380.84 (7)	156,000[a] ± 27129.32 (5)	5,203.71	0.023
Income from Job	73,500 ± 9670.28 (30)	165,333.34 ± 32687.07 (3)	33,421.83	0.001
Others (Please specify)	86,556[a] ± 9872.70 (5)	85555.56[b] ± 12595.31 (18)	430.63	0.053
Total Income (Taka)	**472944[b] ± 12814.34**	**663342.74[a ±] 12062.01**	90,541.87	0.001
Expenditure/ Year (Taka)				
Food Expenditure	136,188 ± 16153.08 (96)	182,643 ± 4812.15 (84)	6,752.33	0.036
Fuel/Electric	18,600 ± 2708.82 (96)	17528 ± 402.52 (89)	346.98	0.61
Travel Expenditure	21,200 ± 2516.93 (96)	21099 ± 722.42 (5)	123.76	0.84
Communication/Mobile Expenditure	14,963 ± 2329.76 (96)	20668 ± 2746.99 (94)	1767.86	0.042
Cloth Expenditure	14,391 ± 1517.93 (92)	17779 ± 1298.88 (52)	976.54	0.021
Children's Education Cost	22,240 ± 2302.85 (79)	30333 ± 2283.00 (45)	3401.93	0.011
Health Care Cost	4,919 ± 1178.27 (37)	12137 ± 2913.61 (27)	786.12	0.027
House building and maintenance	12,833 ± 4044.89 (5)	20750 ± 2710.76 (8)	507.34	0.046
Payment of Loan	75,000[b] ± 45000 (2)	82500 ± 16520.19 (4)	3753.77	0.058
Payment of Installment	77,800[b] ± 21799.43 (20)	144177[a] ± 6976.59 (79)	31231.52	0.001
Expenditure for social festival	4,523 ±1813.69 (22)	12375 ± 2459.04 (16)	898.22	0.038
Expenditure for livestock rearing	64,162 ± 3669.02 (94)	91,729 ± 7925.22 (9)	6831.11	0.017
Others (Please specify)	-			
Total Expenditure (BDT)	466819 ± 9548.61	653719 ± 5345.96	56532.66	0.001
Net income/Year/ Household	**6125 ± 3265.73**	**9624 ± 1231.54**	342.94	0.018

Legends: SEM= Standard error of mean, BDT= Bangladeshi Taka, Parenthesis indicates the number of respondents; Means with different superscript a and b differed significantly at P<0.05.

7.2. Module 2

7.2.1. Section B: Status of Animal Production, Processing and Marketing

The average number of livestock and poultry per household and breed percentage of the study areas and the changes after implementation of the project is presented in Table 5. In the studied area the available species of livestock, such as, cattle, goat, chicken, duck, and pigeon were seen. But only cattle information is presented in Table 5 and the available breed of cattle were seen Holstein, crossbred, Sahiwal, and deshi (Red Chittagong Cattle). There were no significant differences found between the baseline and beneficiary groups for the total number of male cattle, but differences were observed among cows per household (Table 5). Significant (P<0.05) differences were observed in the number of milking cows, pregnant cows, heifers, and average number of cattle per households between these two groups. Among the livestock and poultry numbers the average chicken's number per household was higher than other species. In the comparison to breeds in cattle, it was seen that Holstein–Friesian and its crossbred cows was a higher percentage than Deshi, Sahiwal and other genotype. The breed type and the herd structure of both groups was like the study of Khan et al. (2012, 2014) and Uddin et al. (2011).

The animal (dairy) management information in the studied areas and the changes after implementation of the project is presented in Table 6. Improved housed farms percentage was higher (46 to 92.08%) than non-improved (7.92 to 54%) housing of dairy farms under both baseline and beneficiary group in the studied areas. The improved housing has increased 100% and non-improved housing has decreased 85%. The shed type and construction of the shed was a semi-pakka and pakka and these types of sheds was higher than the other types and these two types of sheds has increased 41.92% and 40.69%, respectively. Beneficiaries farm was more (89.11%) well ventilated than the baseline group farmers (57.41%) and the increased rate was 55.22% whereas the not well-ventilated animal shed has decreased 100%. These observations were increased due to the training of farmers and increases the farmers awareness and commercialization. The drainage systems of the beneficiary's animal shed have increased 268.38%. This positive improvement was observed as the IDF through SEP project build community drainage system in the locality. Both types of farmers' keep cleanliness to their cow shed more, and few numbers of respondents are separating the cow dung and urine and have drain around the animal shed under both group (Table 6). However, these parameters also increased for the beneficiaries. Although there was a positive value observed for fencing around the dairy farms, yet the smaller number of farms has fenced in their animal shed found in both types of farms was lower. Systems of rearing for cattle are presented in Figure 7. For dairy cattle, it was seen that the higher percentage of farmers in both baseline and beneficiary groups are rearing their cattle under intensive rearing system which was higher than the semi-intensive and extensive rearing systems. And the changes were observed increased 34.5%. These dairy animals shed management and system of rearing has increased due provide training, increases the farmers awareness and supported by the IDF through SEP project and commercialization.

Table 5: Number of livestock and poultry per households and percentage of available breeds

Animal			**Sex**		**Type of cattle**						**Total**		
			Male	**Female**	**Milking cow**	**Pregnant**	**Heifer**	**Bull**	**Dry cow**	**Bullock**	**Average**	**Min**	**Max**
Cattle (Baseline)		Average No.	2.85 ±0.117 (48)	3.92[a] ±0.423 (58)	1.97[a] ±0.219 (58)	1.50[a] ±0.046 (14)	1.44[a] ±0.08 (9)	1.25 ±0.125 (4)	1.40 ±0.069 (10)	1.0 ±0 (4)	5.62[a] ±0.023 (58)	1.0	20.0
	Breed (%)	Deshi	58.33 (28)	5.17 (3)									
		Friesian	22.92 (11)	88.0 (51)									
		Sahiwal	18.75 (4)	3.44 (2)									
		Others	00	3.44 (2)									
Cattle (Beneficiary)		Average No.	3.02 ± 0.60 (23)	7.28[b] ±0.28 (57)	3.98[b] ±0.45 (27)	3.75[b] ± 0.24 (25)	4.24[b] ± 0.27 (24)	-	1.99±0.29 (22)	-	7.40[b] ±0.36 (52)	2.0	48.0
	Breed (%)	Deshi	13.26 (13)	28.36 (65)									
		Friesian	25.31 (21)	20.34 (32)									
		Crossbred	45.33 (37)	38.57 (43)									
		Sahiwal	15.51 (7)	12.73 (14)									
		Others	00	00									
P-value			0.235	0.031	0.026	0.017	0.035	-	0.873	-	0.043	-	-

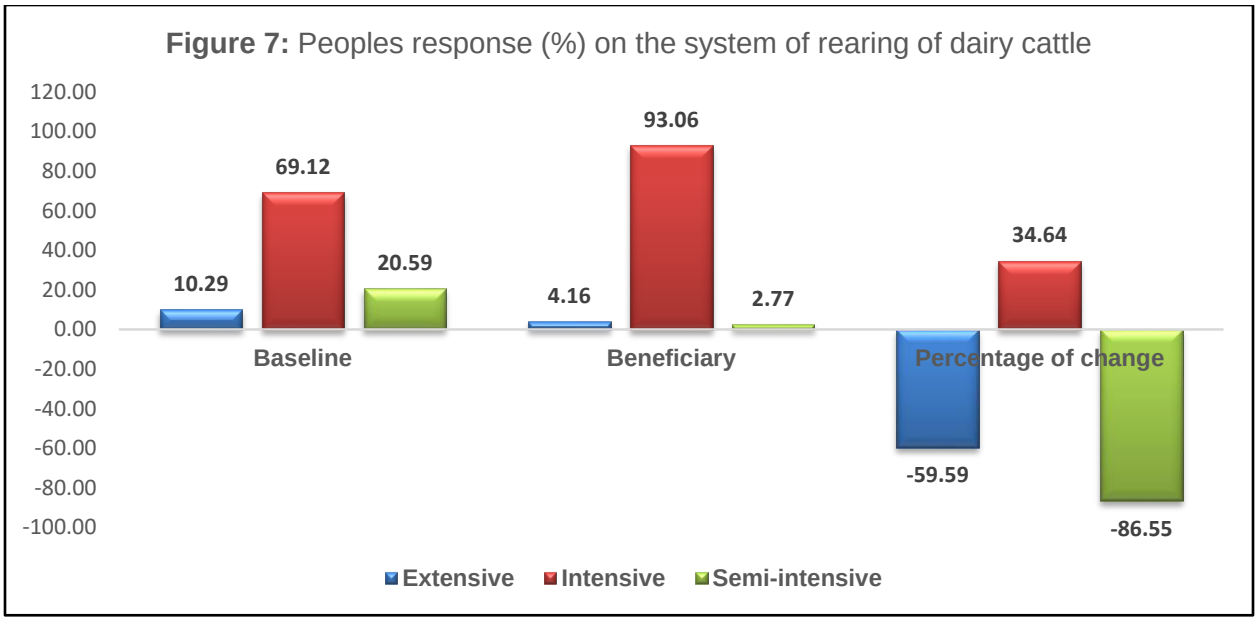
Parenthesis indicates the number of respondents; % = Percentage

Means with different superscript a and b differed significantly at P<0.05.

Table 6: Percentages of respondents on animal (dairy) shed management

Questions	Response	Baseline	Beneficiary	Percentage of Changes
Is there any Improved animal shed?	Yes	46.00 (41)	92.08 (93)	(+) 100.17
	No	54 (48)	7.92 (8)	(-) 85.33
If yes, what type of shed you constructed?	Katcha	33.87 (21)	6.93 (7)	(-) 79.54
	Semi-pakka	25.81 (16)	36.63 (37)	(+) 41.92
	Pakka Other	38.71 (24)	54.46 (55)	(+) 40.69
	Others	3.23 (2)	1.98 (2)	(-) 38.70
Have the shed proper ventilation?	Well Ventilated	57.41 (31)	89.11 (90)	(+) 55.22
	Not well Ventilated	27.78 (15)	10.89 (11)	(-) 60.80
	Not Ventilated	5.56 (3)	00	(-) 100.00
	Other (Specify)	9.26 (5)	00	(-) 100.00
Do you maintain cleanliness of shed?	Well drainage	24.19 (15)	89.11 (90)	(+) 268.38
	Not Well drainage	75.81 (47)	10.89 (11)	(-) 85.64
Do you have arrangement for separating cow dung and urine?	Yes	22.22 (14)	26.73 (27)	(+) 20.30
	No	77.78 (49)	73.26 (74)	(-) 5.81
Do you have drain around the animal shed?	Yes	59.02 (36)	60.39 (61)	(+) 2.32
	No	40.98 (25)	39.60 (40)	(-) 3.37
Do you have any fence around the animal shed to protect the insects, bird's other animal?	Yes	35.09 (20)	46.53 (47)	(+) 32.60
	No	64.91 (37)	53.47 (54)	(-) 17.62

Parenthesis indicated the number of respondents



The information regarding the supplying of electricity and use of transparent and heat tolerance material in cow shed and the changes after implementation of the project is presented in Table 7. Most of the farmer's dairy farm has connected with grid electricity and this percentage has increased 11.13% for the beneficiary's than the baseline. However, less than 49 to 58% people under both groups checked their electricity connection regularly in their dairy shed and this percentage was also increased 19.01%. In addition, the comparatively lower percentage of people used less cost light, fan and other equipment's in their animal shed in the baseline than the beneficiary group and the changes was positive more than 92%. For use of transparent material for adequate light shed material in your animal shed it was observed that a smaller number of people of both groups used this material in their farm, however, the beneficiary group of people used more in number than the baseline group and positive impact was observed. For use of heat tolerance material in the animal shed and solar panel most of the respondents' people do not use these in their cattle shed. The percentage of respondents of beneficiary group peoples shown positive values than the baseline group people.

Table 7: Supplying of electricity and use of transparent and heat tolerance material in animal shed

Questions	Response	Baseline	Beneficiary	Percentage of Changes
Does your farm have electricity connection?	Yes	82.86 (58)	92.08 (93)	(+)11.13
	No	17.14 (12)	7.92 (8)	(-) 53.79
Do you check your electric connection regularly?	Yes	49.09 (27)	58.42 (59)	(+)19.01
	No	50.91 (28)	41.58 (42)	(-) 18.33
Are you using less cost light, fan and other equipment's in your animal shed?	Yes	35.14 (13)	67.68 (67)	(+)92.60
	No	64.86 (24)	32.32 (32)	(-) 50.17
Do you use any transparent material for adequate light shed material in your animal shed?	Yes	14.29 (8)	15.15 (15)	(+) 6.02
	No	85.71 (48)	84.85 (84)	(-) 1.00
Do you use heat tolerance shed material in your animal shed?	Yes	8.16 (4)	10.17 (6)	(+)24.63
	No	91.84 (45)	89.83 (53)	(-) 2.19
Do you use renewable solar panel in your animal shed?	Yes	10.87 (5)	31.74 (20)	(+)192.00
	No	89.13 (41)	68.26 (43)	(-) 23.42

Parenthesis indicated the number of respondents

Regarding the details of supplying of electricity and use of transparent and heat tolerance material in animal shed the more results and the changes after implementation of the project was presented in Table 8. It was observed from the Table 8 that the uses of less cost light, fan and other equipment's in animal shed has increased more than 92.6% in the beneficiary farmers than the baseline famers. The farmers are using these materials in their dairy farmer from 6 months to 2 years and more than 86% of the respondents said that they will continue it by their own costs, and they mentioned the average costs of adaptation of these materials was Tk. 1294.80±165.78. The respondent percentages in beneficiary group for renewable solar panel used in animal shed has increased more than 192% and the farmers uses the renewable solar panel in their farm from 6 months to 4 years. More than 100% among the respondents said that they will continue it by their own costs, and they mentioned the average costs of adaptation of these materials was Tk. 87,000±2675.55.

