PERFORMANCE
EVALUATION REPORT

Submitted to

DRDF – USAID Dairy Project
6-B/3, Gulberg 3, Lahore

Submitted By

SEBCON Pvt. Limited

Contents

LIST OF TABLES & FIGURES

EXECUTIVE SUMMARY

Services of SEBCON, Islamabad were hired by Dairy and Rural Development Foundation (DRDF) to collect information about farmers, AITs and WLEWs on selected performance indicators listed in the Performance Monitoring Plan (PMP). For the farmers, a baseline and an end-line survey was carried out to see the impact of the program through adoption of best practices and milk yield.

The dairy project launched by US-AID and DRDF in 2011 aimed at realizing the tremendous potential of dairy farming in Pakistan for improvement and growth. The main objective was to increase the income of small dairy holders by increasing the milk yield of their animals. The project has attempted to achieve its objectives by enhancing the awareness of dairy farmers about the latest dairy farm practices, by implementation of modern methods of dairy farming, and by ensuring ready availability of livestock services and inputs at farmers' doorsteps. The dairy project has employed a four-fold approach of training 9,000 dairy farmers in best dairy farm practices, training of 2,000 artificial insemination technicians (AITs) and establishing them as self-employed entrepreneurs, training of 5,000 women livestock extension workers (WLEWs) and establishing them as small entrepreneurs, and a mass awareness campaign on electronic and print media to increase knowledge of best dairy farming practices. The project has also organized supply-chains for liquid nitrogen, semen, vaccines and cattle feed in the project areas.

A sample of 337 farmers, 123 AITs and 346 WLEWs spread across 10 districts of Punjab was used in this survey. Majority of the trainee farmers (47 percent) had ages between 21 and 30 years indicating the involvement of a relatively younger age group in the dairy profession. This promises better sustainability for the projected changes. The average annual household cash income of the baseline group of farmers was Rs. 477,763 and its major sources included dairy with 34 percent, crops 39 percent and off-farm income 25 percent. The average annual household cash income of the end-line group of farmers was Rs. 558,384, including dairy income with 34 percent, income from crops 37 percent and off-farm income 25 percent.

The animal distribution in the herd showed not significant difference for the end-line and base-line groups. The three most frequent cattle breeds kept by farmers were: Sahiwal (30.0 percent), Du-Ghali (crossbred) 12.6 percent and Holstein-Friesian (local-cross bred animal from imported semen) 10.8 percentHolstein-Friesian (imported-pure bred) 8.5 percent. The breeds of buffaloes were Nili-Ravi 93.9 percent and Desi 3.7 percent. According to the information reported by the survey respondents, on an average, per animal daily milk production increased by about 17.1 percent as compared to the daily per animal milk production before receiving training from DRDF.

It is important for farmers to grow and preserve quality fodder for animal feeding because the fodder supply in Pakistan is seasonal and shortage has been a recurrent problem historically. In our survey, about 17.8 percent farmers faced shortage of green fodder and 38.3 percent farmers faced shortage of dry fodder. They spent on average Rs. 43,004 on the purchase of fodder per year other than self-cultivation. Like fodder concentrated feed is one of the important source of nutrition for animal.

Concentrates were fed to milking dairy animals by 68.8 percent of the farmers before the training and the number increased to 81.8 percent according to the end-line survey. The baseline group fed oilseed cakes (traditional concentrate) in 53.7 percent cases, and a balanced mixed ration in 19.6 percent cases.

In the end-line survey, 41.1 percent farmers reported to have used oilseed cakes, and 47.6 percent had used a balanced mixed ration.

Deworming of dairy animals was regularly carried out by 48.1 percent farmers before training and by 66.7 percent end-line farmers. More sources of anti-parasitic medicines were available to end-line farmers in their own villages viz. from WLEWs as compared to the baseline farmers. Teat dipping is another important best dairy farming practice which prevents mastitis in animals. Baseline survey shows that 5.3 percent farmers dipped teats in disinfectants for the prevention of mastitis and 1.5 percent performed "Surf" tests for the early detection of subclinical mastitis. The end-line survey showed an increase in these numbers: 38.7 percent farmers dipped teats and 19 percent did "Surf" tests indicating a positive impact of the training.

Improvement in calf rearing practices due to the training was observed in the comparison of baseline group with end-line group. The calf rearing practices improved due to the training and a higher percentage of farmers reported to have recorded milk production (15.5 percent) and breeding records (30.4 percent) in the end line as compared to the baseline. The vaccination indicators also showed improvement: 78.58 percent farmers of the end-line group had their animals vaccinated against FMD and HS, whereas 58.5 percent farmers of the baseline group used these injections. More service providers for vaccinations (WLEWs) were available to end-line farmers in their own villages as compared to the baseline farmers.

The records of 346 WLEWs indicated that they performed an average of 67.37 services/transactions during the past 90 days, ranging from 4 to 1112 services. Services provided by surveyed WLEWs are as follow: HS vaccinations (2016), treatment of cough/fever/diarrhea (1854), sale of concentrates (1343), FMD vaccinations (1124), treatment of parasitic infections (1075), treatment of indigestion (793), sale of vaccines/medicine (650), treatment of tympany (551), wound dressing (475), other cases (349), treatment of mastitis (265), sale of fodder seed/fertilizer/insecticide (102) and milk collection (31) .The average monthly income of WLEWs in the last 3 months was Rs. 6,018, ranging from Rs. 2,718 to Rs. 11,108. The average total monthly expenditure was Rs. 4,278, which included the cost of Vanda (Rs. 3,554), cost of medicine (Rs. 641), and cost of transportation (Rs. 83).

On average, AITs performed 99 AI services during the past 90 days, ranging from 0 to 1345. The types of semen used included Holstein-Friesian (imported) 8 percent, Holstein-Friesian (local) 20 percent, Sahiwal 37 percent, Nili-Ravi 24 percent, Brown Swiss 1 percent, Jersey 2 percent, and others 8 percent. The average number of pregnancy tests performed on self-serviced animals was 14.3 per month and for animals serviced by other AITs it was 6.3 per month. The rate of positive tests for self-serviced animals was 70 percent, and for animals serviced by other AITs it was 55 percent.

The average monthly income of AITs during the last three months was Rs 10,001 and average expenditure was Rs 4,711, which included the cost of semen (Rs 2,745), cost of transportation (Rs 936) and cost of Liquid Nitrogen Gas (Rs 793). The average per month net income was Rs. 5,290. The majority of the farmers (around 44 percent) earned an average monthly profit of less than Rs. 5,000. The DRDF trains AITs for record keeping and it is considered to be an important practice because it allows the beneficiary to analyze his performance. The survey results show that 91.1 percent of the project trained AITs had properly maintained and updated registers for their records.

SECTION I

BACKGROUND & METHDOLOGY OF THE SURVEY

The economy of Pakistan is largely based on agriculture which provides livelihoods to 75 percent of the rural population and contributes 22 percent of the GDP. The share of livestock in agriculture income is 50 percent and 35 million people in rural areas are engaged in dairy farming. According to the last livestock census (2006) there were 67 million dairy animals in Pakistan and the country ranked 5th in the world in milk production. The dairy farmers use antiquated methods in raising livestock and there is a serious shortage of veterinary/ livestock support services. Consequently, productivity per animal is very low and the economic condition of the majority of smallholding dairy farmers is quite depressing. There is a tremendous potential for improvement and growth in dairy farming in Pakistan.

USAID Pakistan signed an agreement (Cooperative Agreement No. 391-A-0011-0120600) with Dairy and Rural Development Foundation (DRDF) to launch a dairy project, initially focused on Central and Southern Punjab, but eventually covering the entire country. The project envisaged enhancing livestock productivity by increasing awareness of dairy farmers, by introducing modern dairy farming practices, and by strengthening market linkages within the dairy sub-sector. It was planned to make available services of trained livestock extension workers and dairy service providers.

Most important interventions of the dairy project included training and support to 9,000 small dairy farm holders in best dairy farming practices; training of 2000 Artificial Insemination Technicians (AITs) and their establishment as entrepreneurs; training of 5000 Women Livestock Extension Workers (WLEWs) in basic animal healthcare and as small entrepreneurs; and launching of an awareness campaign on radio, in print and electronic media.

The Project was operated in selected groups of villages (clusters) in the project areas. After meeting the targets of training, the project moved to other clusters where potential trainees were identified through a mobilization/selection process

USAID-DRDF has contracted SEBCON, Islamabad to carry out performance evaluation survey. The purpose was to collect information on selected performance indicators to measure the performance of the project trained farmers, AITs and WLEWs against these indicators and also measure the overall impact created in enhancing the income opportunities and wellbeing of rural communities.

Specific Objectives

The specific objective of the survey was to determine the status of the following indicators, given in the PMP, at the baseline and end-line stages:

- Average change in the project-assisted household's real annual income from dairy activities relative to the baseline.
- Average per month income of WLEWs from livestock services.
- Average per month income of AITs from providing AI services and pregnancy tests.
- Measure the change in livestock productivity from:
  - HS and FMD vaccination of Dairy Animals
  - Change in average monthly (per animal owned by project-assisted household) quantity of milk produced relative to the baseline.

- Change in feeding practices
- Vaccination and basic health care service provided by WLEWs relative to the baseline.
- Adoption best dairy farming practices

The purpose of this report is to determine the percentage of farmers using the dairy farming practices advocated by the project such as:

- Preparation of silage
- 24-hour access to fodder and water
- Feeding concentrates
- Treatment against external and internal practices
- Dipping of teats in disinfectants
- Calf-rearing
- Maintenance of farm records

In addition to the indicators above, the survey will also collect information of:

- Number of insemination procedures performed (disaggregated by semen type, local/imported/cross-bred) relative to the baseline.
- Percentage of AIT trainees providing professional services to communities.
- Ratio of insemination procedures to pregnancy.
- Percentage of project-trained WLEWs introduced to input-suppliers.
- Number of WLEWs trained in business practices, book-keeping and milk collection. Surveys

Methodology

There is no project baseline established before the start of project activities. Due to this limitation the farmers trained in year 2012 and first eight months of year 2013 were not considered in sampling. The surveys were scheduled in the first quarter of 2014 (7th February, 2014 to 6th April, 2014). The most recently trained farmers (Sep-Oct 2013) were included in the sample in order to minimize the recall error while the AITs and WLEWs were sampled out from all batches trained till August 2013.

A proportionate random sampling method is used for sample selection. For farmers proportion was based on districts while for AITs and WLEWs proportion was based on batches. The selected farmers group was *surveyed twice*: in first round they were surveyed from 6th February 2014 to 28th February 2014 and information was collected on their herd composition, milk production and dairy practices. Second round of survey was done in the last week of March 2014 (about six months after receiving the training). The information collected in both the rounds of surveys was from the same group of farmers and this allows us to measure the short term impact of training on these farmers' diary practices and the resultant change in the productivity. Because the baseline data is based on farmers that had been trained three months (approx.) before the survey, the differences in the outcome variables presented in this data are at best an underestimation of the true effects. Given below table provide the sample size of AITs, WLEWs and farmers.