Table 8: Details of supplying of electricity and use of transparent and heat tolerance material in animal shed

Questions	Response	Baseline	Beneficiary	Percentage of Changes
Are you using less cost light, fan and other equipment's in your animal shed?	Yes	35.14 (13)	67.68 (67)	(+) 92.60
	No	64.86 (24)	32.32 (32)	(-) 50.17
How long have you been using less cost light, fan etc.?	Year	-	1.4 (67) (6 mo. – 2 yrs.)	
Will you continue to be using it?	Yes	-	96.97 (64)	
	No	-	3.03 (2)	
Who will bear the costs?	Own	-	86.57 (58)	
	others	-	13.43 (9)	
Costs for adaptation (Establishment+ Maintenance)	Taka	-	1294.80±165.78 (67)	
Do you use renewable solar panel in your animal shed?	Yes	10.87 (5)	31.74 (20)	(+) 192.00
	No	89.13 (41)	68.26 (43)	(-) 23.42
How long have you been using less cost light, fan etc.?	Year	-	1.61 (21) 6 mo. – 4 yrs.	
Will you continue to be using it?	Yes	-	100 (21)	
	No	-	00	
Who will bear the costs?	Own	-	100 (20)	
	others	-		
Costs for adaptation (Establishment+ Maintenance)	Taka		84700.00±2675.55 (20)	

Parenthesis indicated the number of respondents; mean

The information regarding the feeds, fodder and feeding of dairy cattle and the changes after implementation of the project are presented in Table 9. The farmers fed their cattle roughages straw, green grass, green straw and concentrate mixture. However, the greater number of people in beneficiary group is responding that they fed all the four feeds (straw, roughage, concentrates and green straw) to their cattle and the percentages of green grass feeding has increased 36.32% (Table 9). The more percentages of the peoples under both groups preserve their cattle feed in the dairy shed but the changes have decreased 27.96% for the beneficiary group than the baseline group. Whereas more percentages of people under beneficiary group preserve their cattle feed in the open place far from animal shed. More percentages of peoples from both groups feed their cattle in stall-feeding conditions and the changes also positive more

than 5% for the beneficiary's. The farmers grazed their cattle on the plain land, fallow land, and homestead from both groups. However, the differences observed between baseline and beneficiary group people's response in case of green straw feeding, preserve the feed in open place far from animal shed, stall feeding and grazing on the plain land. The cattle are grazed in grazing land 5.33±0.71 h for beneficiary group and 5.75±1.22 h for beneficiary group, respectively, and this grazing hour was not differed significantly (P<0.05).

Table 9: Response (%) of people on feeds and feeding of dairy cattle

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
What is the feed you fed to your cattle	Straw	27.89 (70)	22.77 (23)	(-) 18.36
	Green Straw	22.71 (57)	13.86 (14)	(-) 38.97
	Green Grass	24.30 (61)	37.62 (38)	(+) 54.81
	Concentrate feed	25.10 (63)	25.74 (26)	(+) 2.55
Where do you preserve animal feed?	Open place close to animal shed	5.81 (5)	7.92 (8)	(+) 36.32
	Open place far from animal shed	3.49 (3)	1.98 (2)	(-) 43.27
	In animal shed	60.47 (52)	43.56 (44)	(-) 27.96
	Separate open house	17.44 (15)	31.68 (32)	(+) 81.65
	Separate close house	12.79 (11)	13.86 (14)	(+) 8.37
	Others (Specify)	-	0.99 (1)	-
How do you feed your animal?	Stall feeding	83.33 (55)	87.5 (63)	(+) 5.00
	Pasture	12.12 (8)	12.5 (9)	(+) 3.14
	tethering	3.03 (2)	-	(-) 100.00
	Others	1.52 (1)	-	(-) 100.00
Where the animals usually graze?	Hill	7.84 (8)	11.11 (1)	(+) 41.71
	Plain land	37.25 (38)	55.56 (5)	(+) 49.15
	Fallow land	28.43 (29)	33.33 (3)	(+) 17.24
	Roadside	0.98 (1)	-	(-) 100.00
	Embankment	5.88 (6)	-	(-) 100.00
	Homestead	19.61 (20)	-	(-) 100.00
How is many hours' animal grazed in the field in a day?		5.75 ±1.22 (65)	5.33 ±0.71 (9)	-

Parenthesis indicated the number of respondents

Table 10 indicated that whether farmers know the daily feeds and available feeds in the locality. About 91.57% of baseline farmers respondents that they fed locally available grasses to their cattle but this percentages have decreased (37.28%) for the beneficiary group people. Farmers feeding their cattle both roughages and concentrate and the list of available feeds and fodder are given in the Table 10.

Table 10: Feeds and available feeds in the locality for cattle feeding.

Questions	**Response**	**Baseline**	**Beneficiary**	**Percentages of changes**
Do you cattle feed local grasses?	Yes	91.57 (76)	57.43 (58)	(-) 37.28
	No	8.43 (7)	40.59 (41)	(+) 381.49
Which feed is available in your area?	Concentrate feed	Concentrate: broken corn and wheat, rice polish, rice bran, grains, brans and protein concentrate, vitamin, and minerals		
	Straw	Rice straw		
	Green Straw	Immature dry paddy, maize		
	Green Grass	HYV: Napier (*Pennisetum purpurium*), para (*Brachiaria mutica*) and German (*Echinochloa polystachya*) Local grasses: Durba (*Cynodon dactylon*), Helancha, Mutha (*Cyperus rotundus*), Puti (*Heliotropium indicus*) Chora (Algelica *glauca*), Painna grass.		

The information of supplying of water to the dairy cattle and sources of water and water preservation for the animals and the changes after implementation of the project is presented in Table 11. This table 11, showed that the peoples of both group supply tube well water to their cattle and the changes decreased about 1.46% for beneficiary farmers than the baseline farmers. Both groups of people know that tube well water is safe for dairy cows. This Table 11 also indicated that no people preserve rainwater for their cattle, but very few numbers of people from the beneficiary group preserved rainwater in the tank for their cows and themselves.

Table 11: Percentage of respondents about supplying of water to the cattle and sources of water and water preservation

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Do you supply water to your cattle?	Yes	97.83 (90)	100 (101)	(+) 2.22
	No	2.17 (2)	00	(-) 100.00
Indicate the sources of water for cattle	Tube well	95.45 (84)	94.06 (95)	(-) 1.46
	Ring well	-	-	-
	Pond	2.27 (2)	2.97 (3)	(+) 30.84
	River/canal	1.14 (1)	1.98 (1)	(+) 73.68
	Rainwater	-	-	-
	Others(spfy)	1.14 (1)	0.99 (1)	(-) 13.16
Which source of water is safe for cattle?	Tube well	80.00 (16)	100 (101)	(+) 25.00
	Pond	10.00 (2)	-	(-) 100.00
	Ring well	10.00 (2)	-	(-) 100.00
Do you preserve rainwater for use of drinking water for cattle?	Yes	10.00 (5)	7.59 (6)	(-) 24.10
	No	90.00 (45)	92.40 (73)	(+) 2.67
If yes, where do you preserve rainwater?		Tank	Tank	-

Parenthesis indicated the number of respondents

The vaccination, deworming and biosecurity of dairy cattle under both control and beneficiary group and the changes after implementation of the project is presented in Table 12. From the Table 12, it was seen that most of the farmers from beneficiary group follow regular vaccination (91.14%) and deworming (93 %) schedule for their animals, as they know that the regular vaccination and deworming reduces the infectious diseases. Both the vaccination and deworming percentages have increases positively for beneficiary group. They keep regular vaccination of common infectious diseases like foot and mouth diseases (FMD), black quarter (BQ), anthrax and hemorrhagic septicemia (HS) to their cattle. The farmer's follow the bio-security measures for their animal, and it has increases passively for the beneficiary group than the baseline group. However, a greater number of the people of the beneficiary group maintained the disease control and biosecurity measures.

Table 12: Respondents percentage on vaccination, deworming and biosecurity in cattle shed

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Did you practice scheduled vaccination?	Yes	66.07 (37)	91.14 (72)	(+) 37.94
	No	32.93 (19)	8.86 (7)	(-) 73.09
If yes, which vaccination used?	FMD	31.94 (61)	39.02 (80)	(+) 22.17
	BQ	23.56 (45)	25.37 (52)	(+) 7.68
	Anthrax	26.18 (50)	28.29 (58)	(+) 8.06
	HS	15.71 (30)	5.37 (11)	(-) 65.82
	Others	2.62 (5)	1.95 (4)	(-) 25.57
Scheduled de worming practiced?	Yes	68.52 (37)	93.00 (93)	(+) 35.73
	No	31.48 (17)	7.00 (7)	(-) 77.76
Biosecurity of animal shed followed.	Yes	29.27 (12)	39.58 (38)	(+) 35.22
	No	70.73 (29)	60.42 (58)	(-) 14.58

Parenthesis indicated the number of respondents

The information about the feeds and fodders for dairy cattle and the changes after implementation of the project is presented in the Table 13. More than 85% people from the baseline and 11.88% people from the beneficiary groups did not cultivate high yielding (HYV) perennial fodders (Table 13). But after receiving training on fodder production this fodder production from the beneficiary's has increased more than 492% than the baseline group. It was also observed that both the group of people cultivated perennial and seasonal fodders and baseline farmers fed their cattle mainly seasonal fodders and beneficiary farmers fed their cattle perennial fodders. Cattle are grazed on the hilly plain land, fallow land, and roadside embankment and homestead areas. Among the HYV fodders Napier (*Pennisetum purpurium*), para (*Brachiaria mutica*) and German (*Echinochloa polystachya*) grasses were cultivated by both groups of farmers. In addition, both groups of farmers also cultivated the seasonal grasses like cowpea (*Vigna unguiculata*), maize (*Zea mays*) and Khesari (*Lathyrus sativus*) etc. and more people of the beneficiary group cultivated than the baseline group farmer. Both groups of farmers don't have idea that Shajna (*Moringa oleifera*) is an animal feed, and they are not agreed to feed Shajna to their cattle only 11.11% of beneficiary's has given consent that they will feed their cattle Shajna. Furthermore, the farmers feed their cattle the local grasses and they indicated the name of some local grasses. The systems of rearing of cattle in both groups are shown in Figure 8. Figure 8 indicated that farmers rearing their cattle in stall-feeding and stall feeding plus grazing system.

Table 13: Respondents percentage on the **f**eed and fodder for animals (cattle)

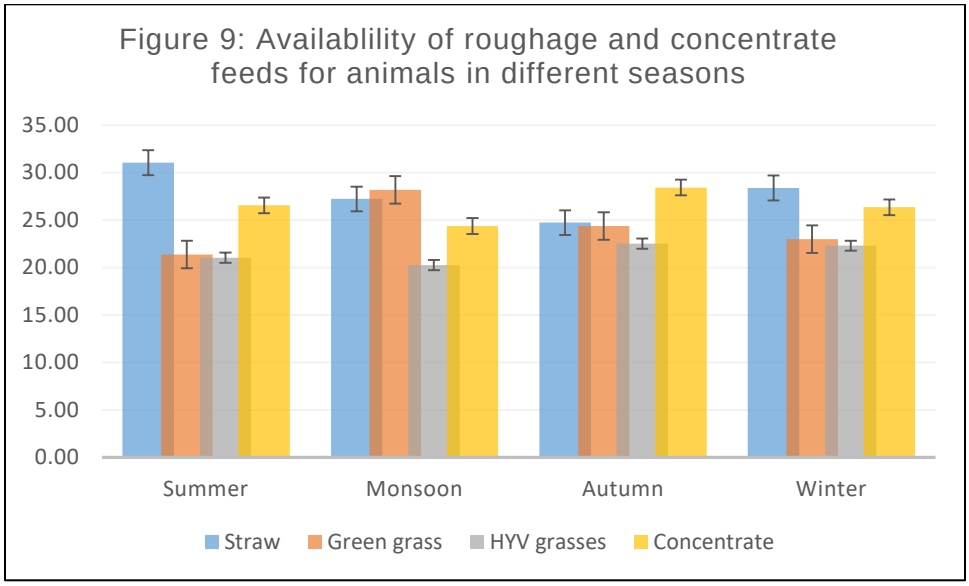
Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Do you use cultivated fodder (HYV) for your cattle?	Yes	14.75 (9)	88.12 (89)	(+) 497.42
	No	85.25 (52)	11.88 (12)	(-) 86.06
If yes, what type of fodder you fed?	Perennial	9.68 (6)	86.13 (87)	(+) 789.77
	Seasonal	90.32 (56)	69.30 (70)	(-) 23.27
	Tree leaves	-	4.95 (4)	-
What are perennial fodders (HYV)?	Napier	36.54 (38)	83.17 (84)	(+) 127.61
	Para	21.15 (22)	22.77 (23)	(+) 7.66
	German	42.31 (44)	36.64 (37)	(-) 13.40
What are seasonal fodders?	Cowpea	6.98 (6)	28.71 (29)	(+) 311.32
	Lintil	2.33 (2)	5.94 (6)	(+) 154.94
	Kheshari	40.70 (35)	33.66 (34)	(-) 17.30
	Maize	18.60 (16)	43.56 (44)	(+) 134.19
	Others	31.40 (27)	11.88 (12)	(-) 62.17
Do you have any idea that Shajna Can use as animal feed?	Yes	18.75 (3)	32.07 (17)	(+) 71.04
	No	81.25 (13)	67.92 (36)	(-) 16.41
Will you feed Shajna to your animal if it will work best?	Yes	0	11.11 (2)	-
	No	100.00 (13)	88.89 (16)	(-) 11.11

Parenthesis indicated the number of respondents

Irrespective of respondent groups the availability of feeds and fodder in the studied areas is shown in the Figure 9. Figure 9 showed that straw is available throughout the year and abundant during winter to summer and lean season is autumn. Green grasses are available during the monsoon and autumn, but scarcity period is late winter to summer. The beneficiary group farmers cultivated High yielding variety of fodder, but the numbers of respondents' peoples are few. However, farmers keep continuity throughout the year feeding with a concentrated mix of their cattle.

The milk production characteristics of cows of baseline and beneficiary group farmers and the changes after implementation of the project is presented in Table 14. The available breeds of the cows were found non-descriptive deshi (ND), Holstein-Friesian and crossbreds and a greater number of respondents people rear Holstein genotype, this finding agreed with the findings of Chando et al. (2021a). Farmers milked their cows in the morning and evening, and it was observed that morning milk production was higher than evening. The daily average milk yield for cows of baseline group was 9.63± 2.726 liter/day and for beneficiary group was 14.07±0.27 liter/day, which was significantly differed between the beneficiary and baseline groups and the milk production of beneficiary group farmers cows increases 46.11%. Farmers of both groups reared mainly Holstein and their crossbreds. The daily milk production of

available Holstein genotypes is like Khan et al. (2005, 2014) and Hossain et al. (2002) under Bangladeshi conditions. There were no significant differences observed the between baseline and beneficiary farmer's cows for lactation length, post-partum heat period and calving interval. The highest lactation yield of cows was observed in beneficiary group (2996.89 ± 65.817 liter) than the baseline group (2189.20 ± 63.679 liter) people and which differed significantly (P<0.05) between groups. The lactation production of Holstein and Holstein crossbred was concordant with Khan and Mazumder (2011), Das et al. (2013). Lactation number of cows were also significant (P<0.05) difference between the group that is the value 2.54 vs. 1.49, beneficiary vs. baseline group.



The response percentage regarding the measurements taken before and after milking of cows and the changes after implementation of the project is shown in Table 15. Table 15 showed that both groups of farmers clean their farm, and the percentages of changes increases 60.41% in beneficiary group than baseline group. Both group of farmers clean their farms in the morning and noon, but the number of farmers was more under beneficiary group than the baseline group. Furthermore, the beneficiary group farmers also clean their farm before milking. Both types of farmers used sanitizer / cleaning agent during cleaning to their farms, but the high percentage of farmers from the beneficiary group than the control group practiced it. Usually, they use bleaching powder, Lysol and Savlon as sanitizer/cleaning agents. For the time interval between routine checkups of their cows, most of the respondent from baseline group said that they checked their cows routinely as a weekly and periodically basis, but the beneficiary farmers said they checked their cows routinely as a weekly, monthly, bi-monthly and six monthly. The less percentage of the farmers from both groups clean their cows before milking, they washed the cow's udder, hind quarter, etc. They also cleaned the milking places and milker's hand, after milking their cow but the number of percentages was lower than the numbers were unpracticed.

Table 14: Milk production characteristics of cows under control and beneficiary group farmers

Cattle	Breed	Percentage	Milk yield (litre)		Daily milk yield (litre)	Lactation length (day)	Total milk yield (litre)	Lactation Number	Calving interval (day)	Post-Partum heat period (day)
			Morning	Evening						
Baseline	Deshi	1.87 (2)	7.80[b] ± 0.152 (113)	3.32 ± 0.107 (62)	9.63[b] ± 0.272 (113)	227.69 ± 2.726 (113)	2189.20[b] ± 63.679 (113)	2.54[a] ±0. 088 (108)	377.44± 3.391 (86)	76.78[b] ±2.745 (87)
	Friesian	85.98 (92)								
	Crossbred	4.67(13)								
Min			4	2	4	170	800	1	300	45
Max			11	5	16	270	3360	5	480	120
Beneficiary group	Deshi	4.72 (5)	2.7± 0.30	2.00±0.27	4.70±0.34	154.00±2.45	723.00 ±52.43	1.40± 0.25	498.00± 18.00	79.00±5.56
	Friesian	78.30 (83)	9.54±0.12	5.35±0.11	14.95±0.15	214.76±2.39	3202.95 ±40.83	1.55±0.06	517.59±5 .99	77.17±2.08
	Crossbred	16.98 (18)	8.33±0.34	4.56±0.25	12.61±0.53	211.66±4.67	2678.33 ±134.96	1.22±0.10	523.33±1 .67	61.67±1.67
Average			9.01± 0.18	5.06±0.12	14.07±0.27	211.36±2.38	2996.89 ±65.81	1.49±0.05	517.64±6 .43	74.62±1.76
Min			2	1.5	3.5	150	560	1	10	50
Max			12	8	20	270	3900	3	24	120
Percentages of Changes			(+) 15.51	(+) 52.41	(+) 46.11	(-) 7.17	(+) 36.89	(-) 41.34	(+) 37.14	(-) 2.81

Legends: Min: Minimum, Max= Maximum, Parenthesis indicates the number of respondents

Means with different superscript a and b differed significantly at $P<0.05$.

Table 15: Percentage of people on the measurements taken before and after milking of cows

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Do you clean your farm and cow?	Yes	60.49 (49)	97.03 (98)	(+) 60.41
	No	39.51 (32)	2.97 (3)	(-) 92.48
In what time, you clean your farm and cows?	Morning	51.81 (43)	42.57 (43)	(-) 17.83
	Noon	26.51 (22)	38.61 (39)	(+) 45.64
	Afternoon	15.66 (13)	00	(-) 100.00
	Before milking	3.61 (3)	18.81 (19)	(+) 421.05
	After milking	2.41 (2)	00	(-) 100.00
	Others			
Do you use sanitizer/cleaning agent during cleaning?	Yes	52.27 (23)	76.24 (77)	(+) 45.86
	No	46.73 (21)	23.76 (24)	(+) 248.39
Please give the name of sanitizer / cleaning agent	Bleaching powder, Savlon, Lijol			
Time interval between routine checkup of the cow	Weakly	17.07 (7)	40.00 (30)	(+) 134.33
	periodically	78.05 (32)	16.00 (12)	(-) 79.50
	Monthly	-	1.33 (1)	
	Bi-monthly	4.88 (2)	5.33 (4)	(+) 9.22
	Six monthly	-	36.00 (27)	
	Yearly	-	1.33 (1)	
	None	-		
Do you wash and clean the cows before milking?	Yes	76.67 (23)	89.33 (67)	(+) 16.51
	No	23.33 (7)	37.33 (28)	(+) 60.01
Do you wash the udder of cows before milking?	Yes	100.00 (31)	100.00 (88)	0.00
	No	-	-	
Do you wash the hind quarter of cows before milking?	Yes	29.03 (9)	66.67 (46)	(+) 129.66
	No	70.97 (22)	33.33 (23)	(-) 53.04
Do you Clean the milking place before milking?	Yes	43.33 (13)	70.96 (44)	(+) 63.77
	No	56.67 (17)	29.03 (18)	(-) 48.77
Are the milkers clean their hand before milking?	Yes	26.67 (8)	67.16 (45)	(+) 151.82
	No	73.33 (22)	32.84 (22)	(-) 55.22

Parenthesis indicates the number of respondents

The response (%) about handling of cow's milk, after milking and the changes after implementation of the project is presented in Table 16. The people from both the baseline and beneficiary group preserved their cow's milk in a pot and dram; and a greater number of people preserve milk in a pot. Table 16 also indicated that farmers don't use any type of preservatives and foreign materials in the milk and farmers thrown spoilage milk on the ground and water. In

addition, it was seen that 44 to 47% people carry their milk to the market themselves and 52 to 57% sale their milk to the goala/ Bepari/ middleman at the farm gate. Moreover, most of the farmers don't produce milk products only a few numbers of people produced dahi (yoghurt) and people do not have any idea of using 1 kg milk, how much milk products are produced.

Table 16: Respondent percentage on the handling of cow's milk

Questions	**Response**	**Baseline**	**Beneficiary group**	**Percentage of Changes**
How do you preserve the milk after milking?	Pot	95.91 (47)	96.29 (78)	(+) 0.40
	Drum	4.09 (2)	3.71 (3)	(-) 9.29
Do you use any preservatives for milk preservation	No	100 (19)	100 (60)	0.00
How do you carry milk to the market	Himself	44.44 (8)	47.22 (34)	(+) 6.26
	Goala/Bepari/Faria	55.56 (10)	52.78 (38)	(-) 5.00
If milk is spoilage, what do you do with this milk	Thrown in mud/water			
Do you mix any foreign matter? (flour, myda, sugar, batasha etc.) in the milk?	Yes	-	-	-
	No	100.00 (19)	100.00 (48)	0.00
Do you produce any milk products?	Yes	10.00 (1)	3.45 (1)	(-) 65.50
	No	90.00 (9)	96.55 (28)	(+) 7.28
If yes, what are this?	Dahi	100.00 (1)	100.00 (1)	0.00
	Ghee	-	-	
	Ghol	-	-	
	Powder milk	-	-	
	Butter	-	-	
	cheese	-	-	
	Sweatmeat	-	-	
	Others	-	-	
Do you have any idea of using 1 kg milk, how much milk products are produced	Yes	-	-	
	No	100 (19)	100 (6)	0.00

Parenthesis indicates the number of respondents

Breeding related information of cows in the studied areas and the changes after implementation of the project is shown in Table 17. The average age and service per conception of the cows was 3.36 to 4.12 years between the baseline and beneficiary group's cow's, respectively. About 67.62% of the farmers from baseline group and 85.19% from beneficiary group given their opinion that they used artificial insemination instead of natural service and the success rate of AI was higher. The sources of frozen semen were BRAC, DLS and milk vita. When they use BRAC semen their AI service cost was higher than the users of DLS semen. The same statement was observed by Khan et al. (2018) at the Chattogram Hill Tracts (CHT).

Table 17: Breeding related information of dairy cows

Cattle No	Age (Year)	No of Service	Type of insemination (%)		Insemination Cost, Taka	Result (%) (1= Successful 2=Unsuccessful		Sources of semen (%)			
			Natural	Artificial		1	2	DLS	BRACK	Milk vita	Others
Baseline	3.36±1.08 (105)	2.01±0.85 (100)	32.38 (34)	67.62 (71)	300.00 to 1000.00	71.43 (13)	28.57 (3)	41.75 (11)	53.40 (17)	3.88 (4)	0.97 (1)
Beneficiary	4.12±0.08 (78)	2.01±0.05	14.81 (12)	85.19 (69)	250.00 to 1000.00	77.23 (61)	22.77 (18)	66.25 (53)	25 (20)	5.00 (4)	3.75 (3)
Significance/ Percentage of Changes	NS	NS	(-) 54.26	(+) 25.98	-	(+) 8.12	(-) 20.30	(+) 58.68	(-) 53.18	(+) 28.87	(+) 286.59

Parenthesis indicates the number of respondents

7.3. Module 3

7.3.1. Section C: Training, extension, and related activities

Information on training and extension related activities of livestock rearing to the farmers in the studied areas and the changes after implementation of the project are presented in the Table 18. From Table 18, about 33% of the respondent people from both the baseline and 76.47% beneficiary group received training on livestock rearing and technology and the changes were positive 124.21% from baseline group. The training agencies were the Department of Livestock Services (DLS), Bangladesh Rural Advancement Committee (BRAC), Integrated Development Foundation (IDF), Youth Training Center (YTC), Association for Social Advancement (ASA) and Rangpur- Dinajpur Rural Service (RDRS) and the duration of the training was ranging from 01 to 03 days (Table 18). Among the agencies IDF has given more training to their beneficiary members followed by BRAC, and DLS, respectively. This table also indicated that among the respondent farmers' no one has attendant on the training course on biosecurity. The training courses were fodder cultivation/production, sustainable dairy rearing, vermi-composting, environment, vaccination, and preventive measures.

The information regarding the farmer's opinion on the livestock technology training courses and the changes after implementation of the project is shown in the Table 19. Farmers from both groups received training on improved feeding and rearing of cows, fodder production, beef fattening technology, disease control and vaccination. However, the number of respondents received of these trainings was very little for baseline group, but the number of training frequencies has increased for beneficiaries. In addition, a few numbers of people got training on preliminary treatments of animals and training on global practices. However, the farmers from beneficiary group received more training on preliminary treatments of animals and the increase rate was 196.86%. Farmers also given their comments whether they will practice the training knowledge in their own farm or advise to implement the training knowledge on their neighbor's farms. About 75% farmers from baseline groups said that they would not be able to apply their training knowledge in their farms, but the responded percentage was increased for beneficiary group and the rate of increase was 170%. As the training course was complicated for them, training duration was very short and lack of hands-on practice in training (Table 19). However, fewer numbers of respondents' farmer also said that they would apply their training knowledge in their own farms, and they would provide advice to their neighbors, and they try to motivate themselves. In addition, 100% farmers from both group respondents that they have not received any training on biosecurity.

Table 18: Information regarding the Training on Livestock

Questions		Baseline group			Beneficiary group			Percentage of Changes
Did you receive any training on Livestock technology?	Yes (%)	33.66 (34)			75.47 (40)			(+) 124.21
	No (%)	66.34 (67)			24.53 (13)			(-) 63.02
Which agency and training course, duration respondent?	**Agency**	**Respondent (%)**	**Duration (day)**	**Training course**	**Respondent (%)**	**Duration (day)**	**Training course**	
	DLS	24.24 (8)	01 to 03	HYV fodder cultivation, Fattening of cattle, Vaccination and preventive measures	7.69 (5)	01 to 03	Fattening of cattle, Vaccination and preventive measures	(-) 67.96
	BRAC	39.39 (13)	03	Fattening of cattle	36.92 (24)	03	Fattening of cattle,	(-) 6.27
	IDF	30.30 (10)	01 to 03	Fodder production, Dairy rearing, vermin composting	50.77 (33)	1 to 2	Fodder production; Dairy rearing; vermi composting; Environment; Sustainable dairy rearing, Vaccination, and preventive measures	(+) 67.56
	YTC	6.06 (2)	01	Vaccination and preventive measures	4.62 (3)	01	Vaccination and preventive measures	(-) 23.76
You or any members of household attended bio-security training?	Yes	-					-	
	No	100 (95)					100 (60)	00

Parenthesis indicates the number of respondents

Table 19: Farmer's response (%) on the livestock technology training courses

Question	Response	Baseline group		Beneficiary group		Percentage of Changes
In which Livestock Technology you received training and how many times		%	Frequency	%	Frequency	
	Improved feeding and rearing practices of cow	50.00 (6)	1	30.77 (20)	3	(-) 38.46
	Fodder production	16.67 (2)	2	33.85 (22)	12	(+) 103.05
	Beef fattening technology	33.33 (4)	2	23.08 (15)	4	(-) 30.75
	Disease prevention & Vaccination	16.67 (2)	2	33.85 (22)	4	(+) 103.05
	Environment management	-	-	12.31 (8)	2	(+) 100.00
	Vermi composing	-	-	12.3 (12)	8	(+) 100.00
Do you have training on preliminary treatment of your animal?	Yes	22.00 (22)		65.31 (32)		(+) 196.86
	No	78.00 (78)		32.65 (16)		(-) 58.14
Do you have training on global good practice?	Yes	3.33 (3)		15.22 (7)		(+) 357.05
	No	96.77 (90)		84.78 (39)		(-) 12.39
Are you applying your training knowledge in your farm?	Yes	25.00 (12)		67.5 (27)		(+) 170.00
	No	75.00 (36)		32.5 (13)		(-) 56.67
If no, why?	Duration of training was very short, Lack of practical knowledge, could not memorize the training subjects					
If yes, how?	Practicing the improved methods in own farm	75.00 (9)		72.5 (29)		(-) 3.33
	Motivating neighbors for practicing improved methods	25.00 (3)		27.5 (11)		(+) 10

Parenthesis indicates the number of respondents

7.4. Module 4

7.4.1. Section D: Environmental factors in dairy sub-sectors

Information about the animal environment and social safety issues, regarding the transmission of diseases and the changes after implementation of the project is presented in Table 20. More than 52% of the respondents' farmers from both group rearing their cattle under the separate shed and this value has increased 48% than the baseline group. Then comparatively higher percentage 20.79 to 27.94% of farmers from both groups rearing their cattle inside a room. Whereas the beneficiary less percentages of beneficiary farmers rearing their cattle in the free ranging conditions (Table 20) and the differences was observed between the baseline and beneficiary group (-)32%. About 29 to 42% of the respondents said that their cattle meet the wild animals/birds. More than 54% of respondent from both groups said that their cattle come into contacts with stray dog, fox, and vermin's etc. A lower number (59.59%) of baseline group and higher number (89.66%) of beneficiary group farmers have idea that the wild animals/birds could be a source of infection/illness of their cattle. Furthermore, both groups of farmers thought there was a risk of mixing of animals with other animals/birds causing disease of their cattle (Table 20).