Table 1:Survey Sample

Beneficiary Group	Sampling Frame	Sample Size Proposed (actually covered)	Baseline Survey Date	End-line Survey Date
Farmers	Received training from DRDF in September-October 2013	336 (actually covered 337 in baseline and 336 in end-line)	7 - 28 Feb, 2014 (Before training data on recall basis)	27 Mar - 6 Apr, 2014[1]
WLEWs	Fourteen batches received training from DRDF by August 2013	347 (actually covered 346)	Survey conducted between 7 February and 6 March, 2014	
AITs	Nineteen batches received training from DRDF by July 2013	125 (actually covered 123)	Survey conducted between 7 February and 6 March, 2014	

1- Project closure was expected in July-2014 and finance department has to close its all books well before closure time.

Survey Management

The survey data of farmers, AITs and WLEWs was collected by trained enumerators under the guidance of the senior team. Half of the survey team was comprised of those who had worked for the enumeration of livestock data. The criteria for the selection of the rest of data collection teams were familiarity with the social environment and language of the working area, graduate level education (minimum), and experience of having performed at least two to three surveys, and having a good understanding of research ethics.

A two-day training was given to the enumerators at the start of data collection. The broad categories of the training were: i) overview of the project, including the background and objectives of the survey and the methodology to be employed; ii) data collection. Ten senior supervisors carried out the data collection task in five teams. A senior field monitor was appointed to ensure the quality of the data by regular monitoring visits to the field team during the data collection work.

Quality Assurance and Data Management

SEBCON gives preference to quality assurance as an integral part of survey planning or implementation plan. The following key steps were followed to make the survey more reliable:

- Almost all the field enumerators were involved in the first phase of DRDF baseline and end-line surveys thus they had a good understanding of the project components and indicators as well as being well acquainted with surveys tools.
- Apart from the field enumerators' involvement in the first phase, a two-days training was provided to them to ensure their understanding of the tools and sampling methodology.

- To ensure sufficient time for conducting a quality interview, the daily enumeration target for each enumerator was determined in such a way so that they had sufficient time to cover their daily interviews target easily.
- The sample was selected according to the sample list of beneficiaries prepared by SEBCON's sampling expert; however any replacement in the sample was done in consultation with SEBCON's senior consultant.
- The detailed field plan was shared with DRDF in order to keep them informed about the data collection process and seek their support in the field where required.
- Review of fieldwork at the end of each day by the respective supervisor was conducted.
- Spot checks were made by the team leader.
- In order to prevent tempering of the data, use of pencils for filling the questionnaires were not allowed.
- Validation of the filled questionnaires was carried out through phone contacts.
- Editing of the filled questionnaires was held at SEBCON head office.
- Data entry/data cleaning/validation of information using appropriate statistical tests such as range tests, etc., were then conducted.

The data entry program was developed by SEBCON's Data Analyst in CSPro. Various tests, i.e. range tests, frequencies, consistency in the data, were applied on the entered data to ensure the quality of the entered data. A training for the data entry team was organized by the SEBCON Senior Data Analyst in order to ensure data quality.

The data was analyzed in line with the indicators included in the PMP of the project. The results have been presented in both tables and graphic forms depending upon the nature of the indicators and comprehensibility for the readers. Moreover, the key findings and observations, qualitative and quantitative, have been specifically highlighted in the report to make it more informative and user-friendly. All the data is perfectly coded and analyzed using Statistical Package for Social Sciences (SPSS).

SECTION II

FARMERS

SURVEY RESULTS

The findings presented in this section are based on the information received from 346 farmers from 7 different districts of Punjab. This section summarizes impact of training in comparison to the baseline and the general characteristics of the beneficiaries of the project and presents information on the practices being followed by our beneficiaries.

GENERAL CHARACTERISTICS OF FARMERS' FAMILIES

Punjab's rapid demographic transition is an important contextual factor for impact evaluation. Punjab's ongoing demographic transition is increasing the share of young adults in the population.[1] Therefore, the median age of baseline and end-line farmers has come out to be 28 years. Although, age was not specified in the selection of farmers for training, majority of the trainee farmers (47 percent) turned out to be 21 to 30 years old. This indicates a relatively younger age group entering the dairy profession. As sampled population is depicting the demographic transitions in Punjab, therefore, training the young farmers promises better sustainability for the projected changes.

Record keeping is a fundamental activity of public administration. Individuals with some level of education are more effective in maintaining records than illiterates. Moreover, most of the respondents had Middle (24 percent) or Matric (23 percent) level education which would enable them to maintain farm records and at least read instructions for use of different inputs. [2]

Baseline and end-line groups had 97.9 percent of the respondents living in self-owned houses and the average family size was 6.3 persons (51 percent male and 49 percent female).

Studying the employment dynamics of participants is important for capturing the true picture of program's effectiveness. A slight increase (1.1 percent) in the employment of family members was observed in the end-line survey as compared to the baseline. In the baseline, about 33.6 percent (61.9 percent male and 4.9 percent female) family members were employed while in the end-line it was 34.7 percent (61.4 percent males and 8.7 percent female). A large number of family members were self-employed (10.8 percent) or had petty businesses (30.5 percent).

Household Cash Income and Its Sources

The average annual household cash income in the baseline survey group was Rs. 477,763 and its major sources included dairy 34 percent, off-farm income 25 percent, crops 39 percent and other sources 2 percent. Among the end-line survey group, the average annual household cash income was Rs. 558,383 and its major sources were dairy 34 percent, off-farm income 25 percent, crops 37 percent, and other sources 4 percent.

An increase was observed (statistically significant at 10% level of significance) in the average monthly income of farmers from dairy in the end-line (Rs. 19,994) as compared to the baseline (Rs. 13,722). Increase in the dairy income was more pronounced in lower income groups as compared to those with up to Rs. 200,000 annual household income. The increase in dairy income appeared to have resulted from a combined effect of factors like an increase in the milk yield per animal, increased number of milking animals and increased sale. The duration between the end line and the base line

[1] The Government's "Skills Development Sector Plan 2018" (Government of Punjab 2015).

[2] Recognizing Records as a strategic resource, World Bank Report 2010.

survey was of 2 months, therefore, this increase in income cannot possibly be due to inflation or generic increases in milk price. A period of 2 months, is sufficient for the farmers to adopt the best practices like vaccination, teat dipping etc. A drastic change in inflation or (market prices) would be needed to cause such an increase in dairy incomes and it is highly unlikely to observe these changes over such a small period of time[3].

Table 2: Household Average Annual Cash Income

	Baseline Survey (Year)						
Income Groups	percent of HHs	Average Income	Percentage Share of the Total Income				
			Dairy	Off-Farm	Crop	Other Source	Total
Up to Rs. 100,000	5 percent	59,113	37 percent	14 percent	48 percent	0 percent	100 percent
Rs. 100,001 to Rs. 200,000	15 percent	161,886	32 percent	35 percent	32 percent	1 percent	100 percent
Rs. 200,001 to Rs. 300,000	19 percent	252,392	32 percent	36 percent	31 percent	1 percent	100 percent
Rs. 300,001 to Rs. 400,000	16 percent	348,833	36 percent	32 percent	30 percent	2 percent	100 percent
Rs. 400,001 to Rs. 500,000	11 percent	451,950	30 percent	33 percent	36 percent	1 percent	100 percent
Above Rs. 500,000	34 percent	882,663	35 percent	20 percent	43 percent	2 percent	100 percent
Total	100 percent	477,763	34 percent	25 percent	39 percent	2 percent	100 percent
	End-line Survey (Year)						
Income Groups	percent of HHs	Average Income	Dairy	Off-Farm	Crop	Other Source	Total
Up to Rs. 100,000	2 percent	47,000	43 percent	0 percent	56 percent	1 percent	100 percent
Rs. 100,001 to Rs. 200,000	11 percent	161,757	43 percent	26 percent	29 percent	1 percent	100 percent
Rs. 200,001 to Rs. 300,000	16 percent	257,324	33 percent	36 percent	29 percent	2 percent	100 percent
Rs. 300,001 to Rs. 400,000	16 percent	350,152	31 percent	40 percent	27 percent	1 percent	100 percent
Rs. 400,001 to Rs. 500,000	13 percent	448,318	38 percent	31 percent	30 percent	2 percent	100 percent
Above Rs. 500,000	42 percent	924,502	33 percent	21 percent	41 percent	6 percent	100 percent
Total	100 percent	558,383	34 percent	25 percent	37 percent	4 percent	100 percent

DAIRY FARM STRUCTURE

Information regarding the number and type of the animals owned by farmers is needed in order to understand the characteristics of the farmers trained by the project. On average, 78.3 percent farms in this group consisted of 1 to 5 animals, 11.6 percent had 11 to 20 animals and 0.6 percent had more than 20 animals. Pre-post analysis shows that the number of animals owned by the farmers remain

[3] In order to measure a longer term impact batches training in year 1 or year 2 of the project would be needed. Interviewing these farmers was possible but would have led to recall errors (by the interviewee's). In addition, the project was going to close its operations in July 2014. Due to these constraints, only a short term impact measurement was possible.

stable over the period between the base line and the end line. The detailed distribution of animals is provided in the table below:

Table 3: Average distribution of animals in the herd

Animal Type	Base Line	End Line
Cows	4.12	4.19
Buffaloes	5.57	5.73
Bulls	1.58	1.58
Bullocks	1	1
Camel	1	1
Goats	5.85	6.73
Sheep	6.28	5.95

Approximately 25 percent of the surveyed farmers had imported/cross cattle breeds. The research period, however, is too short to observe any significant changes in the farm structure through breed improvement. Another reason of the reluctance towards imported breeds, as reported by farmers, is the higher price and higher maintenance costs.

The important cattle breeds kept by baseline and end-line farmers included Holstein-Friesian (imported) 8.5 percent, Holstein-Friesian (local) 10.8 percent, Brown Swiss 1.2 percent, Jersey 2.3 percent, Sahiwal 30.0 percent, Cholistani 8.9 percent, Du-Ghali (crossbred) 12.6 percent, and Desi 25.7 percent. The breeds of buffaloes were Nili-Ravi 93.9 percent and Desi 3.7 percent. The distribution of the breeds of the dairy animals owned by the farmer does not change over time. The table below summarizes the distribution of dairy animals breed owned/kept by farmers.

Table 4: Distribution of dairy animal's breeds

Breed	Total			Baseline Survey			End-line Survey		
	Cow	Buffalo	Bull	Cow	Buffalo	Bull	Cow	Buffalo	Bull
Holstein-Friesian (imported)	8.40 %	0.00 %	0.70 %	8.30 %	0.00 %	1.40 %	8.50 %	0.00 %	0.00 %
Holstein-Friesian (local)	10.80 %	0.00 %	2.00 %	10.80 %	0.00 %	1.40 %	10.80 %	0.00 %	2.60 %
Brown Swiss	1.20 %	0.00 %	0.00 %	1.10 %	0.00 %	0.00 %	1.20 %	0.00 %	0.00 %
Jersey	1.90 %	0.00 %	0.00 %	1.50 %	0.00 %	0.00 %	2.30 %	0.00 %	0.00 %
Sahiwal	29.60 %	0.00 %	26.20 %	29.20 %	0.00 %	22.50 %	30.00 %	0.00 %	29.50 %
Cholistani	9.00 %	0.00 %	4.00 %	9.10 %	0.00 %	4.20 %	8.90 %	0.00 %	3.80 %
Du Ghali/ Crossbred	12.50 %	0.00 %	1.30 %	12.30 %	0.00 %	0.00 %	12.60 %	0.00 %	2.60 %
Desi	26.70 %	9.60 %	62.40 %	27.70 %	12.90 %	64.80 %	25.70 %	6.10 %	60.30 %
Nili-Ravi	0.00 %	90.40 %	3.40 %	0 %	87.10 %	5.60 %	0.00 %	93.90 %	1.30 %
Total	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %	100.00 %

Milk Production and Consumption

Daily Milk Production

The farm-level milk production data was analyzed using the paired data. A total of 298 farmers reported their milk production for both periods of the surveys, i.e. baseline and end-line. According to the information reported by the survey respondents, daily milk production had increased, on average, by about 17.1 % per animal (t-statistic 2.2377) as compared to the daily per animal milk production before receiving training from DRDF. This result is statistically significant at 5 % level of significance.

Consumption and Sale of Milk

Farmers in the baseline group consumed 37 % milk, mostly for preparing yogurt, butter and butter-milk, and for making tea, etc. Similarly, farmers in the end-line group consumed 35 % of the milk they produced. In the baseline group, the farmers sold 63 % milk and the beneficiaries delivered milk to Milk Collection Centres (4.4 %), Milk Processing Companies collected milk from farm-gate/house (4.4 %), to Dodhi (78.50 %), to neighbors/shops, etc. (18.0 %), and others (0.5 %). Farmers in the end-line group sold 65 % of the their produced milk and they delivered it to Milk Collection Centres (8.07 %), Milk Processing Companies collected milk at farm gate/house (6.73%), to Dodhi (72.65%), and to neighbors/shops, etc., (12.56 %).

Availability of Fodder

No significant difference was observed in the pattern of purchase of fodder by farmers during the past 12 months between the baseline and end-line survey period. In the baseline survey 180 (53 %) farmers had spent an average of Rs. 43,004 on the purchase of fodder, while in the end-line 55 % farmers had spent an average of Rs. 40,741 on the purchase of green and/or dry fodder.

Improved Dairy Farm Practices

Preparation of Silage: Silage making was not common among the surveyed farmers. The survey results indicated that only 3.3 % farmers in the baseline and 2.4 % farmers in the end-line prepared it in this season. No improvement in this practice has been observed in the end-line survey. The decrease in the number of farmers (3 farmers) in the end-line survey was due to non-availability of crop. Reasons for not preparing silage during the past 12 months are given in Table 5. None of the farmer reported 'Lack of know-how' as the reason of not making silage which indicates the successful dissemination of information to farmers.

Table 5: Reasons for Not Making Silage

Reasons	Baseline Survey		End-line Survey	
		%		%
No need (have sufficient amount of green fodder)	115	35.3 %	127	38.7 %
Insufficient land	130	39.9 %	146	44.5 %

Machinery not available	9	2.8 %	25	7.6 %
Lack of know-how	35	10.7 %	0	0.0 %
Insufficient water and land	37	11.3 %	30	9.1 %
Total	326	100.0 %	328	100.0 %

Feeding Concentrates: A significant increase (13 %) was reported by the farmers in the end-line survey as compared to the baseline regarding the feeding of concentrates to dairy animals during the past 6 months. In the baseline survey, 232 farmers (68.8 %) fed concentrates to dairy animals during the past 6 months. As compared to this, 275 (81.8 %) farmers in the end-line survey fed concentrates during the past 6 months.

A positive significant change was observed in the type of concentrates given to dairy animals by the farmers. In the baseline, about 54 % farmers used oilseed cakes (traditional concentrates) whereas in the end-line the number of such farmers decreased to 41 %. On the other hand, the use of a balanced mixed feed has significantly increased from 17.5 % in the baseline to 45.5 % in the end-line (Table 3.4).

Table 6: Types of Concentrates Used

	Baseline Survey		**End-line Survey**	
		%		%
Oilseed cakes	181	53.70 %	138	41.10 %
Balanced Mixed Concentrates-Prepared Themselves	7	2.10 %	7	2.10 %
Balanced Mixed Concentrates -Prepared by Feed Mill	59	17.50 %	153	45.50 %
Total Mixed Ration	1	0.30 %	1	0.30 %
Others	3	0.90 %	6	1.80 %

There was approximately a 17 % increase in the cost of concentrates in the last 6 months and there was a considerable increase in the use of Balanced Mixed Concentrates (Feed Mill).

Vaccination Against and Incidence of FMD and HS: A highly significant change was observed among the farmers regarding vaccination of their animals against FMD and HS diseases. About 49 % of the 139 farmers who did not vaccinate their animals before receiving DRDF training, had vaccinated their animals after the training (Fig 2).

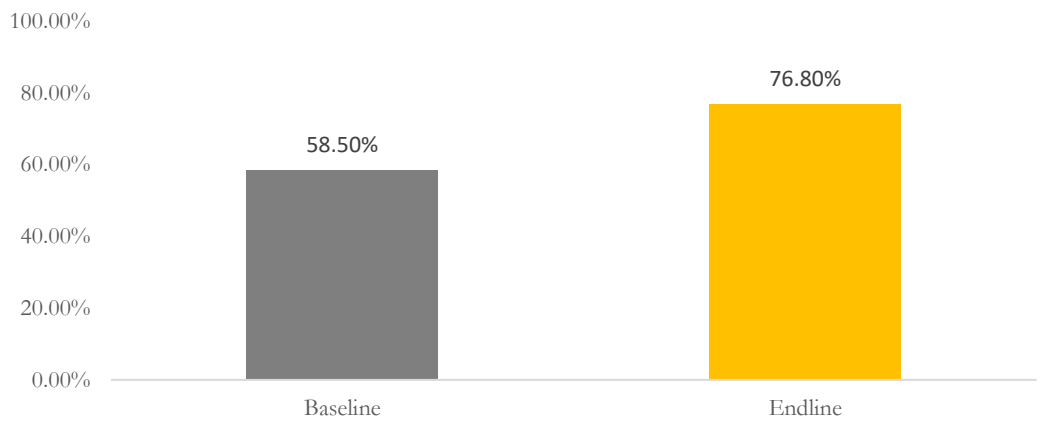


Figure 1: Vaccination against FMD and HS

Treatment against External and Internal Parasites and Frequency of De-Worming: In the baseline survey, 48.1 % farmers reported de-worming of dairy animals; 56.2 % performed de-worming every 3 months, 35.8 % every 6 months and 8.0 % whenever needed. In the end-line survey, 66.7 % farmers de-wormed their animals; 51.8 % quarterly, 36.2 % after 6 months, and 12.1 % whenever necessary. De-worming was practiced by 18.6 % more farmers at the time of the end-line survey as compared to the baseline. This was a significant change. It was noted that 12.1 % of end-line farmers used de-worming whenever needed, which means farmers practiced deworming only after the signs of infestation have appeared. This would cause a loss in production to the farmers. De-worming needs to be applied regularly, at least after 6 months (Fig 3 and 4).

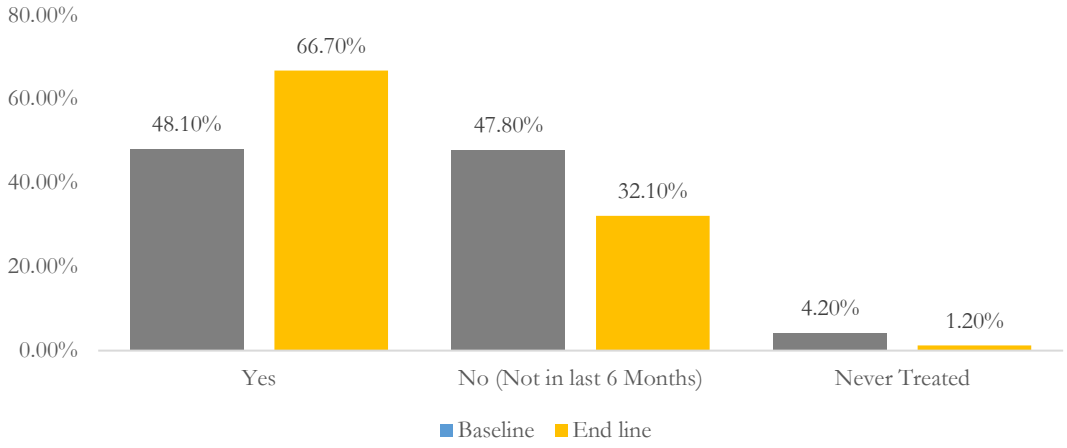


Figure 2: Treatment of Animals against External and Internal Parasites in last 6 months.

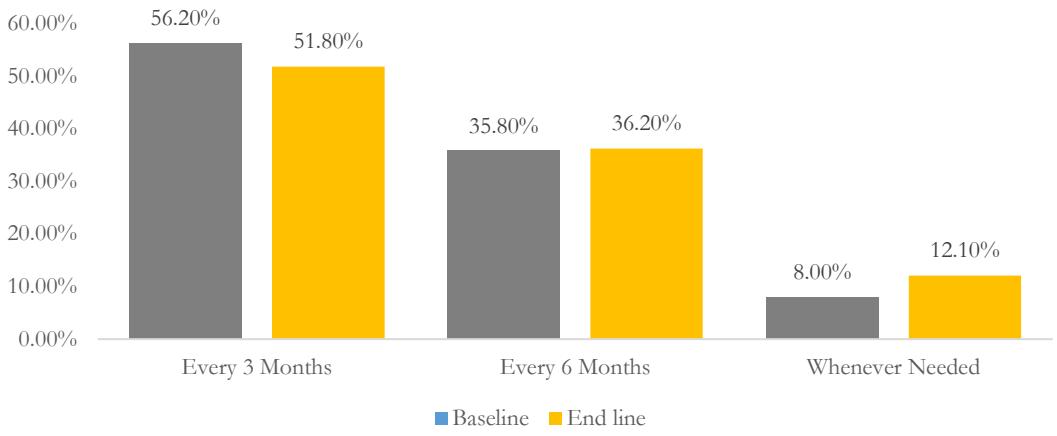


Figure 3: Frequency of Treatment of Animals against External and Internal Parasites

Prevention of Mastitis: Eighteen (5.3 %) baseline farmers dipped teats of dairy animals in disinfectants after milking for the prevention of mastitis. In the end-line survey, 130 farmers (38.7 %) dipped the teats in disinfectants in order to prevent mastitis. The %age of end-line farmers who practiced dipping of teats was significantly higher than the baseline figure. Provision of teat-cups and disinfectants to the farmers must have been helpful in this regard.