Table 20: Animal environment and social safety issues: Farmer's response (%) regarding the transmission of diseases

Questions	Response	Baseline group	Beneficiary group	Percentage of Changes
How do you rear your cattle?	Under separate shed	51.47 (70)	76.24 (77)	(+) 48.13
	Inside a room	27.94 (38)	20.79 (21)	(-) 25.59
	Free ranging	20.59 (28)	3.96 (4)	(-) 80.77
Does your animal come in contract with any wild animals/birds?	Yes	42.22 (38)	28.71 (29)	(-) 32.00
	No	57.78 (52)	71.28 (72)	(+) 23.36
If yes, which animals/birds?	Migrated birds	8.57 (9)	6.90 (2)	(-) 19.49
	Dog	34.29 (36)	62.07 (17)	(+) 81.01
	Pig	2.86 (3)	6.89 (2)	(+) 140.91
	Chi/Eagle	-	3.45 (1)	-
	Others (fox, vermin Etc.)	54.29 (57)	20.69 (6)	(-) 61.89
Do you think wild animal/birds can be a source of infection/illness to your animal?	Yes	59.59 (50)	89.66 (26)	(+) 50.46
	No	40.41 (34)	10.34 (3)	(-) 74.41
Do you think there is a risk from mixing of animal with other animals causing disease of your animals?	No risk	23.46 (19)	20.79 (21)	(-) 11.38
	Some risk	65.43 (53)	60.39 (61)	(-) 7.70
	Big risk	11.11 (9)	18.81 (19)	(+) 69.31

Parenthesis indicates the number of respondents

The information about the animal environment and social safety regarding the transmission and management of diseases and the changes after implementation of the project are shown in Table 21. From Table 21, it was seen that, most of the respondents from both groups said that their children do not meet their animals. However, those children meet animals they respondents that it was not a big risk to come in contact their children with animals. This Table 21 also indicated that when their cattle become sick, they separated the sick animals with others, but some respondents said they don't do anything for the sick animals, and very few people sell their infected animals in the market. When their animal died from any diseases, most of the people of both group respondents that they buried the dead carcass, and some people said they were thrown the carcass in the open places, but the respondents' number was less. When, if there is an outbreak occurred in the neighborhood's animal, then the people taken measures not to mix their animals with the neighbor's animals, and some peoples said they vaccinated their other animals. After the handing of animals and after slaughtering and handling animal meat, about 49-84% of the peoples from both group respondents that they washed their hands with soap and water. More than 80% peoples among the respondents from both baseline and beneficiary groups said that they buried the slaughter waste properly.

Table 21: Animal environment and social safety issues: Respondents percentage regarding the transmission and management of diseases

Questions	**Response**	**Baseline group**	**Beneficiary group**	**Percentage of Changes**
Do children meet animal?	Yes	45.78 (38)	8.91 (9)	(-) 80.54
	No	54.22 (45)	91.09 (92)	(+) 68.00
Do you think there is any risk that a child can become ill after contact with animals?	No risk	15.00 (12)	12.82 (10)	(-) 14.53
	Some risk	57.50 (46)	67.95 (53)	(+) 18.17
	Big risk	27.50 (22)	19.23 (15)	(-) 30.07
What do you do when you notice a sick animal in your stock?	Nothing	21.52 (17)	9.58 (7)	(-) 55.48
	Put in separate	35.44 (28)	82.19 (60)	(+) 131.91
	Sell	29.11 (23)	8.22 (6)	(-) 71.76
	Slaughter and eat	1.27 (1)	-	(-) 100.00
	slaughter and sell	3.80 (3)	-	(-) 100.00
What do you do when any animal dies?	Throw in roadside/river/ditch /bush	15.52 (9)	4.82 (4)	(-) 68.94
	Bury	74.14 (43)	91.57 (76)	(+) 23.51
	uncover the skin & sell	6.90 (4)	1.20 (1)	(-) 82.61
	Nothing	3.45 (2)	2.41 (2)	(-) 30.14
What do you do if there is an outbreak in the neighborhood?	Nothing	12.94 (11)	7.59 (6)	(-) 41.34
	Take measures not to mixed with neighborhood animals	54.12 (46)	74.68 (59)	(+) 37.99
	Vaccinate own	28.24 (24)	17.72 (14)	(-) 37.25

	animals			
	Others	4.71 (4)	-	(-) 100.00
How often do you wash your hands with soap and water after handling/s animals?	Always	48.86 (43)	83.75 (67)	(+) 71.41
	Sometimes	35.23 (31)	12.5 (10)	(-) 64.52
	Rarely	10.23 (9)	3.75 (3)	(-) 63.34
	Never	5.68 (5)	-	(-) 100.00
How often do you wash your hands with soap and water after slaughtering and handling animal meat?	Always	46.43 (26)	90.80 (79)	(+) 95.56
	Sometimes	30.36 (17)	5.75 (5)	(-) 81.06
	Rarely	17.86 (10)	3.45 (3)	(-) 80.68
	Never	5.36 (3)	-	(-) 100.00
How do you dispose slaughter waste?	Leave them at slaughter place	8.93 (3)	11.84 (9)	(+) 32.59
	Throw in open area	1.79 (1)	00	(-)100.00
	Bury	89.29 (50)	88.16 (67)	(-) 1.27

Parenthesis indicates the number of respondents

The information regarding the animal environment and social safety issues: measures with slaughter and dead animals and the changes after implementation of the project are shown in Table 22. About 62.35% respondents from the baseline group and 67.53% from the beneficiary group of people said that there is a health risk in handling the dead animals. From both groups, about 42.13% people from the baseline group and 47.67% from the beneficiary group said that there is no health risk if they washed their hands after touching animals and before preparing or eating food. The changes of beneficiary group were positive (349.81%) on there is a big risk touching the sick and dead animals. In addition, Table 22, also indicated that more than 97% respondent people from both groups given their opinion that they washed their hands after burying or disposing of dead animal. For the washing of hands, about 53 to 63% people used soap with water and more than 26% people washed their hands with water only, and very few numbers of people used water and ash for washing their hands.

Table 22: Animal environment and social safety issues: People response (%) on the measures with slaughter and dead animals

Questions	Response	Baseline group	Beneficiary group	Percentage of Changes
Do you think there is a health risk in handling dead animal?	Yes	62.35 (53)	67.53 (52)	(+) 8.31
	No	37.65 (32)	32.47 (25)	(-) 13.76
How risky is it to your health if you do not wash your hands after touching animals and before preparing or eating food?	No risk	42.53 (37)	5.81 (5)	(-) 86.34
	Some risk	47.13 (41)	47.67 (41)	(+) 1.15
	Big risk	10.34 (10)	46.51 (40)	(+) 349.81
Do you wash your hands after burying or disposing of dead animal?	Yes	98.86 (87)	97.64 (83)	(-) 1.23
	No	1.14 (1)	2.36 (2)	(+) 107.02
What do you use in washing your hands?	Soap and water	53.52 (38)	62.38 (63)	(+) 16.55
	Water only	26.76 (19)	6.93 (7)	(-) 74.10
	Water and ash	11.27 (8)	5.94 (6)	(-) 47.29
	Disinfectant	-	4.95 (5)	
	Others	8.45 (6)	-	(-) 100.00

Parenthesis indicates the number of respondents

The information about the health safety issues of workers in the animal farm and the changes after implementation of the project is presented in the Table 23. More than 44 to 57% people among the respondents from both groups said that they have arranged for personal protection equipment (PPE) for their workers on their farm and they mentioned the available PPE in their farm was hand gloves, mask, and gumboot. The changes from baseline to beneficiary group was positive. The farmers are using the PPE from 1 to 3 years and most of the farmers respondents that they will continue using PPE by their own costs and the average costs for adaptation and maintenance was 1561.77 ±75.99 (Table 23).

Table 23: Respondents percentage on the health safety issues of workers in the dairy farm

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Do you have arrangement of any personal protection equipment (PPE) for the workers in your farm	Yes	44.68 (21)	57.43 (58)	(+) 28.54
	No	53.32 (26)	42.57 (43)	(-) 20.16
If yes, please indicate the name of the PPE	Hand gloves	28.57 (6)	87.5 (47)	(+) 206.27
	Mask	52.38 (11)	26.35 (13)	(-) 49.69
	Gumboot	19.04 (4)	87.5 (47)	(+) 359.56
How long have you been using PPE?			2.22±0.35 (45) 1 to 3 years	
Will you continue using PPE	Yes		100 (44)	
	No		00	
If yes, way to continue?	Own		97.62 (41)	
	Others Support		2.38 (1)	
Average costing for adaptation (Establishment + Maintenance cost)	Taka		1561.77 ±75.99 (34)	

Parenthesis indicates the number of respondents

Information about the health safety issues personal protection equipment's (PPE) of workers in details used in the dairy farm and the changes after implementation of the project is presented in the Table 24. When the workers clean the manure and urine in the farm, they used personal protection equipment (PPE), hand gloves as PPE in dairy farm, the respondents yes from the baseline 25.91% but the beneficiary farmers respondents 54.02% and the percentages of changes was 110.11%. The respondents are using hand globes from 6 months to 3 years. Furthermore, the respondents said that they will continue it by their own costs. The average costs for adaptation and maintenance of hand gloves were Tk 245.65 ± 8.41. The use of apron as personal protection equipment (PPE), in dairy farm, it was found that very few numbers of worker used apron during work in dairy farm but those are using it they said that they will continue it by their own costs. The average costs for adaptation and maintenance of apron were Tk 1750 ± 250. However, for the use of gumboot as PPE, more than 25% respondents from baseline and 100% from the beneficiary respondents said they are using gumboot in their dairy farm during cleaning and the percentages of changes was 300%. The farmers those are using gumboot from 6 months to 3 years during cleaning in their dairy farm they said that that they will continue it by their own costs. The average costs for adaptation and maintenance of gumboot were Tk 732.81 ± 7.93. For the risk in the workplace, the respondent said they have risk from snake bite, harmful insects and plants and others, but they could not mention the name of the risks specifically. The respondents also said if they felt in any accident, they have taken treatments and for preventive purpose some farmers-built wall surrounding their farm. Furthermore, very few number of respondents from both baseline and beneficiary group told that they have preliminary treatment facilities, hand washing facilities, toilet facilities and supply of fresh water for washing of hand and mouths of their workers. However, more than 82.3 to 96.87% respondent said they don't have separate toilet facilities for the male and female workers.

Table 24: information about the health safety issues: personal protection equipment's (PPE) of workers in details used in the dairy farm

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
When the workers clean the manures and urine are they use hand gloves as equipment (PPE) in your farm?	Yes	25.71 (9)	54.02 (47)	110.11
	No	74.29 (26)	45.98 (40)	-38.107
How long have you been using hand gloves?	Years		1.62 ±0.35 (47) 6 mo. to 3 years	
Will you continue using hand gloves?			93.33 (47)	
			6.67 (3)	
If yes, way to continue?	Own costs		85.71 (36)	
	Others Support		14.29 (6)	
Average costing for adaptation (Establishment + Maintenance cost)			245.65 ± 8.41 (43)	
When the workers clean the manures and urine are they use apron as equipment (PPE) in your farm?	Yes		6.98 (3)	
	No		93.02 (40)	
How long have you been using apron?	Years		0.9 ±0.1(4) 6 mo. to 1 year	
Will you continue using apron?	Yes		100 (4)	
	No			
If yes way to continue?	Own costs		100 (4)	
	Others support			
Average costing for adaptation (Establishment + Maintenance cost)	Taka		1750 ± 250 (4)	
When the workers clean the manures and urine are they use gumboot as equipment (PPE) in your farm?	Yes	25.00 (3)	100 (73)	(+) 300.00
	No	00.0 9)	00	(-) 100.00)
How long have you been using gumboot?	Years		1.16 ± 0.09 (62) 6 mo. to 3 years	
Will you continue using gumboot?	Yes		83.05 (49)	
	No		16.95 (10)	
If yes way to continue?	Own costs		94.55 (52)	
	Others support		5.45 (3)	
Average costing for adaptation (Establishment	taka		732.81 ± 7.93 (32)	

+ Maintenance cost)				
Is there any risk in workplace	Yes	51.35 (19)	9.09 (4)	(-) 82.30
	No	48.65 (18)	90.01 (40)	(+) 85.02
If yes, what are these?	Snake bite	9.52 (2)	75.00 (3)	(+) 687.82
	Harmful insects or plant	14.29 (3)	-	(-) 100.00
	Others	76.19 (16)	25.00 (1)	(-) 67.19
What are the measures have you taken to recover this risk at workplace?		Treatment	Treatment and surrounding wall	-
Is there any preliminary treatment for the workers in your farm?	Yes	17.65 (6)	78.57 (22)	(+) 345.16
	No	82.32 (28)	21.43 (6)	(-) 73.97
How long have you been using preliminary treatment?	Years		2.32 ± 0.15 (24) 6 mo. to 3 years	
Will you continue using preliminary treatment?	Yes		100.00 (22)	
	No		00	
If yes way to continue?	Own costs		100 (22)	
	Others support		00	
Average costing for adaptation (Establishment + Maintenance cost)			2845.45 ± 71.39 (22)	
Is there any hand washing facilities for workers in your farm?	Yes	56.76 (21)	81.63 (40)	(+) 43.82
	No	43.24 (16)	18.37 (9)	(-) 57.52
How long have you been using it?			2.92 ± 0.13 (38) 6 mo. to 4 years	
Will you continue using it?	Yes		100 (34)	
	No		00	
If yes way to continue?	Own costs		78.13 (25)	
	Others support		21.87 (7)	
Average costing for adaptation (Establishment + Maintenance cost)	Taka		2477.27 ± 204.91 (22)	
Do you have supply fresh water in your farm for washing hand and mouth of your worker?	Yes	88.89 (32)	97.61 (41)	(+) 9.81
	No	11.11 (4)	2.38 (1)	(-) 78.58
How long have you been using it?	Years		2.77 ± 0.18 (37) 1 year to 4 years	
Will you continue using it?	Yes		100 (37)	
	No		00	
If yes way to continue?	Own costs		100.00 (28)	
	Others support		00	
Average costing for adaptation (Establishment	Taka		33266.67 ± 3751.40 (21)	

+ Maintenance cost)				
Do you have good toilet facilities for your workers in your farm?	Yes	31.25 (10)	60.87 (14)	(+) 94.78
	No	68.75 (22)	39.13 (9)	(-) 43.08
How long have you been using it?	Years		1.21±0.22 (7) 6 mo. to 3 years	
Will you continue using it?	Yes		81.82 (9)	
	No		18.18 (2)	
If yes way to continue?	Own costs		100 (9)	
	Others support		00	
Average costing for adaptation (Establishment + Maintenance cost)	Taka		15,212.50 ± 3227.42 (8)	
Do you have separate toilet facilities for your male and female workers?	Yes	3.13 (1)	12.5 (2)	(+) 299.36
	No	96.87 (31)	87.5 (14)	(-) 9.67

Information about the health safety issues during pandemic diseases: personal protection equipment's (PPE) of workers in details used in the dairy farm and the changes after implementation of the project is presented in Table 25. From Table 25, among the respondents about 5.88% farmers from baseline and 89.10% farmers from the beneficiary groups said that they hanged notice board in their farm regarding health safety issues. Those have given positive response they also said that they will continue this by their own costs in their farm. The average costs for adaptation and maintenance of notice board were Tk 349.03 ± 32.89. During the COVID-19 and Dengue pandemic period, respondent people from both the group said that they faced many challenges and problems on how to survive for upcoming days and they all are concerned about the impacts of COVID-19 pandemic. A few numbers of respondents from both groups replied that they have affected by corona and dengue (Table 25). Those who were affected, they had taken measures, like isolation and treatments from a doctor over the telephone or taken / purchased medicine from the medicine shop nearby. Among the respondents more than 73% people from the both groups were faced many problems during COVID-19 pandemic, like treatments of peoples, treatments of animals, purchase of animal feed, selling of milk and milk products, and getting credits from bank and NGOs. They overcome these issues by taking loan from neighbors, relatives and communicating with others.

From the beneficiary farmers only five and eight respondents said that they separate cowdung collection center and vermi-composting facilities and they are using these facilities by the supported of IDF through SEP project mostly as grant. However, most of the users said they will continue these facilities by their own costs. The preliminary costs of adaptation of theses facilities were also bearded by the project. The farmers are maintaining the facilities for their own income.

Table 25: Information about the health safety issues during pandemic diseases: personal protection equipment's (PPE) of workers in details used in the dairy farm

Questions	Response	Baseline	Beneficiary group	Percentage of Changes
Do you hang a notice board on your farm regarding health safety issues?	Yes	5.88 (2)	89.10 (49)	(+) 1415.31
	No	88.24 (32)	10.90 (6)	(-) 87.65
How long have you been using it?	Years		1.19±0.09 (45) 6 mo. to 2 years	
Will you continue using it?	Yes		88.89 (32)	
	No		11.11 (4)	
If yes way to continue?	Own costs		80.00 (28)	
	Others support		20.00 (7)	
Average costing for adaptation	Taka		349.03 ± 32.89 (31)	
Do you face any problems during corona/dengue pandemic?	Yes	73.33 (22)	76.71 (56)	(+) 4.61
	No	26.67 (8)	23.29 (17)	(-) 12.67
If yes, what are these	Treatment of yourself	17.71 (17)	31.58 (18)	(+) 78.32
	Worker's treatment	15.63 (15)	28.07 (16)	(+) 79.59
	Treatment of animals	17.71 (17)	5.26 (3)	(-) 70.30
	Animal feed	17.71 (17)	14.04 (8)	(-) 20.72
	Marketing of milk and milk products	19.79 (19)	8.77 (5)	(-) 55.68
	Bank or NGO Credit	8.33 (8)	12.28 (7)	(+) 47.42
	Others	3.13 (3)	-	(-) 100.00
Do you have any cowdung collection centers in your farm?	Yes		7.81 (5)	
	No		92.19 (59)	
How long have you been using it?	Years		0.76 ± 0.09 (5)	
Will you continue using it?	Yes		60.00 (3)	
	No		40.00 (2)	
If yes way to continue?	Own costs		66.67 (2)	
	Others support		33.33 (1)	
Average costing for adaptation	Taka		103,375.00±554.34 (4)	
Do you have any vermi-compost on your farm?	Yes		10.17 (6)	
	No		89.83 (53)	

How long have you been using it?			0.80±0.08 (6)	
Will you continue using it?	Yes		83.33 (5)	
	No		16.67 (1)	
If yes way to continue?	Own costs		83.33 (5)	
	Others support		16.67 (1)	
Average costing for adaptation	Taka		20766.67± 266.67 (5)	

Parenthesis indicates the number of respondents, mo.=months; Tk = Taka

The information about the climatic factors and the changes after implementation of the project is presented in Table 26. About 88 to 97% of the respondents from both group peoples said that natural disaster happened due to the change of climates in their areas. They also mentioned the name of the disasters, as flood, drought, cyclone, tornado, salinity, tidal, earth quark and heavy raining. However, the highest percentage of respondents said flood and tidal is a big problem for them. The respondent farmers also said during the last 5 years, they faced problems with flood, drought and tidal. More than 50% respondents' people from both groups have taken measures by storing human and animal food and buying some medicine for preliminary treatments. Furthermore, about 76 to 89% of the respondents from both group people said the milk yield of cows were fluctuated with the fluctuation of ambient temperature. More than 75% people from the respondents of baseline group and 57% people of the beneficiary group said that the highest milk yield of cows was obtained during monsoon and second winter was because, during this period green grass are available.

Table 26: Farmer's opinion (%) on the climatic factors

Questions	**Response**	**Baseline group**	**Beneficiary group**	**Percentage of Changes**
Is there any disaster happened due to the change of climates in your area?	Yes	97.70 (85)	87.13 (84)	(-) 10.82
	No	2.30 (2)	10.64 (10)	(+) 362.61
If yes, please indicate the name	Flood	36.84 (77)	42.50 (34)	(+) 15.36
	Drought	8.13 (17)	11.25 (9)	(+) 38.38
	Cyclone	14.35 (30)	7.50 (6)	(-) 47.74
	Tornado	8.13 (17)	7.50 (6)	(-) 7.75
	Salinity	4.78 (10)	8.75 (7)	(+) 83.05
	Tidal	19.62 (41)	11.25 (9)	(-) 42.66
	Earthquake	1.91 (4)	2.50 (2)	(+) 30.89
	Heavy raining	6.22 (13)	8.75 (7)	(+) 40.68
	Others	-	-	-
List the disasters you faced last 5 years.	Flood	49.02 (25)	51.25 (41)	(+) 4.55
	Drought	41.18 (21)	21.25 (15)	(-) 48.40
	Tidal	9.80 (5)	18.75 (17)	(+) 91.33
	Salinity		8.75 (7)	-
Have you taken any steps to	Yes	63.64 (28)	82.71 (67)	(+) 29.97

overcome the disasters	No	36.36 (16)	17.28 (14)	(-) 52.48
If yes, what are these?	Storage of food and water and important medicine for preliminary treatment			
Do you think milk yield of cows are affected with the fluctuations of ambient temperature?	Yes	89.19 (33)	76.14 (67)	(-) 14.63
	No	10.81 (4)	23.86 (21)	(+) 120.72
Indicate the milk yield of cow highest in season	Winter	24.39 (10)	33.33 (14)	(+) 36.65
	Monsoon	75.61 (31)	57.14 (24)	(-) 24.43
	Summer	-	9.52 (4)	

Parenthesis indicates the number of respondents

The air, water, and sound pollution information of dairy farm from baseline and beneficiary farmers and the changes after implementation of the project is shown in the Table 27. As per the respondents of the baseline group farmers, only 3.39% farmers and from the beneficiary group 22.77% farmers have a generator in their dairy farm. However, except few people most of the respondents did not maintain proper height for setting the chimney of generator (15 ft height of land) and don't have a protective wall (canopy) for reducing the sound of the generator. Except 3 people from beneficiary group the farmers from both groups don't use any high sound producing machine (chopper, grinder etc.) in their dairy shed. Furthermore, only 6 to 6 farmers have separate pit for disposed the manure and urine. The distance of the manure pit from the farm was 2 to 300 ft for group of farmers. Most of the farms do not have a separate arrangement for separating manure and urine in their dairy shed. About 43.90% respondents said from the beneficiary people that their dairy farm has connection with community drainage canal. However, the community drainage canal built by the supported of IDF through SEP project. However, most of the users said they will continue these facilities by their own costs. The preliminary costs of adaptation of this facility were also borne by the project. The farmers are maintaining the facilities for their own income.

About 29.73% peoples of the baseline group and 29.73% people of the beneficiary group uses cow dung as a fuel. Very few numbers of people from baseline but more than 34% from beneficiary group said they has biogas facilities.

Table 27: Respondents' percentage on the air, water and sound pollution in the cattle shed

Questions	Response	Baseline group	Beneficiary group	Percentage of Changes
Do you use generator in your dairy farm?	Yes	3.39 (2)	22.77 (23)	(+) 571.68
	No	96.61 (57)	77.23 (78)	(-) 20.06
If yes, is the chimney of generator set in safety height (15 ft height from land)	Yes	100 (2)	91.30 (21)	(-) 8.70
	No	-	8.70 (2)	
Do you have protective wall (canopy) for reducing the sound of generator?	Yes		34.78 (8)	
	No	100 (2)	65.22 (15)	(-) 34.78
Are you using any high sound producing machine (chopper, grinder etc.) in your animal shed?	Yes		5.77 (3)	
	No	100 (43)	94.23 (49)	(-) 5.77
What are the measures you have taken for reducing air pollution?		-	High wall	
For reducing the air pollution are you hang a notice board in your animal shed?	Yes	-	39.27 (12)	
	No	100 (42)	70.73 (29)	(-) 29.27
How do your drainage manure and urine produced from your cow shed?	Yes		83.78 (31)	
	No		16.22 (6)	
Do you have any separate pit for dispose the manure and urine?	Yes	4.44 (2)	18.75 (6)	(+) 322.30
	No	95.56 (44)	81.25 (44)	(-) 14.97
How far the manure pit from your cow shed?		29.23 ± 54.21 (2-200) ft	34.77 ± 3.31 (62) (10-300 ft)	
Do you have separate arrangement to separate manure and urine in your animal shed?	Yes	35.19 (19)	40.32 (25)	(+) 14.58
	No	64.81 (35)	59.68 (37)	(-) 7.92
How do you have a connection between your cow shed with the community drainage canal?	Yes		43.90 (18)	
	No		56.10 (23)	
How long you are using it	Months		8.64±0.61 (3 to 12 Mo)	
Will you continue	Yes		85.71 (18)	
	No		14.29 (3)	
If yes way to continue	Own cost		77.71 (14)	
	Others support		22.22 (4)	
Average costing for adaptation (maintenance costs)			4481.25 ± 292.43 (16)	
Do you use cow dung as fuel?	Yes	29.73 (11)	42.37 (25)	(+) 42.52
	No	70.27 (26)	57.63 (34)	(-) 17.99
Do you have biogas plant?	Yes	8.57 (3)	34.88 (15)	(+) 307.00
	No	91.43 (32)	65.12 (28)	(-) 28.78

What kind of raw material you use in your biogas plant?	Cow dung			
How long you are using it	Months		13.2±1.68 (6 to 24 Mo)	-
Will you continue	Yes		87.50 (8)	-
	No		12.50 (1)	-
If yes way to continue	Own cost		75.00 (6)	-
	Others support		25.00 (2)	-
Average costing for adaptation (Adaptation and maintenance costs)			68037.50 ± 466.75 (8)	
What do you do by the used syringe, needle, bottle, and others treatment debris?	Thrown	22.22 (2)	7.31 (3)	(+) 307.00
	Buried	77.78 (7)	92.68 (38)	(-) 28.78

Parenthesis indicates the number of respondents

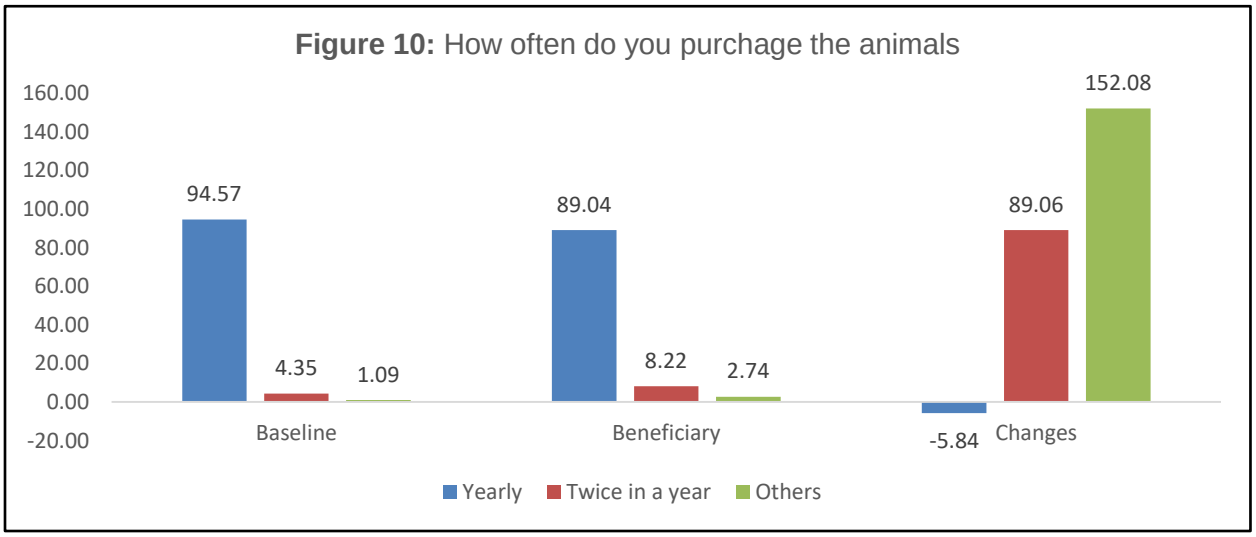
Those have biogas plant they use cowdung as raw material for this plant. Those have given positive response they also said that they will continue this by their own costs in their farm. The average costs for adaptation and maintenance of biogas plant were Tk 68037.50 ± 466.75. Some farmers also got support from IDF through SEP project for adaptation of biogas. More than 78% people among the respondents of the baseline group and 93% people of beneficiary group people said that they buried the used syringe, needle, bottle, and others treatment debris and the rest of the people thrown it.