"Surf Test" was used by 5 (1.5 %) farmers in the baseline survey to detect and to treat mastitis; 3 farmers used it after 30 days and 2 farmers whenever needed. In the end-line survey, the surf-test was used by 64 (19 %) farmers; 10 used it after 15 days, 29 every 30 days, 21 whenever needed and one used it only once. A large %age (17.5 %) of end-line farmers performed the "Surf Test" for detection of early mastitis. This change appeared to be significant. But many farmers (32.8 % in the end-line) did not perform the test regularly and did it only whenever it was needed. By that time, considerable production loss has taken place.

Breeding and Reproduction: A slightly larger number of end-line farmers compared to baseline used AI Services. The change was not significant though. AI service was used by 162 (48.1 %) baseline farmers and by 167 (49.7 %) of the end-line farmers

A mixed trend in the use of local and imported semen has been observed in the comparison of the two survey results. Use of Friesian (both imported and local) and Swiss-Brown semen has slightly increased, on the other hand farmers have given lesser preference to Jersey semen. At the same time, use of Sahiwal semen has decreased by 11.22 %. This indicated a trend towards use of semen of superior genetic value.

In the baseline survey, 15 % farmers used Holstein-Friesian (imported) semen, 17.5 % used Holstein-Friesian (local) semen, 43.7 % used Sahiwal semen, 17.0 % used Nili-Ravi semen, 0.5 % used Swiss-Brown semen, and 6.3 % used Jersey semen. In the end-line survey, 17.5 % farmers used Holstein-Friesian (imported) semen, 21.1 % used Holstein-Friesian (local) semen, 32.5 % used Sahiwal semen, 23.2 % used Nili-Ravi semen, 1.8 % used Swiss-Brown semen, and 3.9 % used Jersey semen. The %age of end-line farmers using Holstein-Friesian imported and local semen has increased by 2.4 % and 3.6 % respectively as compared to baseline. Statistics are summarized in the Fig. 5.

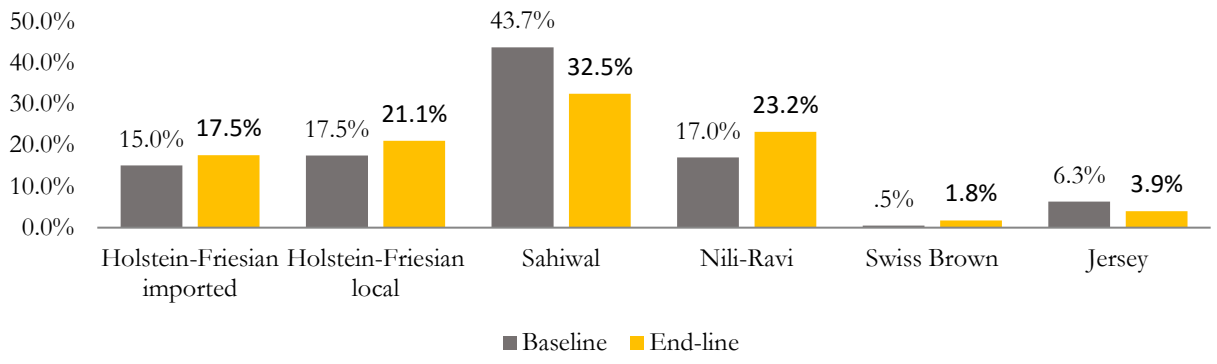


Figure 4: Types of Semen Used

Pregnancy was detected by 37.4 % baseline farmers as a result of a lack of repeat heat, 38.3 % farmers got a check-up performed by an AIT, and 23.3 % farmers based their knowledge on the visible changes in the body appearance of the dairy animals. There was no response from 1 % of the farmers. In end-line survey, 26.8 % farmers detected pregnancy as a result of a lack of repeat heat, 40.8 % got a body check-up (palpation) performed by an AIT, whereas 26.8 % found out from the visible changes in the body appearance of the dairy animals, and there was no response from 5.7 % farmers.

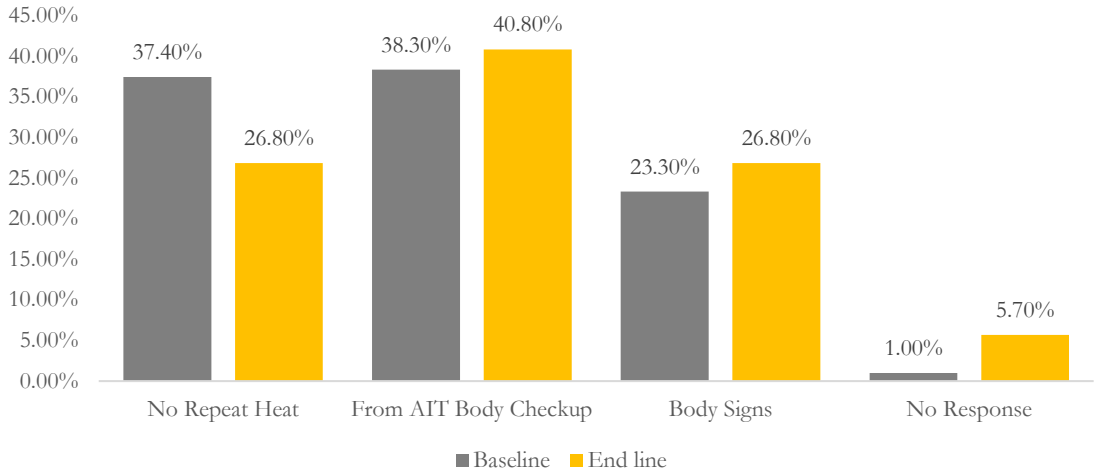


Figure 5: Methods Used for Detection of Pregnancy

Calf Rearing Practices: The farmers reported a 5.3 % increase in rearing calves (both male and female) from 73 % in the baseline to 78.3 % in the end-line. Likewise, adoption of various calf-rearing practices showed a mixed trend. There was a slight decrease (0.5 % and 1.6 %) in weighing and feeding of colostrum respectively, while the practice of feeding whole milk, feeding of concentrates to calves, and de-worming has increased by 3.3 %, 7.9 % and 11.9 % respectively amongst the farmers in the end-line survey as compared to the baseline.

A highly significant change in the knowledge about dehorning procedures are apparent when comparing the two survey results though. It has increased from 17.2 % in the baseline survey to 72.6

% in the end-line survey. Among various methods for dehorning, the greatest increase has been reported in the knowledge of the electrical dehorning method, i.e. by 43 %.

		Baseline Survey *%age*	End-line Survey *%age*
Knowledge of Dehorning			
Knowledge about dehorning techniques	Yes	17.2 %	72.6 %
	No	82.8 %	27.4 %
	Total	100 %	100 %
Electrical Dehorning			
Information about Electrical Dehorning	Yes	8.6 %	51.6 %
	No	91.4 %	48.4 %
	Total	100.0 %	100.0 %
Non-Electrical Dehorning			
Information about Non-Electrical Dehorning	Yes	13.8 %	34.4 %
	No	86.2 %	65.6 %
Caustic Soda			
Information about Caustic Soda	Yes	82.8 %	75.8 %
	No	17.2 %	24.2 %
	Total	100.0 %	100.0 %

Figure 6: Knowledge, Availability and Practice of Dehorning Techniques

Maintenance of Farm Records: A significant increase has been noticed in the number of farmers maintaining farm records. The greatest increase was found in the maintaining of milk production records which increased by 30.4 % (from 8.3 % to 38.7 %), followed by 15.5 % for breeding records (from 8.6 % to 24.1 %), and 5.6 % in keeping health records (from 11.3 % to 17.9 %). The smallest increase of 3.6 % was observed in the maintenance of financial records (from 1.8 % to 5.4 %).

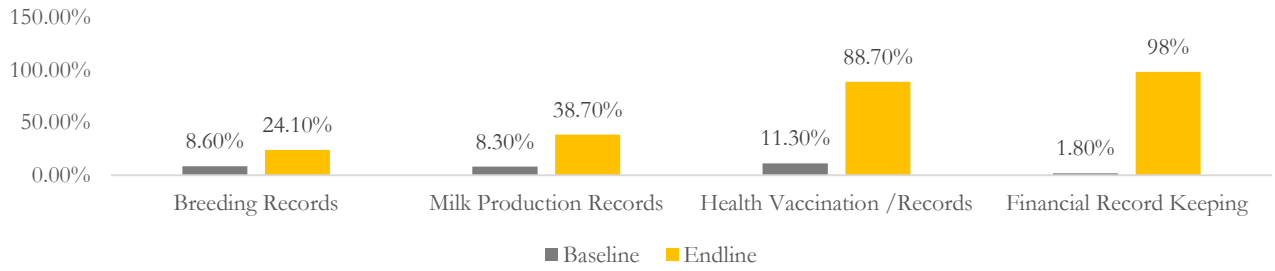


Figure 7: Record Maintenance

Adoption of Best Dairy Farming Practices

An attempt was made to develop a composite indicator for the adoption of best dairy practices among the baseline and end-line farmers by giving equal weight to the following 8 dairy farm practices and scoring the farmers by the number of practices adopted by them.

1) Feeding of concentrates
2) Vaccination against FMD and HS

3) De-worming
4) Prevention of mastitis
5) Animal breeding/ use of AI services
6) Calf rearing
7) Farm hygiene
8) Keeping farm records

In the baseline survey, 24 % (79) farmers adopted 3 practices whereas in the end-line survey 24 % (80) farmers adopted 5 best practices. The maximum number of best practices (7) was adopted by only one farmer (0.3 %) in the baseline survey, whereas 12 farmers (4 %) adopted all 7 best practices in the end-line survey. The graph below clearly shows that the %age of farmers adopting best practices against the number of best practices. The distribution moves towards left indicating that more farmers in the end-line survey used the best practices advocated by the DRDF trainings as compared to the baseline.