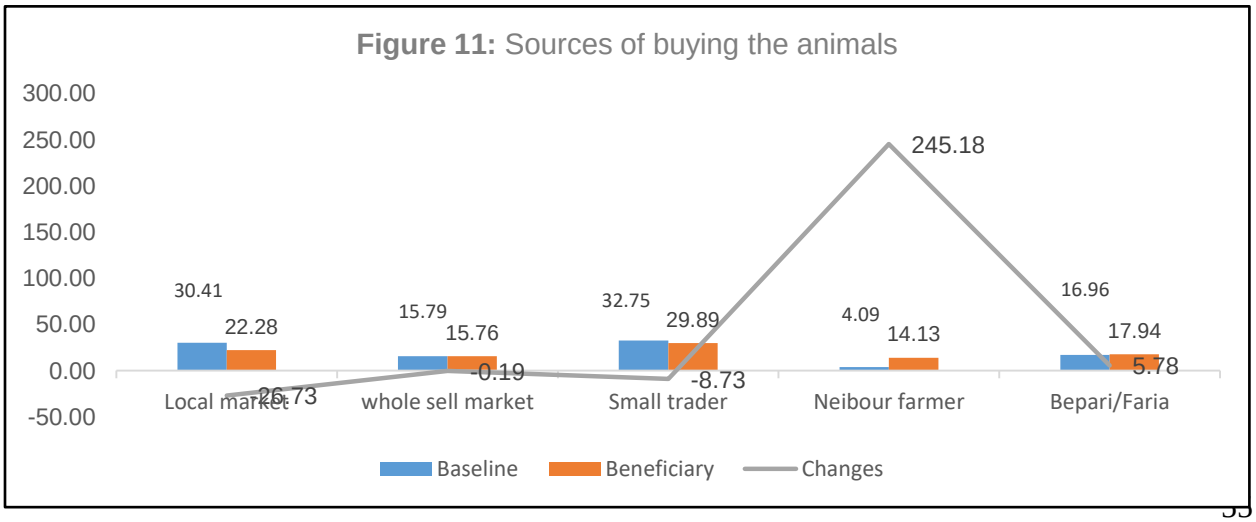
7.5. Module 5

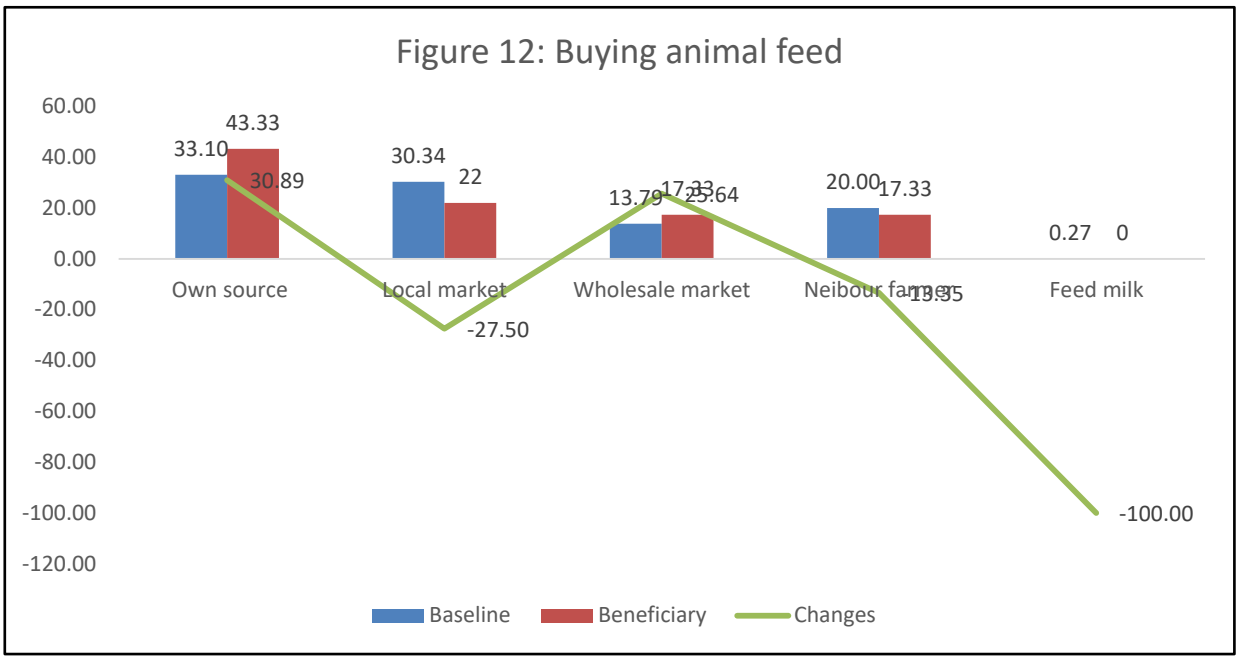
7.5.1 Section E: Opportunities of livestock entrepreneurs and value chain development

7.5.1.1. Purchases of animals

Among the respondents of the farmers, 94.57% people in the baseline group and 92.00% of the beneficiary group buy their animals, mainly once a year, however, the rest of the people buy their animals twice a year Figure 10. The percentage of people of the baseline and the beneficiary group buys their animals from different sources and its changes from baseline to beneficiary is shown in Figure (11). The beneficiary group people, mainly buy their animals from local market and small traders, Bepari/Faria and neighbor farmers whereas the baseline group people buy their animals from local market and small traders, Bepari/Faria (Figure 11). The percentage of people of the baseline and the beneficiary group buy / use their animal feed from the sources, like, own, local and wholesale market, neighbors' farmers sources are shown in Figure 12. The people of the beneficiary group mainly used the animal feed from their own sources and buy mostly from the local market, and the baseline group people buy their animal feed from the local and wholesale market and the changes was positive (Figure 12). Both groups of people respond that their animals did not die after purchasing.







7.5.1.2. Selling of animals and animal products

Information regarding the selling of animals and animal products and the use of cow dung is presented in the Figures 13 to 16. Figure 12 indicated that a higher percentage of the beneficiary group people sell their animals to the local market followed by other sources, whereas the highest percentage of baseline group farmers sell their animals to the small traders followed by Bepari / Faria and the changes is shown in line in the Figure (13). Among the constraints of selling the animals (Figure 14), most of the respondent's people said that low price, distance of markets, Bapari / Faria interference and transportation, among them highest percentage of people indicated the low price and Bapari / Faria interference is a main constraint. Available transportation facilities for carrying the animals to the market is walking of the animals, rickshaw/van, motor vehicle, and others in the studied area. Mainly people of both groups carry their animals to the market by walking themselves followed by motor vehicle (Figure 15) and the changes was positive. The places for selling of animals and their products are shown in Figure 16. Figure 16 indicated that among the respondents, higher percentage of people from the baseline group sells their animal and animal products in them at the Upazila market and the beneficiary group people sell their animals and animal products at the Upazila market followed by in yard.

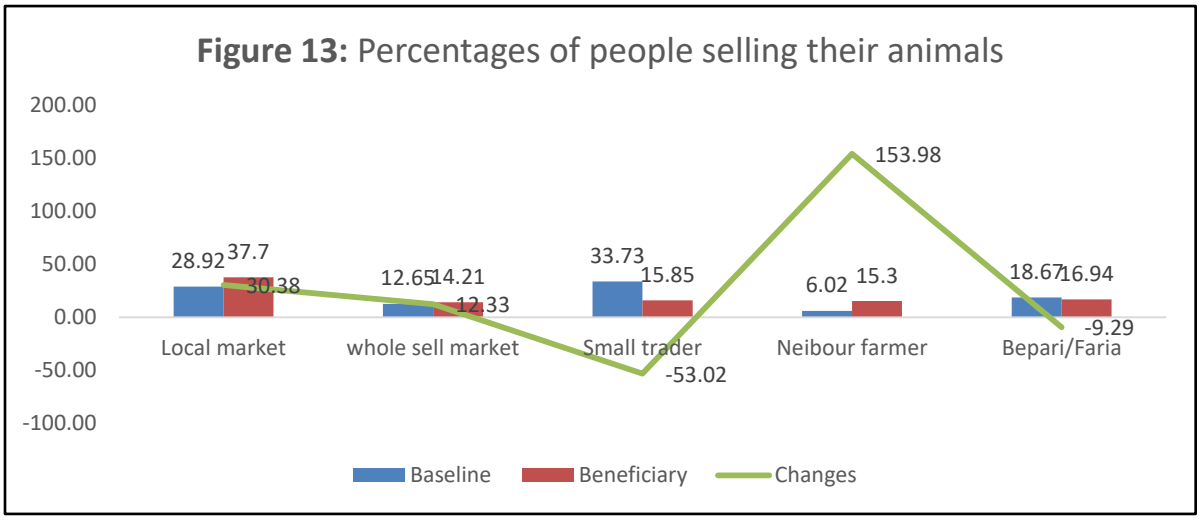


Figure 13: Percentages of people selling their animals
200.00
150.00
100.00
50.00
0.00
-50.00
-100.00
28.92
37.7
30.38
12.65
14.21
12.33
33.73
15.85
-53.02
6.02
15.3
153.98
18.67
16.94
-9.29
Local market
whole sell market
Small trader
Neibour farmer
Bepari/Faria
Baseline
Beneficiary
Changes

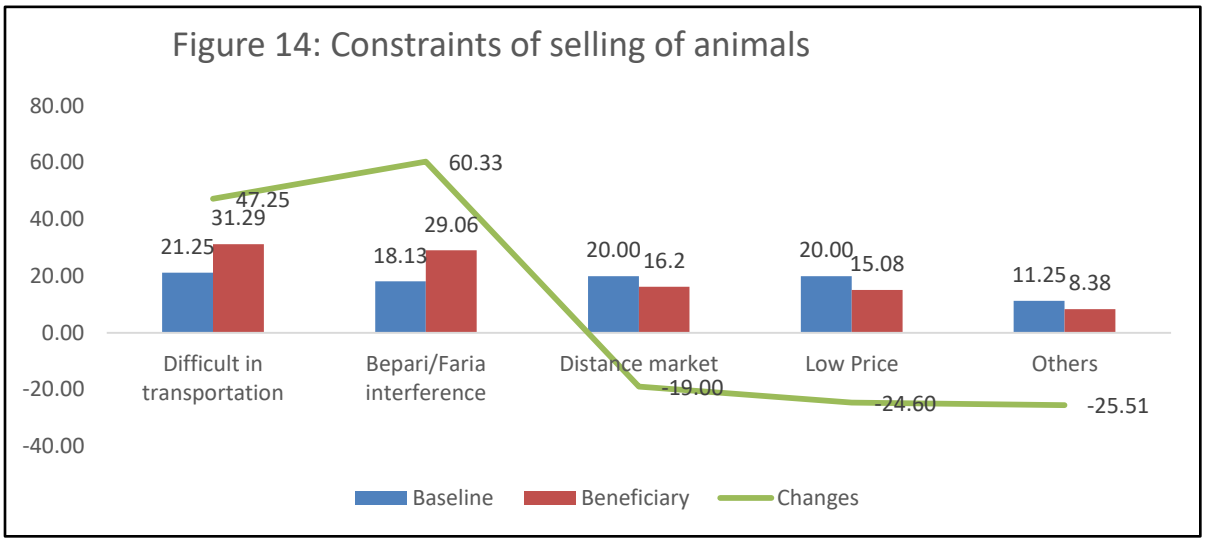


Figure 14: Constraints of selling of animals
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
21.25
31.29
47.25
18.13
29.06
60.33
20.00
16.2
-19.00
20.00
15.08
-24.60
11.25
8.38
-25.51
Difficult in transportation
Bepari/Faria interference
Distance market
Low Price
Others
Baseline
Beneficiary
Changes

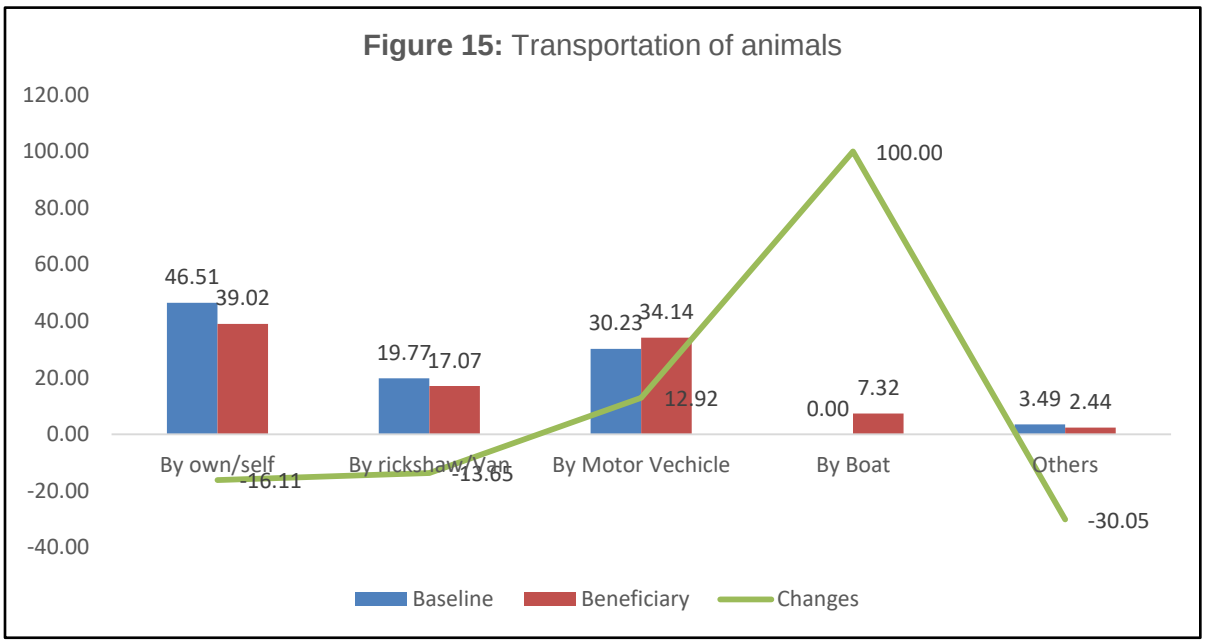
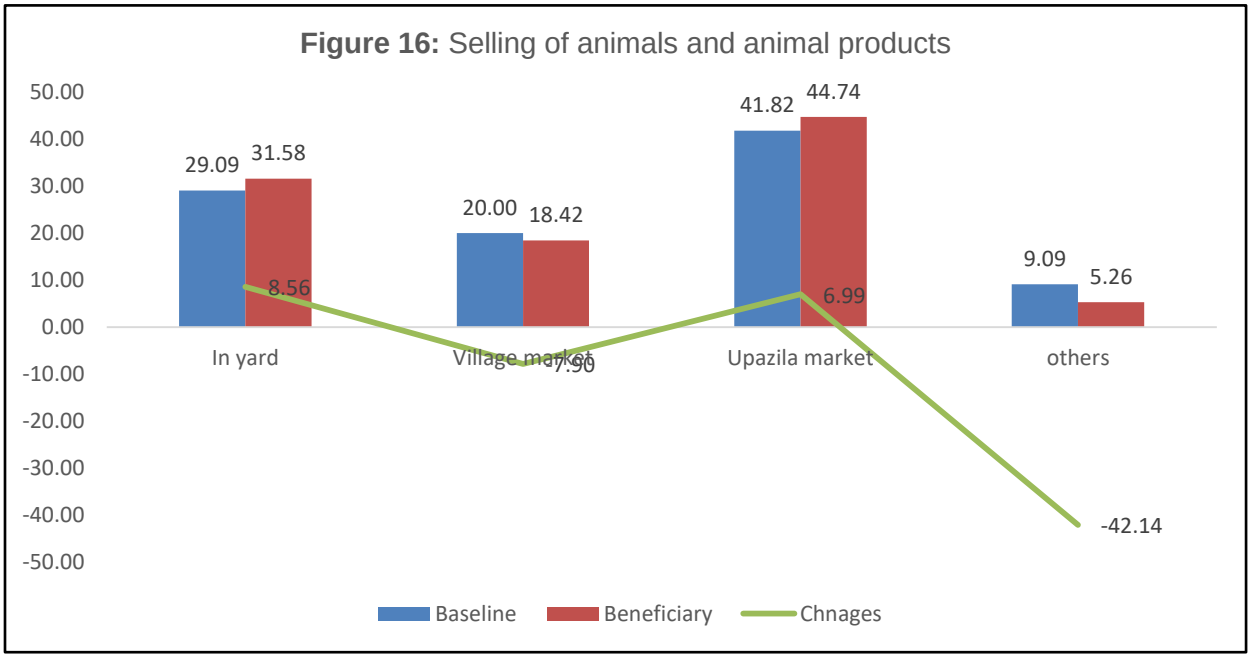


Figure 15: Transportation of animals
120.00
100.00
80.00
60.00
40.00
20.00
0.00
-20.00
-40.00
46.51
39.02
-16.11
19.77
17.07
-13.65
30.23
34.14
12.92
0.00
7.32
100.00
3.49
2.44
-30.05
By own/self
By rickshaw/Van
By Motor Vechicle
By Boat
Others
Baseline
Beneficiary
Changes



The information about the marketing of milk and milk products and its changes from baseline to beneficiary group is presented in Table 28. The Table 28 showed that most of the people sell the raw milk, and the milk price depends on volume only. Some people respondents that there is a milk processing plant (Milk-Vita) at the studied area Sikolbha (greater Patiya Upazila) of Chattogram district and they get milk price from them based on fat percentages. Mostly farmers sell their milk in yard to the Bepari / Faria and they get milk price from taka 56 to 62. However, some farmers sell their milk directly to the marker, to IDF etc. and IDF pay them Tk 68 per kg of milk.

Table 28: Peoples response (%) on the marketing milk and milk products

Questions	**Response**	**Baseline group**	**Beneficiary group**	**Percentages of Changes**
Do you sell raw milk?	Yes	96.88 (31)	100 (73)	(+) 3.22
	No	3.13 (1)	00	(-) 100.00
Milk price depends on.	Volume	100 (34)	97.26 (71)	(-) 2.74
	Fat percentage	-	2.74 (2)	(+) 100.00
	Protein percentage	-	-	
	Fat+Protein content	-	-	
	Others	-	-	
To Whom you are selling raw milk	Bepari/Faria		55.10 (27)	
	Own		6.12 (3)	
	IDF		12.24 (6)	
	Milk Vita		4.08 (2)	
	Fulkoli		22.45 (11)	
Selling price per Kg milk	Taka		57.74 ±0.36 (73)	

			56 to 62	
Do you have any milk processing plant in your area?	Yes	65.79 (25)	65.75 (48)	(-) 0.06
	No	34.21 (13)	34.25 (25)	(+) 0.12
Do you know IDF has a milk processing plant in your area	Yes		37.14 (26)	
	No		62.85 (44)	
Do you sell your cow's milk to the IDF milk processing plant?	Yes		4.35 (3)	
	No		95.65 (66)	
How much price do you get from the IDF milk processing plant	Taka		68.00	
Do you know the name of any milk processing technique?	Yes	44.74 (17)	46.77 (29)	(+) 4.54
	No	55.26 (21)	53.23 (33)	(-) 3.67
If yes, what are these?	Pasteurization	58.82 (10)	58.81 (10)	(-) 0.02
	Homogenization	5.88 (1)	13.53 (3)	(+) 130.10
	Fortified milk	-	-	-
	skim milk	11.76 (2)	10.00 (2)	(-) 14.97
	Others	23. 53 (4)	17.65 (4)	(-) 24.99
Does the IDF milk chilling plant produce any milk product	Yes		6.93 (7)	
	No		93.07 (94)	
Does IDF milk chilling plant produce any milk product?	Yes		-	
	No		100 (7)	

Parenthesis indicates the number of respondents

Furthermore, about 45% people respondents from the baseline and 47% from the beneficiary groups said that they knew the name of the milk processing technique, and that is pasteurization, homogenization, skim milk and ghee of milk. Only 7 people occasionally supply milk to the IDF, and they do not have any idea that IDF produce any milk products. Presently after collection of raw milk IDF chilling and pasteurization the milk and sell it to the consumers.

For livestock farming, the input like, cow, bull calf, heifer, semen, animal feed, vaccine / drug, cattle shed / stat / equipment's or others were purchased / received by both the baseline and beneficiary groups from different market and government and non-governmental organization. Farmers from both groups, mainly purchased bull calf for fattening, semen for insemination of the cows', cattle feeds and vaccine and medicines for their cattle.

The information of women's participation in the livestock rearing and decisions about family consumptions is presented in Table 29**.** Usually both the woman and men take care for their animals and the value for the baseline group, 64.29% and for the beneficiary group 80.49% among the respondents. A similar pattern was seen for taking the decision on consumption of the livestock and livestock products by both groups. However, the changes were mostly in favour to beneficiary group.

Table 29: Respondent's percentage on woman's participation with livestock rearing and consumptions

Questions	Response	Baseline group	Beneficiary group	Percentage of chnages
Who takes care of livestock (animal)?	Woman	14.29 (2)	4.88 (4)	(-) 65.85
	Men	21.43 (3)	10.98 (9)	(-) 48.76
	Both	64.29 (9)	80.49 (66)	(+) 25.19
	Children	0.00	0.00	00
	Paid labour	0.00	3.66 (3)	(+) 100.00
Who takes the decision on consumption of the livestock and livestock products?	Woman	18.18(2)	-	(-) 100.00
	Men	18.18 (2)	-	(-) 100.00
	both	63.64 (7)	100 (82)	(+) 57.13

Involvements of peoples with different livestock rearing aspects are shown in Figure 18. For the collection of milk, among the respondents from the baseline group, it was seen that both men and women and from both groups were involved. However, in case of beneficiary farmers the paid labour involvement was also increased. For feeding and watering of livestock, almost the same percentage of men and women was involved. On the other hand, for slaughtering maximum respondents said that a higher percentage of men were involved in this activity. For washing, among the respondents the baseline group people said that adult male and the beneficiary group said both men and women were involved; and for disposing adult men and women disposed the dead animal.

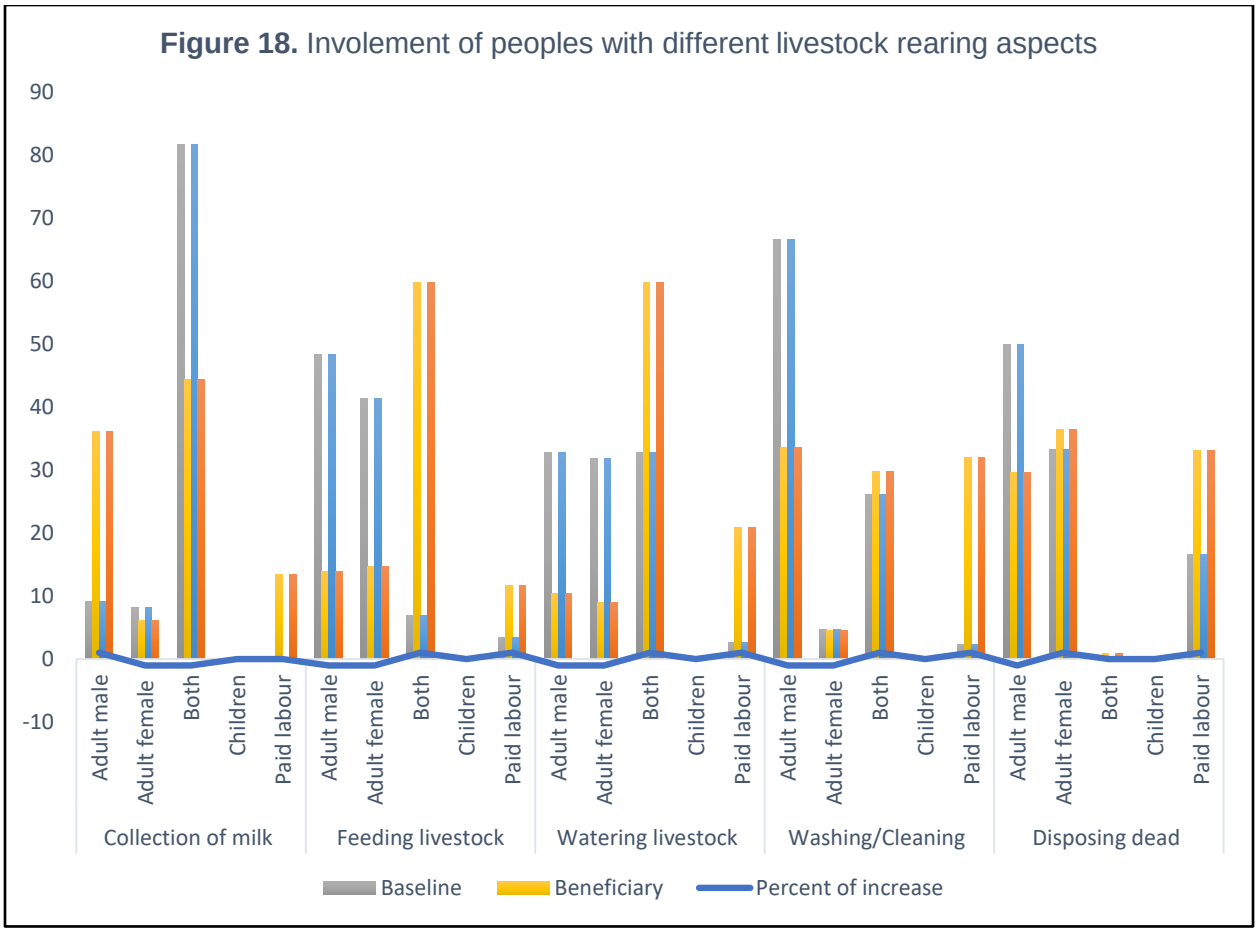


Figure 18. Involement of peoples with different livestock rearing aspects
90
80
70
60
50
40
30
20
10
0
-10
Adult male
Adult female
Both
Children
Paid labour
Collection of milk
Feeding livestock
Watering livestock
Washing/Cleaning
Disposing dead
Baseline
Beneficiary
Percent of increase

8. Business information

8.1. Fodder Production

In this impact study 101 beneficiary farmers households were surveyed, and it was found that more than 89 respondents cultivated perineal grasses among them 83.17% farmers cultivated Napier (*Pennisetum purpureum*), and rest of the farmers cultivated Para (*Brachiaria mutica*), and German (*Echinochloa polystachya*), grass. It was seen that more than 20 respondents cultivated fodders Napier (*Pennisetum purpureum*), and German (*Echinochloa polystachya*), grasses for their cows as well as they sale their cultivated green fodders to their neighbours farms and local market and they have taken it as a business. The case studies were presented in Table 31. In this Table 31, two farmers dairy farming and fodder production costs and benefits were presented. The farmer 1, (Mrs. Monwara Begum) having 15 milking cow and produces milk 120 to150 liter milk per day and sale the raw milk to Fulkoli and get milk price per kg 63 taka at farmgate. She cultivated Napier and German in about 200 acres of land, the land was taken lease from the landowner. She produces grasses for her cattle and excess about 25% fodders sold in the neigbours and local market.