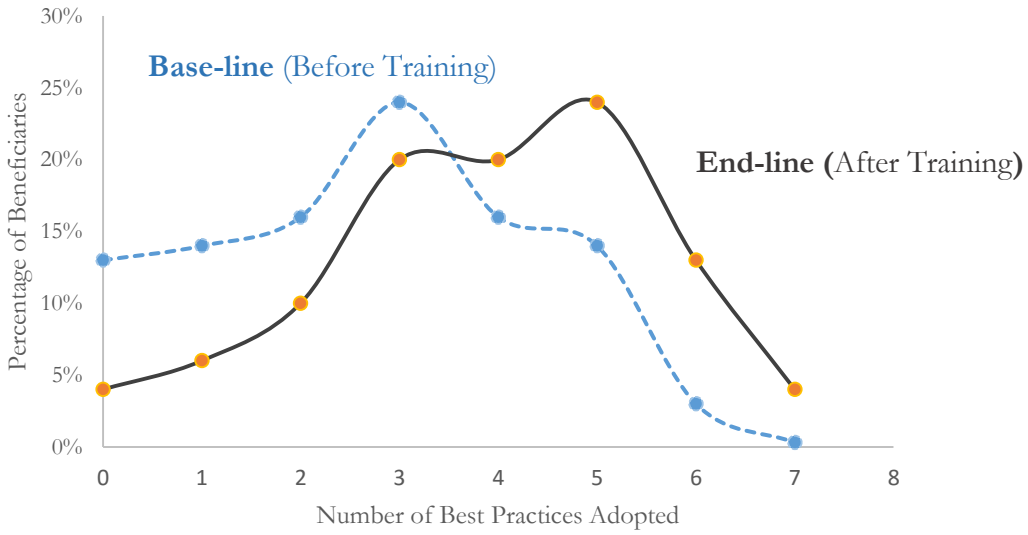


Figure 8: Adoption Rates of Best Practices

Capacity Building

The majority of farmers (95.4 %) recalled the DRDF training while the rest of farmers did not know the name of the department/organization which had arranged the training. Almost all the respondents (98.5 %) confirmed receiving the complete 4-days training. Only 5 farmers could not complete the four days of training. Moreover, all farmers who successfully completed training also confirmed receipt of the support kit.

Information about Livestock during the last 12 Months and its Sources

Eighty-seven (35.6 %) farmers received information about livestock during the past 12 months and sources included Community Based Organizations (49.4 %),Extension Magazines (38.9 %), Progressive Farmers (16.7 %), Farmers' Field Days (16.7 %), Radio (16.1 %), Research Stations(11.6 %), NGOs (11.1 %), Others (5.6 %), Newspapers (5.6 %), TV (5.6 %), and Vets & Para-Vets (5.6 %).

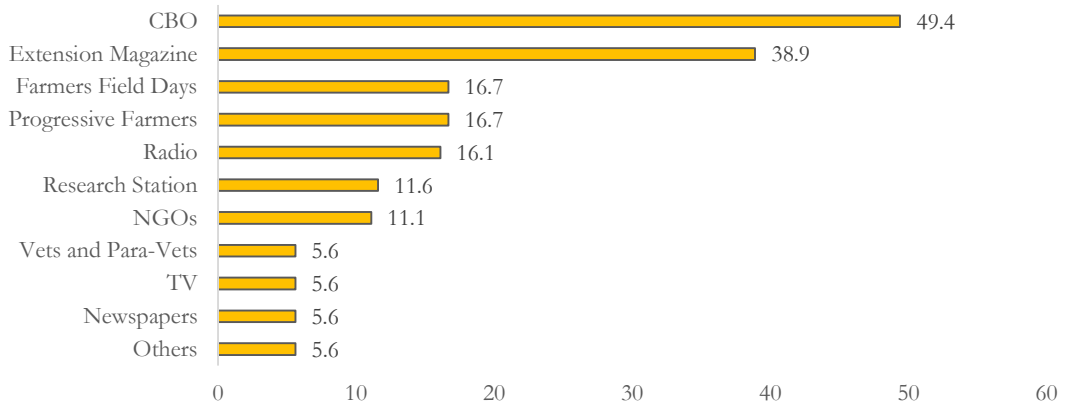


Figure 9:Source of Information on Livestock in Last 6 Months

Use of WLEW and AIT Services by the Farmers

According to 266 (79.2 %) farmers, a DRDF-trained WLEW was present in their village and 165 (62 %) farmers knew her name.

Eighty-three (31.2 %) farmers contacted a WLEW 1-40 times for the treatment of animals during the last 6 months, 67 (25.2 %) farmers contacted a WLEW 1-10 times for concentrates, and 63 (23.7 %) farmers contacted a WLEW 1-6 times for vaccinations. One-hundred and eighteen (44.3 %) farmers did not contact a WLEW during the last six months.

According to 136 (40.5 %) farmers, an AIT was available in their respective village. Out of 136, 121 farmers remembered their names.

Sixty-three farmers (46.3 %) out of these 136 contacted an AIT during the last 6 months for AI services. 39 farmers (26.6 %)farmers contacted an AIT for a pregnancy test. 35 (25.7 %) farmers contacted an AIT for other purposes, and 36 (26.5 %) farmers did not contact any AIT during the last six months.

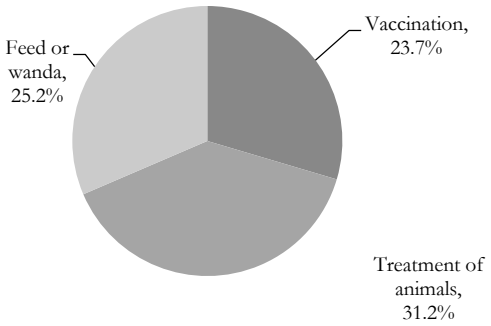


Figure 11: Farmers' Contact with WLEW

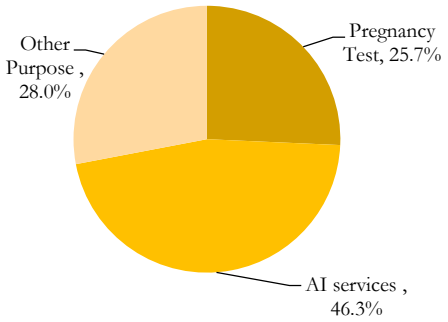


Figure 10 Farmer's Contact with AIT

Farmers' Response to Questions on Social Issues and Problems

Five (1.5 %) farmers faced problems in selling milk, 74 (22 %) farmers did not receive cooperation from family members in dairy work, 200 (59.5 %) farmers trusted females on advice on vaccinations, and only 29 (8.6 %) farmers replied in the affirmative to the question of whether people got any information from the media campaign on the Dairy Project.

		Frequency	%age
Do you face any problem in selling milk?	Yes	5	1.5 %
	No	331	98.5 %
	Total	336	100.0 %
Do you receive cooperation from family members in dairy work?	Yes	262	78.0 %
	No	74	22.0 %
	Total	336	100.0 %
Do you trust on female advice for animal vaccination?	Yes	200	59.5 %
	No	136	40.5 %
	Total	336	100.0 %

Figure 12 Social Issues and Problems of Farmers

DRDF/Dairy Project Awareness Campaign

Twenty-nine (8.6 %) farmers said that the Dairy Project provided information about dairy farming through mass media like Radio, TV and Newspapers, etc., 3.4 % said that they received informationthrough TV, and 96.6 % farmers named Radio as their main source of information. Farmers responded to the question about the last time they received information as follows: last week (23.3 %), last onemonth (20 %), in the last 3 months (30 %), and more than 3 months ago (26.7 %).

The three important media messages were:

1. **USAID is working to help farmers.**
2. **Health of animal is important.**
3. **Use of concentrates is important for dairy animals.**

The information was very beneficial for 52 % of the farmers, somewhat beneficial for 32 % farmers, and of no benefit for 16 % farmers.

Responding to the question "Which media can play important role in providing dairy farming information to farmers", TV was named as the most preferred choice by 96.7 % respondents, newspaper by 2.7 %, and radio by 0.6 % respondents.

SECTION III

WOMEN LIVESTOCK EXTENSION WORKERS

SURVEY RESULTS

The findings presented in this section are based on the information received from 346 WLEWs coming from 10 different districts of Punjab. This section summarizes the general characteristics of the beneficiaries of the project and presents information on the practices being followed by our beneficiaries.

General Characteristics of WLWES' Families

It is important to understand the family characteristics of the beneficiaries to understand the true impact of the program. This subsection presents information of the general socioeconomic characteristics of the WLEWs including information of the income and education levels of their family.

A majority (330, 95.3 %) of the WLEWs lived in self-owned[4] houses, 6 (1.7 %) lived in rented houses, 7 (2.0 %) lived free in relatives' houses, and 3 (0.8 %) lived free on the landlords' property. The average family size in the case of the 346 WLEWs was 5.6 persons; 2.9 were females and 2.6 were males. The majority of the WLEWs' family members (23.2 %) had primary education, 19.2 % were illiterate, 0.5 % had Madrassa education, 15.9 % had less than primary education, 2.1 had middle, 18.4 had Matric, 6.4 % had intermediate, and 2.9 % had BA/B.Sc. level education. A small number of WLEWs' family members (0.8 %) also had MA/M.Sc. level education, 0.1 % had a technical diploma, and 0.1 % had a professional degree.

Figure 13 presents information on the education level of the WLEWs. Only 4 % of the WLEWs reported to have received no or less than 5 years of education. A majority (96 %) of the WLEWs had completed middle and around 60 % had completed more than 10 years of education. The %age of employed male and female members of the WLEWs families were 47.5 % and 22.9 % respectively. Majority (39.6 %) of the employed persons were self-employed.

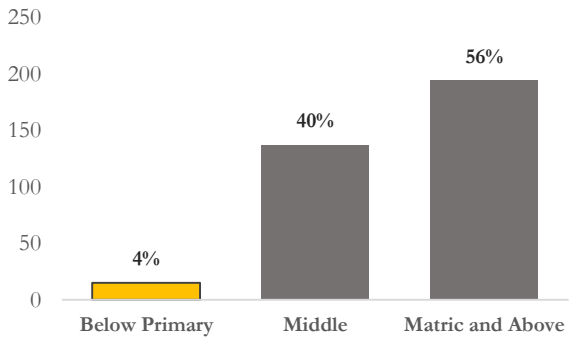


Figure 13:WLEWs Education

According to the HIES report 2011-12[5], the average monthly income per household for the first and second quintile is Rs. 13,221 and Rs. 16,578 respectively. The estimates from the survey show that the average monthly household cash income was Rs. 19,676 (with a range from Rs 60,709 to Rs 881,645), with a median annual income of Rs. 13,667. This indicates that most of the WLEWs come from low income households. Table 4.1 presents details of the household income distribution of WLEWs.

Table 7: Income Distribution of HH

Income Groups	Household Average Annual Cash Income	
	% of HHs	Average
Up to Rs. 100,000	31.2 %	60709

[4] Houses owned by them or their families.

[5] http://www.pbs.gov.pk/sites/default/files/pslm/publications/hies11_12/Complete_report.pdf

Rs. 100,001 to Rs. 200,000	28.9 %	146942
Rs. 200,001 to Rs. 300,000	17.1 %	249051
Rs. 300,001 to Rs. 400,000	9.0 %	353648
Rs. 400,001 to Rs. 500,000	4.9 %	438635
Above Rs. 500,000	9.0 %	881645
Total	100 %	236114

Participation of the males and female members of the household in dairy activities can be beneficial because it can help them earn and allows them to provide multiple services to the same consumer. Twenty-five (7.2 %) WLEWs said that their father, husband and/or brother(s) had received training from DRDF; 11 persons had received AIT training and 14 had received farmer's training.

WLEW Training

The two major reasons for joining WLEW training included the need for money (39.0 %) and a desire to do business (39.0 %). Table 4.2 below presents the details of reasons by WLEWs for getting training from DRDF.

Table 8: The need of WLEW trainign

Responses	**Number of WLEW** (Count)	**Number of WLEW** (Percentage)
I needed money	135	39.0
There was no other job	34	9.8
I wanted to do business	135	39.0
Wanted to serve the village	1	0.3
For more income	2	0.6
DRDF motivated me	13	3.8
Wanted to learn something new	2	0.6
My Headmaster asked me to do it	1	0.3
wanted to help the people	4	1.2
Friend asked me to do it	2	0.6
No answer	17	4.9
Total	346	100.0

According to the training plans of DRDF, the duration of WLEWs training is of 30 days. The topic of the training recalled by more than 50 % WLEWs was animal health, including signs/diagnosis of common livestock diseases (66.8 %), treatment of wounds, diarrhea, tympany and cough (60.4 %), parasites and de-worming (54.3 %), safety and control of animals (52.6 %), storage, and transportation and administration of vaccines (52.3 %). Out of 346, 282 WLEWs (roughly 82 %) confirmed that the DRDF team trained them to maintain records of their transactions.

Market Size for Livestock Extension services

In order to gauge the perception of market size in the eyes of WLEWs, they were asked to report the expected number of households in their own and the neighboring villages that could be their potential

clients. The average number of expected clients for a WLEW is 196 out of which 141 were reported to be from WLEWs own village and 55 were reported to be from the neighboring villages. These estimates show that WLEWs' perceive that they have a demand of their services.

Status of WLEW Record

Proper record management is an important task to gauge the WLEW progress, performance and utilization of WLEW services at the village level. Around 83 % of the WLEWs were registering their transactions according to the training provided to them by DRDF. Around 31 % of the WLEWs had up to date registers having entries since they started their work after training. About 51 % (175 WLEWs) were maintaining the registers but the records were incomplete, while 17.3 % WLEWs did not have the record register at all.

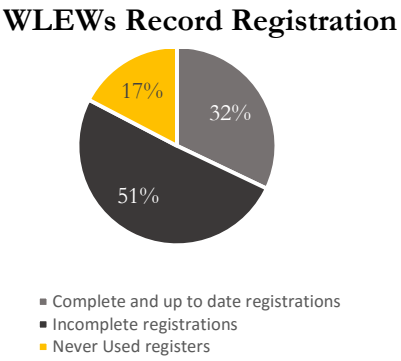


Figure 14:WLEW Record Registration

The data was further analyzed to examine the last three months' record status of WLEWs. Findings indicated that there was a positive change in the record maintenance practice as 44 % WLEWs had up-to-date records in their registers for the last three months. Reasons given by WLEWs for not keeping up-to-date records included: (1) Not knowing the procedure to enter data (16 %), (2) It is difficult to enter data (23 %); and (3) There is no need, the work is insufficient (61 %). All extension workers were given training in business practices and record keeping but still many WLEWs were unable to maintain a register. Apparently, more efforts are required in this regard.

Average Number of Service

The economic activity undertaken by the WLEWs indicates the extent to which the market for livestock services has been established. According to the register records, the average number of services/transactions performed per month by each WLEW during the past 90 days was 22, ranging from 0 to 371.

Number of Services / Transactions	Number of WLEWs	%age	Minimum	Maximum	Mean
No Services/ Transactions	25	7.2	0	0	0
1 to 10 Services/ Transactions	57	16.5	1	10	6
11. to 20 Services/ Transactions	36	10.4	11	20	15
21 to 30 Services/ Transactions	15	4.3	22	28	25
31 to 40 Services/ Transactions	8	2.3	31	40	35
41 to 50 Services/ Transactions	2	.6	45	48	47
51 to 60 Services/ Transactions	1	.3	57	57	57
More Than 60 Services/ Transactions	12	3.5	63	371	154
Register was not updated	190	54.9	-	-	-
Total	346	100.0	0	371	22

Table 9: Distribution of WLEW Services

Types of Services Performed During the Past 90 days

The number of services and transactions performed by WLEWs in the last 90 days included HS vaccination (2016 cases), treatment of cough/temperature/diarrhea (1,854 cases), sale of concentrates (Vanda) (1,343 transactions), FMD vaccinations (1,124 cases), treatment of parasitic infections (1,075), treatment of indigestion (793 cases), sale of vaccines/medicines (650 cases), treatment of tympany (551 cases), wound dressing (475 cases), other cases (349 cases), treatment of mastitis (265 cases), sale of fodder seed/fertilizer/insecticides (102 cases), milk collection (31 transactions), and horn/tail docking (15 cases). Approximately 10,643 services were provided by 346 WLEWs in 90 days. The number of services / transactions performed by WLEWs needs to be improved.

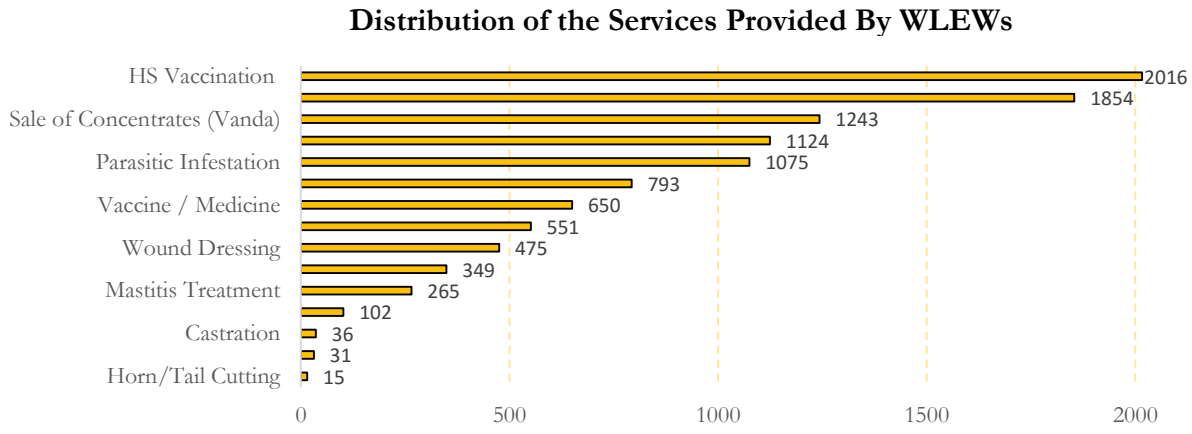


Figure 15: Distribution of WLEW Services

Cost structures, income and net profit in the last 30 days

There was a marked variation in the cost, income, and net profit from different services/transactions carried out by WLEWs. Per service/transaction cost varied from Rs. 10 for an HS vaccination to Rs. 615 for a bag of concentrate (Vanda). The income including fee, which varied from Rs. 31 for an HS vaccination to Rs. 853 for a bag of concentrate (Vanda). The net profit also differed from Rs. 21 for an HS vaccination to Rs. 238 for concentrate (Vanda). The activities generating maximum profit for the WLEWs were sales of concentrates, indigestion and mastitis treatment. The details of the costs, income and profit is provided in the table below:

Table 10: Cost Analysis of WLEWs

Number of Services/Transactions	Cost (Rs) including transportation	Income including Fee (Rs.)	Net Profit (Rs.)
Castration	35	81	45
Cough / Temperature/ Diarrhea	42	86	44
Wound Dressing	30	69	38
Mastitis Treatment	273	343	70
Horn/Tail Cutting	43	107	63

FMD Vaccination	29	68	39
HS Vaccination	10	31	21
Indigestion	47	126	79
Parasitic Infestation	25	53	27
Tympany	61	105	45
Sale of Concentrates (Vanda)	615	853	238
Vaccine / Medicine	36	100	64
Fodder Seeds / Fertilizer / Insecticide	31	61	30
Milk Collection	67	95	29
Other (specify)	152	307	155

Average monthly expenditure in the last 3 months

Regarding the average monthly income and expenditures in the last three months, it was found that WLEWs are not regularly earning from their services as well as a significant number of WLEWs (40 %)did not report any income for the last 3 months. The average monthly income of these (40 %) WLEWs in the last 3 months (November and December 2013, and January 2014) was Rs. 6,018, ranging from Rs. 2,718 in January 2014 to Rs. 11,108 in December 2013. The average total monthly expenditure varied from Rs. 1,481 in January 2014 to Rs. 9,254 in December 2013. Average monthly income and expenditure, including expenditure on transportation, Vanda and medicines is shown in the table below:

Table 11: Average Monthly Expenditure

Name of Month	Number of WLEWS who reported income and expenditures	Monthly Income from WLEW Services (Rs)	Monthly Expenditures (Rs)			
			Total	Transportation	Vanda	Medicines
January 2014	215	2,718	1,481	57	1,000	423
November 2013	203	4,231	2,099	134	1,372	592
December 2013	210	11,106	9,254	58	8,290	906

The monthly income target for the WLEWs for each year was expected to be at least Rs. 3,000. The average net income for the last 3 months was Rs. 1,740 per month, which was much below target. Profit cannot be considered as the sole indicator of the impact of the project trainings because it is an attempt to initiate a new market and the intervention is also hindered by the norms and social regulation structures present in Pakistan.

Sources of Income other than WLEW Work

In order to get the opportunity cost of the WLEW work, we need to understand the alternate opportunities available to the beneficiaries. Fifty-seven WLEWs (15.80 %) reported having sources of income besides WLEW work, with an average monthly income of Rs. 3,227. This indicates that other opportunities exist and this can explain why the participation rates of the WLEWs are low. Despite the high opportunity cost 60 % of the WLEWs continue providing the extensions services and this indicates that the demand of these services exists.

Regularity of Services

A gradual improvement in the working of WLEWs was noticed during the last three months. In November 2013, 54.3 % WLEWs provided services, in December 2013 56.4 % extension workers were on the job, and in January 2014 58.1 % workers provided services. Increased burden of livestock diseases during the winter months may be partially responsible for the improved regularity of services, over this time period. However, the ballpark figure is around 55 % indicating that slightly more than half of the WLEWs are doing business.

Table 12: Regularity of WLEWs

Months	Responses	Number of WLEWs	Percentage (%)
During last one month (January 2014)	Yes	201	58.1
	No	145	41.9
During last two months (December 2013)	Yes	195	56.4
	No	151	43.6
During last three months (November 2013)	Yes	188	54.3
	No	158	45.7

Kinsmen/Spouse help in WLEW Work

A strong association was found between the regularity of WLEW services and family members' support available to her. About 68 % of WLEWs who worked regularly in the last three months were helped by their male family members, whereas in case of irregular WLEWs it was about 32 %. This shows that family support can play a crucial role in keeping the WLEWs motivated enough to work.