Table 31: Costs and benefits for fodder production per year per acre of land

Name of Farmers	**Parameters**	**Grass**	
		Napier	**German**
Mrs Monwara Begum	Total Land (Acre)	120	80
	Costs (Taka)		
	Land lease	15,000.00	10,000.00
	Land preparation	6,000.00	6,000.00
	Cutting price	20,000.00	16,000.00
	Labourer	12,000.00	10,500.00
	Fertilizer	2,700.00	2,200.00
	Vehicle (transport)	90,000.00	90,000.00
	Total costs	145,700.00	134,700.00
	Benefits (Taka)/ acre of land		
	Production per cut (kg)	7500	6000
	Cut per year	8	8
	Yearly production (kg)	60000	48000
	Price per kg fodder (Taka)	4.00	4.00
	Total Sale price/year (Taka)	240,000.00	192,000.00
	Total income (Taka)	94,300.00	57,300.00
	Sale proceeds (25%)	23,575.00	17,190.00
	Total Income from all land	28,29,000.00	13,75,200.00
	Total annual income from fodder production		42,04,200.00
Mr. Jahed Ali	Total Land (Acre)	12	
	Total income per acres (Taka)	94,300.00	
	Sale proceeds (5%)	4715.00	
	Total Income from all land (Taka)	56,580.00	
	Total annual income from fodder production (Taka)		56,580.00

And the farmer 2 (Mr. Jahed Ali) having 30 to 35 milking cows and produces about 350 to 380 kg milk per day and sold the milk in the Chattogram metro polytan area and milk sale price was 70 to 75 Taka. He usually cultivated fodders for his cattle however about 5% fodders were also sold as a regular basis.

Usually, the farmers prepared their fodder land and after planning the fodders cutting, they have done the required intercultural operations and, started cut the fodder after 60 days from planting and then every 30 to 45 days they cut the fodders. There were more than 20 farmers were involved with fodder production and they took it as a business. The table 33, showed that the fodder production is a profitable venture and farmers can take it as a business. For fodder production the farmers obtained training and technical support from IDF and DLS.

8.2. Vermi-composting

The impact study observed that there were 12 farmers were involved with vermi composting and among them 5 were taken it as a business. A cost benefit of vermi composting is presented in the Table 32.

Table 32: Costs benefits from vermi-composing

Item	**Taka**	**Remarks**
Cow dung collection center	103,375.00	Supported by IDF through SEP project
Vermi composting	20,766.00	
Operation costs for preparing one ton		
Cow dung purchase / collection price	8000.00	
Earth worm price	3000.00	
Labour costs	2000.00	
Gunny bag	1000.00	
Vehicle costs	1000.00	
Total costs	15,000.00	
Income		
From compost sale (16 Taka/kg)	16,000.00	
Earth worm sale	3000.00	
Total income	19,000.00	
Profit per batch	4,000.00	
Yearly income (6 batch per year) (Taka)	24,000.00	

Usually, the vermi composting farmers used cowdung from their own farm, however, sometimes they also purchase cowdung from their neighbour farmers with a minimum cost. They purchased the earth worm and with a one taka per piece. Most of the time the farmers work themselves in their farm but sometimes they used paid labour. They sale vermi compost to their neighbour farmers and sometimes in the marker or NGOs. Usually, farmers use vermi compost in the crop land. For vermi composting the farmers obtained training and technical support from IDF and other NGO. However, IDF supported to build the cowdung collection shed and vermi composting places to their member farmers through the SEP project.

8.3. Milk and milk products

IDF collected raw milk from their member farmers and pay 68 to 76 taka per kg of liquid milk and after collection they processed it in their milk chilling plant and College Bazar, Karnafully, Chattogram. IDF milk chilling plant is not operating fully however, at present they packaged and chilled the collected milk and sale it in the market in limited amount.

However, there were some IDF beneficiary farmers they produce various milk product and sale it to the market. The farmers taken loan and trainings and other logistic supports from IDF. The case studies are reported here, (1) Mr. Mohammad Hafez Amed is a sweetmeat maker and has a shop at Boropura, Sarkerhat at Potiya. He produces several milk products such as Sweetmeats (Kalogam, Lalmohan, Chamcham, Sandesh, Sponge sweetmeat etc.) He also produces dahi and matha. His sale proceed per week is 1.5 to 2.0 lakh per week. (2) Mr. Hanif at College Bazar, Karnafully also produces different kind of milk products such as chana, Sandesh etc. They purchase the raw milk from the dairy farmers regularly and pay per kg raw milk is 65 to 68 Taka and after processed and make the products he sale it to the consumers through his shop. Both the sweetmeat makers respondents that it's a profitable business and they will continue it.

8.4. Biogas plant

The impact study reveals that there were some farmers they have biogas plant and they run it for their own source of energy. The farmers setup biogas plant by the assistance of the IDF and they have also taken training from IDF and other NGS. However, 3 to 5 farmers taken it as a business. Although the initial cost to establishing the biogas is higher but once it's set up then the operational cost is very low. Usually, farmers operated their biogas plant using their own dairy farms cowdung. The farmers use the biogas as their source of cooking and lighting in their farm. Some farmers also sale the biogas to their neighbours they connected their furnace with the biogas and the incumbent is paying Taka 1000.00 per furnace per month. The biogas plants farmers respond that may be profitable if they can make bigger biogas plant because from the biogas plants farmers are getting fuel and manure.

9. Credit facilities and Utilization

About 94% (95 out of 101) people from the beneficiary group taken loans from the IDF and average loan was Tk 216,494.85±17953.57 (95)) per household. On the other hand, maximum number two people taken loan from the other NGOs, other respondents taken loan from relatives, middlemen and bank for dairying (Table 33). The peoples of both groups received credits from other sources like, BRAC bank, Middleman/Goala for dairying. The interest rate of of bank and NGOs was 12 to 15%.

Table 33: Sources of credit for dairy farming

Source	Loan amount	Interest rate (%)	Credit dues (total)
From relatives	120,000.00±74832.61(2)	0	Whole amount
From Neighbor	00		
From Bank	500,000.00±00 (1)	12.0	350,000.00
Middleman/ Goala	35,000±00 (1)		
Milk collector/ Processor	00		
IDF	216,494.85±17953.57 (95)	15%	60%
Other NGO	650,000.00±470814 (2)	15%	50%
Others	-	-	-

The information regarding soft loan and grants by IDF for ecofriendly dairy farming is presented in Table 34. They have given mainly soft loan to the farmers but through the SEP project they have given grant to the farmers (Table 34). Among the respondents 100% farmer said that they have not faced any problems for receiving the funds from IDF. In addition, they received SEP projects support in time. Mostly farmers have taken loan for dairying, however some farmers utilize this fund for business as well. Framers are paying equated monthly instalment (EMI) weekly basis. Furthermore, farmers replied than this loan assists to increase their livelihood.

Table 34: Distribution of credit /loan by IDF for dairy farming

Source	Loan amount	Percentage
Credit/Grant	Credit	81.81 (99)
	Grant	18.19 (22)
Year of taken	Credit	2021, 2022
	Grant	2022
Received amount (Taka)	Credit	216,494.85 ±17953.57 (97)
	Grant	44318.18 ± 9760.73 (22)
Do you face any problems during receiving funds?	Yes	00
	No	100.00 (26)
Have you received SEP fund on time?	Yes	100.00 (24)
	No	
Which one is good?	Credit	9.09 (2)
	Grant	90.91(18)
Will you take credit/grant again	Credit	79.17 (19)
	Grant	20.83 (5)
What purpose do you have use of this money	Farming	30.00 (6)
	Others (farming+ business)	70.00 (14)
How you are paying the EMI	Weekly	96.15 (25)
	Bi-weekly	00
	Monthly	3.85 (1)
Do you think credit/grant assist in improving your livelihood?	Yes	95.65 (22)
	No	4.35 (1)
How it assists you to improve your livelihood	Farming	34.78 (8)
	Business	13.04 (3)
	Faming + Business	47.82 (11)

Parenthesis indicated number of observations. EMI =

The physical activities of the project were visited directly by the survey team leader and visited the office for observation of the official activities. The different activities of the project activities are presented in the Table 35. The main activities were (i) non- revenue generating activities (ii) initiatives to increase Eco-labeling and access to premium market (iii) Capacity building at Office and (iv) Capacity development of MEs. These activities were proposed in the proposed activities and at the end it was achieved by the SEP project through IDF.

Table 35: Information regarding the physical activities at project Office

Sl No		Activity	Unit
1. Non-revenue generating activities			
	1.1	Development of cowdung collection center with shed	5
	1.2	Community drainage system development (Farm to drainage place)	5
	1.3	Weighing machine for cowdung	5
	1.4	Public toilet and urinating place with water supply	2
	1.5	Rump development at market (For connection of marketing facilities)	2
	1.6	Eco-friendly cow comfort shed	69
2. Initiatives to increase Eco-labeling and access to premium market			
	2.1	They have organized workshop and meeting for	8
	2.2.	environment certification,	12
	2.3	Product certification	11
	2.4	Business certification	11
	2.5	Development of website, media coverage and e-marketing systems	-
3. Capacity building at Office			
	3.1	All the officers and staff have been requited in the project in time	
	3.2	Well set-up office with computers and furniture's and maintained all records file and documentation	
4. Capacity development of MEs			
	4.1	Provided training to the MEs on Fodder cultivation, vermi composting, sustainable dairy rearing, paravet, vaccination and deworming campaign, environment club and developed training manuals	Lum sum
	4.2	Organized workshop with feed and medicine seller, inception and project closing workshop,	Lum sum
	4.3	Organized environmental fair, livestock fair and milk fair	Lum sum


A
গোবর সংরক্ষণাগার


B


C


D


E


F


G


H
Animal Health Center

Picture: A= Cowdung collection center; B=Vermi-composting; C and D= Community drainage; E= Rump in Cattle market; F and G= Public toilet and urinating place; H= Office room.

10. Sub-project Level Progress of Results Framework

Project Development Objective (PDO) Indicator

1. **PDO Indicator 1:** Microenterprises targeted by the project that have adopted at least one environmentally sustainable practice – 399 No. out of 500

2. **PDO Indicator 2:** Share of target beneficiaries with rating "satisfactory" or above on project interventions (disaggregated by gender) – Male: 35.64% Female: 64.36%

3. **PDO Indicator 3:** Targeted microenterprises that continue the adopted environmentally sustainable practice (disaggregate by gender of ME owner): Male: 35.00 % Female: 65.00%

Intermediate Result Indicator (IRI)

Component 1: Enhancing services facilities and enabling systems

1. Revenue generating common services: 84.61% (N =11)

2. Non-revenue generating common services: 67.00% (N = 4)

3. Eco labeling and access to premium markets: 82.00% (410 out of 500)

4. Capacity building of the MEs: 75.63.00% (605 out of 800)

Component 2: Strengthen access t finance for environmentally friendly and resilient microenterprises

Component 3: # of microenterprises that sign loan agreements with Pos under the project (% of which female owned enterprises): 76.00% (380 out of 500).

*The source of data is impact study survey and visit of farmers household and IDF office.

Conclusions and Recommendations

The following recommendations for achieving better results at the end of project operation:

- The project tried to facilitated and motivated MEs for constructing environmentally friendly animal shed using transparent and heat tolerance shed materials and established modern facilities like manure and urine separation etc. Moreover, the project has not taken initiatives on control odor, insects, and mosquito breeding, properly dispose of dead animal, purchase medicine from an authentic source, medical waste management, and to ensure quarantine facility for newly purchased animals.
- To maintain friendly environment, project established some cowdung collection center with vermi-composting in the project areas and increases the involvement of the MEs for vermi-composting. However, a greater number of ME's should be involved in an appropriate manner.
- Project have taken steps to ensure health and safety equipment, personal protection equipment (PPE) for workers and first aid box at farm level and the awareness buildup of the MEs to maintain all the health safety issues.
- Project has establishment biogas plant as the source of fuel. However, a greater number of farmers should be involved using biogas as a source of fuel, and project have not taken initiatives for treatment of purification of drinking water and preservation of rainwater for the MEs.
- To increase the knowledge of the MEs, project has given hands-on training (fodder production, vermi-composting, sustainable dairy rearing, development of paravet, vaccination and deworming campaign, developed environment club and developed training manuals) with more duration to the farmers. Therefore, most of the parameters increases positively. Furthermore, project has 108 developed paravet by provided necessary training to provide service to the farming community. However, at the same time an effective linkage with the Department of Livestock Services and relevant Govt. Departments channeling support and assistances e.g., technical, legal, business environment, etc. in a sustainable manner should be developed.
- Project has established a milk chilling/processing plant in the project area, and this plant collecting milk from the MEs and after chilling its marketed and in near future it will be facilitated to the MEs for milk marketing, by forming a cooperative and linkage with the market.
- Project built some farmers to be a commercial producer of perineal fodders, vermi compositing and milk product producer, to be a business venture and all these activities are environment friendly. However, a greater number of farmers involvement in near future in this business will increases socioeconomic status of the people in this locality.
- Project has improved the technical (environment friendly production/ farming, processing, farm management, marketing, and pandemic (COVID-19/ Dengue) awareness, etc.) but could not develop business (business development, value chain

development, linkage-networking with service providers, etc.) capacity building for the MEs.

- Private sector engagement is essential for the production, processing, and marketing (for e-marketing project has developed a e-website and its partially functioning). It should be full operating in near future.
- Project has created scope of access to finance for developing affordable loan product and introducing but insurance system to help MEs in expanding farm through developing partnership through the mapping service provider is not develop.
- For increasing the household's income project may take the initiative to introduce improve the genetics of cows to produce more milk with fewer number of milking cows by allowing artificial insemination with superior genes to increase milk production in a safe environment.
- Most of the farmers were female therefore, project has taken initiative for increasing more female ownership of the farm for availing outside opportunities through women entrepreneurship development.
- It is recommended to extend this project for next 3 (three) years to complete all the above recommended activities with other proposed activities in the project proposal.

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