Reasons given by WLEWs for not working regularly during the last 3 months included personal work (49.0 %), no money to purchase Vanda (9.7 %), no work (25.8 %), and lack of trust from people/farmers (15.5 %).

DRDF Staff Visits to WLEWs

According to the DRDF field strategy, the staff meets WLEWs within 10 days of the trainings for an induction meeting, following which they hold monthly and quarterly meetings as per the plan. Moreover, the staff also holds need-based individual meetings with WLEWs.

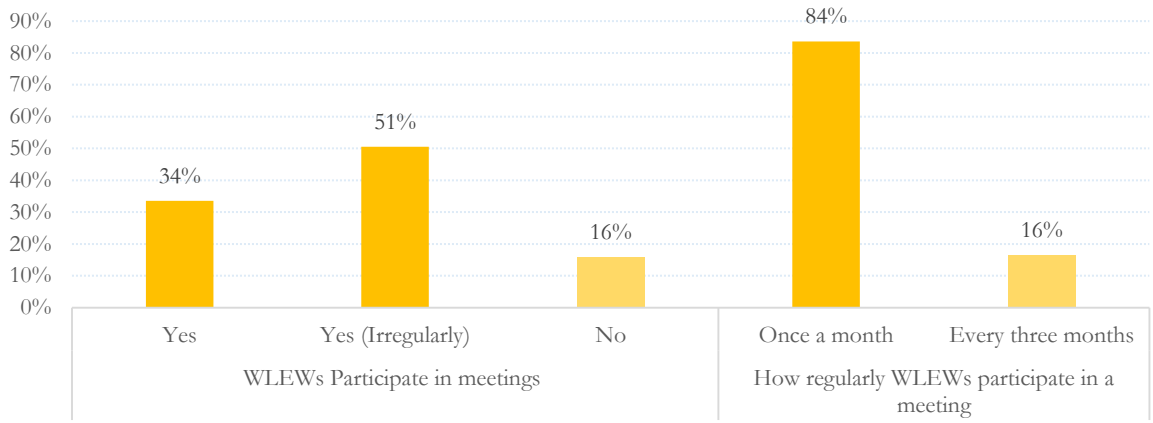
The survey results indicated that about 33.5 % WLEWs participated regularly in the meetings, 50.6 % WLEWs irregularly attended the periodic meetings, while 15.9 % did not participate in any meetings. Amongst those WLEWs regularly participating in the meetings, 83.6 % participated in monthly meetings, while 16.4 % attended quarterly meetings. The graph below shows the frequency of participation of the WLEWs.

Introduction to Input Suppliers

Synergies and complementarities in the business environment are absolutely essential to make it sustainable. Seventy-one (20.5 %) WLEWs were introduced to DRDF suppliers, 24 (6.9 %) WLEWs were introduced to suppliers from Wholesale Dealers in the city, 6 WLEWs were introduced to

Pharmaceutical Companies, and 9 (2.6 %) WLEWs were introduced to other suppliers. These connections can reduce the search costs of WLEWs helping them in running their business smoothly. About 65 % WLEWs had purchased medicines, vaccines and concentrates from suppliers introduced by DRDF, while 35 % WLEWs purchased their supplies from other suppliers (not introduced by DRDF).

Table 13: Participation of WLEWs in meetings.



Social Issues and Problems of WLEWs

About a dozen questions were asked about the social issues of and problems faced by WLEWs. A positive response was reported by WLEWs for most of the social factors. This reflects a great change in the acceptance levels of their work amongst the community. The table below provides the details of the norms reported by the WLEWs.

Table 14: Social Issues and Problems of WLEWs

Issues / Problems	Yes (%)	No (%)
Do you advise farmers regularly about animal diseases and vaccination?	191 (55 %)	155(45 %)
Does the society and your clan appreciate your work?	228 (66 %)	118(34 %)
Do you face prohibitions in movement from your family?	87 (25 %)	259 (75 %)
Is there interference from your family or clan in your talking to other men in running your business?	100 (29 %)	248(71 %)
Does your father/husband/brother(s) help you in your business?	207(60 %)	139(40 %)
Do women work/hold jobs in your clan?	152(44 %)	194(56 %)
Have farmers ever refused to pay for your services?	106(31 %)	238(69 %)
Are you a reliable livestock worker for the farmers?	212 (62 %)	131(38.0 %)
Do you face any other problems in running your business?	155 (45 %)	188(55 %)
Has cooperation increased among women due to DRDF?	211(62 %)	131(38 %)
Do you believe that you can work after becoming livestock extension workers?	248(72 %)	98(28 %)

DRDF Mass Communication

One hundred (28.9 %) WLEWs said that the Dairy Project provides dairy farming information through the media. From these 100 WLEWs, 63 WLEWs cited TV, 4 cited Newspapers, and 33 identified Radio as their key source of information.

The three important messages identified by WLEWs were:

- **JANWAROON KO HIFAZTI TEEKEYLAGWAIN** (VACCINATE THE ANIMALS).
- **KIRMKUSH ADWIYAT ISTEMAL KARAYN** (USE DEWORMING DRUGS).
- **DOODH KEE PAIDAWAAR BARHAYAIN** (INCREASE THE MILK PRODUCTION).

Responding to a question on when was the last time they received information from the media, 7 (7 %) WLEWs said last week, 11 (11 %) said last month, 53 (53 %) said in the last three months, and 29(29 %) WLEWs received information longer than 3 months ago. According to 26 (26.5 %) WLEWs, the information was very useful for farmers, 58 (59.2 %) said it was useful to some extent, 4 (4.1 %) WLEWs said it was not useful, and 10 (10.2 %) WLEWs had no comments in this regard.

About 92.6 % WLEWs identified TV as the media which can play an important role in providing dairy information to farmers. This shows that TV advertisements, despite being expensive, can help in raising awareness amongst the potential poor of beneficiaries.

SECTION IV

ARTIFICAL INSEMINATION TECHNICINAS (AITS)

SURVEY RESULTS

The findings presented in this section are based on the information received from 123 AITS from 12 different districts of Punjab. Tehsil level variations are captured by covering 33 different Tehsils from within 12 districts. This section summarizes the general characteristics of the beneficiaries of the project and presents information on the practices being followed by our beneficiaries.

General Characteristics of AITS' Families

Family characteristics are critical for understanding the true and unbiased impact of AITS' beneficiaries. This subsection presents information of the general socioeconomic characteristics of the WLEWs including information of the income and education levels of their family.

Punjab's ongoing demographic transition is increasing the share of young adults in the population. Approximately two-thirds of Punjab's population today is below the age of 29.[6] Therefore, for getting the representative estimates of AITS' beneficiaries about 71 % of respondents are of 29 years of age or less. Moreover, majority of the AITS (62.6 %) had at least secondary education, while 32 (26 %) had Intermediate education, 10 % had B.A/B.Sc. or more education and 3.25 % had less than secondary education.

The average family size of AITs is 6.7 of whom, on average, 3.6 (54.6 %) were male and 3.0 (45.4 %) were female. Twenty-two % family members of AITs were illiterate, 0.6 % had Madrassa education, 12.2 % did not complete primary level of schooling, 19.5 % had completed primary schooling, 6.8 % had passed middle, 20.5 % were matriculate, 11.1 % had Intermediate, 6.7 % had BA/B.Sc. or higher degrees, and 0.5 % had technical diplomas.

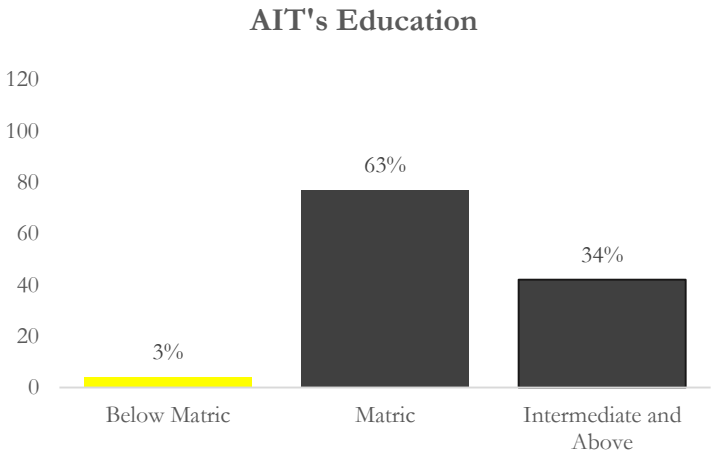


Figure 16: Distribution of AITs Education levels

Moreover, employment networks of family networks entails more opportunities in terms of better health and education. Therefore, looking at the family employment demographics is important factor for studying impact of program. The %age of full-time employed male members of AIT families was 62.4 %; 5.6 % were unemployed, 22.1 % were students, 1.3 % had retired from service, 6.5 % were disabled, and 1.1 % worked as unpaid family labor. Among the female members of AIT families, 5.4 % were employed, 1.6 % were unemployed, 50.0 % were housewives, 13.4 % were farm housewives, 22.6 % were students and 7.0 % were disabled (Table 4.1).

[6] http://nhdr.undp.org.pk/wp-content/uploads/2015/02/Niloufer-Siddiqui-The-Politics-and-Economics-of-Pakistan-Youth.pdf

Table 15: Employment Status of AITS family members

Employment Status	Gender Distribution		
	Male	Female	Total
Employed	62.40 %	5.40 %	36.50 %
Unemployed	6.50 %	1.60 %	4.30 %
House Wife	0.00 %	50 %	22.70 %
Farm-House Wife	0.00 %	13.40 %	6.10 %
Student	22.10 %	22.60 %	22.30 %
Retired	1.30 %	0.00 %	0.70 %
Disabled	6.50 %	0.00 %	6.70 %
Unpaid Family Workers	1.10 %	0.00 %	0.60 %
Total	100 %	100 %	100 %

Building further on the employment, average household income is decisive factor for modelling the motivation of household members. The estimates from the survey show that the average annual household cash income was Rs. 407,727 (with a range from Rs. 67,717to Rs. 1,191,968). This indicates that AITs from varying income brackets were selected. Table 4.2 presents details of the household income distribution of AITs.

Table 16: Income Distribution of AITS family members

Income Brackets	Income Distribution	
	Percentage of AITs	Average Yearly Household Income
0 to Rs. 100,000/-	9.80 %	67,717
Rs. 100,001 to Rs. 200,000	20.30 %	148,376
Rs. 200,001 to Rs. 300,000	19.50 %	255,083
Rs. 300,001 to Rs. 400,000	20.30 %	345,840
Rs. 400,001 to Rs. 500,000	14.60 %	456,278
Above Rs. 500,000	15.40 %	1,191,968
Total	100 %	407,727

AIT Training:

AITs received a support kit upon completion of their training to kick-start their work in the field. Essential items of the support kit included cylinder with liquid nitrogen, insemination Gun, Semen, Gloves and sleeves.

Information on AIT's service area can help us in visualizing the impact and spillover effect of AIT's service. The number of livestock-owning households in AIT's village of residence were 150, on average. While, the number of such households in neighboring villages were 212. Thus, 362 livestock-owning households could benefit from each AIT.

Continuing further, each AIT was provided with a register for record maintaining and monitoring the activities of every AIT. Majority of the AITs maintained records: The registers were available and the records were complete in the case of 112 (91.1 %) AITs; one AIT had register available but no data was recorded in it, while 10 AITs (8.1 %) did not have any register available at the time of interview.

Moreover, the average number of AI services performed by the AITs in a month was 99, ranging from 0 to 449. A histogram showing the frequency of inseminations is provided below. (Fig 17)

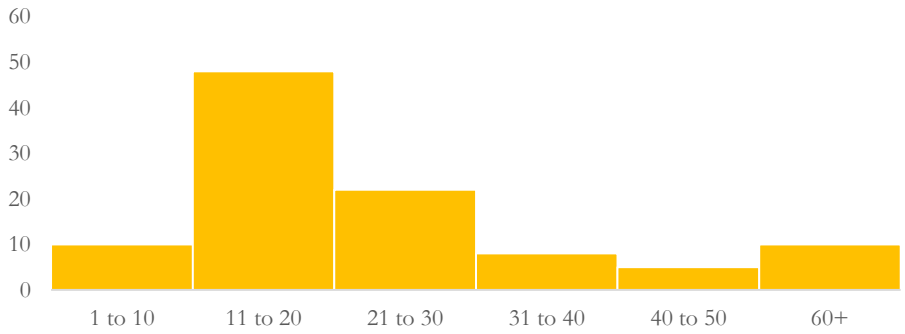


Figure 17: Hitogram (Number of Inseminations)

While, the type of semen inseminated by AITs during the past 90 days included Sahiwal (37 %), Nili-Ravi (24 %), Holstein-Friesian (local) (20 %), Holstein-Friesian (imported) (8 %), Brown Swiss (8 %), Jersey (2 %), and Others (1 %). Moreover, vaccinations were performed by 79 (64.2 %) AITs, and 81 (65.9 %) AITs treated sick animals.

The average monthly expenditure on the purchase of semen including the transportation cost was Rs. 4,007, ranging from Rs. 1,048 to Rs. 22,963, while the average monthly income including fee, was Rs. 9,143, ranging from Rs. 2,883 to Rs. 30,992 according to the number of AI services performed by AITs. The majority of the AITs (around 44 %) earned an average monthly profit of less than Rs. 5000, almost 27 % earned a profit between Rs. 5000 and Rs. 10,000, whereas almost 15 % earned a profit over Rs. 10,000, and almost 15 % earned no income at all

Table 17: Average monthly profit distribution of AITs

Profit Ranges	Number of AITs	
	Count	Percent
No Income	18	14.6 %
Less Than 5000	54	43.9 %
5001-10,000	33	26.8 %
10,001-15,000	10	8.1 %
More Than 15000	8	6.5 %
Total	123	100.0 %

The total number of pregnancy tests performed in 30 days by 123 AITs was 1754 for self-serviced animals and 781 for animals serviced by other AITs. The average number of pregnancy tests performed by each AIT in 30 days for self-serviced animals was 14.3 and 6.3 for animals serviced by others. The rate of positive tests for self-serviced animals was 70 % and for animals serviced by other AITs was 55 %. The %age of pregnancies achieved in self-serviced animals was 70 %, which was better than the anticipated rate for the first year i.e. 58.8 %. Table 5.5 summarizes the pregnancy tests statistics:

Table 18:Pregnancy and Statistics

	Self-serviced animals	Animals serviced by other AITs
Total pregnancy tests performed	1754	781
Number of AITs	123	123
Average # of Tests Per AIT	14.3	6.3
Positive pregnancy results (Ratio)	70 %	55 %

The source of semen and LNG is summarized here for checking the validity of program: AITs obtained 81 % doses of semen from DRDF, 2 % doses from the Livestock Department and 17 % doses from other suppliers. Ninety-four % LNG was procured from DRDF and 6 % from other suppliers. No LNG was purchased from the Livestock Department (Table 19).

Table 19: Source of Semen and Liquid Nitrogen Gas (LNG) in past 90 days

	Semen Doses (%)	Liquid Nitrogen Gas
Source	**%**	**Number**
DRDF	81 %	94 %
Livestock Department	2 %	0 %
Other	17 %	6 %
Total	100 %	100 %

Continuing with summarizing the AITs training process: Average monthly income during last 3 months was Rs. 10,001 and average monthly expenditure on semen was Rs. 2,745, on transportation Rs. 936, and on LNG it was Rs. 793. The average per month net income of Rs. 5290 has surpassed the target income of Rs. 3000 per month. Forty-nine (39.8 %) AITs had other sources of income besides the income from AI work. Average income of AITs from other sources was Rs. 11,643 per month, ranging from Rs. 1,000 to Rs. 80,000 per month, and on average AITs spent 31 hours per week on other jobs.

Table 20:Monthly income and expenditure on AI Services during past 90 days

Name of the Month	Monthly Income (Rs)	Monthly Expenditures			Other Expenditures
		Transportation	Semen	Liquid Nitrogen Gas	
		(Rs)	(Rs)	(Rs)	
Jan-14	10,132	1020	2,675	764	252
Nov-13	9597	889	2897	726	214
Dec-13	10273	900	2664	888	245
Three months average	10,001	936	2745	793	237

DRDF staff was also actively interacting with AITs for the successful implementation of program. The survey results indicated that about 38.2 % AITs participated regularly in the meetings with DRDF staff, 31.7 % AITs irregularly attended the periodic meetings, while 30.19 % did not participate in any meetings. Amongst those AITs regularly participating in the meetings, 91.8 % participated in monthly meetings, while 8.2 % attended quarterly meetings.

Social Issues/ Problems facing AITs

AIT's responses to questions on social issues were:

- 97 % AITs regularly provided information to farmers.
- The work of 96 % AITs was appreciated by society and family members whereas 4 % received a negative response.
- 17 % AITs faced difficulty in mobility on visits.
- Cooperation of family members was available to 91 % AITs.
- 28 % AITs faced refusal of payments of dues by the farmers.
- A high proportion (99 %) of AITs were trusted by the farmers for their professional work.
- 16 % AITs faced other problems regarding their work.

- 58 % said that there were other AI workers in the village.

Awareness Campaign of DRDF / Dairy Project about Dairy Farming

Fifty-five (44.7 %) AITs said that DRDF provided information to farmers about dairy farming through media (radio, TV, newspapers). Twenty-nine AITs (52.7 %) received information last time from TV, 21 (38.2 %) AITs heard it on radio, and 5 (9.1 %) AITs received it from newspapers. Three (5.5 %) AITs received media information in the last week, 27 (49.1 %) received it in the last one month, 11 (20.0 %) AITs received media information in the last 3 months, and 14 (25.5 %) AITs received media information more than 3 months ago.

The three important messages from media were:

1. **Feed Vanda to animals.**
2. **About animal care.**
3. **Use good semen for breed improvement.**

Responding to a question on how useful media information was to them, 54 % AITs answered saying it was very useful, 44.4 % stated it was somewhat useful, and 1.6 % stated it was not useful. In response to the question "How useful was media information for farmers?", AIT responded as follows: 47.6 % stated "Very useful", 44.4 % "Somewhat useful" and 4.8 % "Do not know". Regarding the relative importance of media, AIT's responses were 89.9 % supportive for TV, 3.4 % for Radio, and 6.7 % for Newspaper.

SECTION V

CONCLUSION

CONCLUSIONS

The DRDF Dairy Project has contributed towards introducing new concepts and interventions for the enhancement of livestock productivity in Pakistan. The data clearly shows that the beneficiaries of the project led trainings are using best practices to their advantage. This training of small-holder dairy farmers in best dairy farming practices and trainings of the locals as AITs and WLEWs has been a positive transformation to say the least. The trainings conducted by the project have not only benefited the performance of the dairy sector by enhancing the milk yield (average daily milk production increased by 17.1 %, approximately) but have also provided earning opportunities for the rural youth. Majority of the trainee farmers turned out to be 21 to 30 years old. A similar, younger trend was visible for the WLEWs and AITs as well. In addition, beneficiaries belonging to lower income classes benefited the most out of the trainings provided, because higher income classes usually have sources of income that are not related to the dairy sector.

The continuation rate for WLEWs was found to be around 60 % and more than 90 % of the AITs continued to provide AI services. The project has achieved its short-term goals successfully. The introduction of WLEWs is perhaps the biggest achievement of the DRDF Dairy Project. At this stage, it is important and necessary to boost-up and strengthen their confidence and professional know-how with refresher courses and supervision by specialists. In a traditional society like rural Punjab, it would be rather unusual to expect dramatic results in response to these interventions in a few months' time, but the response has been very encouraging so far. Women are not allowed to work according to the traditional social norms and the project interventions. The problem of uptake and the friction caused by the norms have been observed by previous studies as well (see Mumtaz and Salway (2005), Sathar and Kazi (2000)[7]). This pattern has been observed by research papers focusing on adoption of new practices (for example see Munshi and Myaux (2000)).

Despite the initial success of the project to introduce women as extension service provider, the project require to more focus on WLEW-component sustainability and their continuation of work after the project life. For this purpose more efforts should be extended to their regular follow-up and strengthening of their input supply network as this has been reported to be a significant handicap. To increase the income of WLEWs, more business lines like calf rearing, milk collection and sale of mineral mixtures should be added in their scope of work and these topics should also be the part of their training.

The design of the project has enabled it to initiate the development of a new market for the rural areas in which the local AITs and WLEWs can help the farmers. The effects and implementation of the program is perfectly in line with the market for the poor approach (commonly referred to as M4P) as it gives poor youth from rural areas an opportunity to improve lifestyle. These complementarities between the beneficiaries can help in generating business and are mutually beneficial for the rural environment. The project has contributed towards increasing the income of the beneficiaries and this additional income will positively affect their welfare. It has not only helped the poor to obtain sustainable livelihood but it

[7] Sathar, Zeba Ayesha, and Shahnaz Kazi. "Women's autonomy in the context of rural Pakistan." *The Pakistan Development Review* (2000): 89-110.

Mumtaz, Zubia, and Sarah Salway. "'I never go anywhere': extricating the links between women's mobility and uptake of reproductive health services in Pakistan." *Social science & medicine* 60.8 (2005): 1751-1765.

has also helped in strengthening the dairy sector generally. Continuation of the project of follow-up farm visits, supervision, and technical support of WLEWs and AITs, continuation and strengthening of supply chain operations and provision of dairy farming information through mass media are very necessary for some more years so that market gets established to a self-sustainable level.

RECOMMENDATIONS

This subsection concludes the report by providing some recommendations based on the trends and results shown by the data:

- **WLEWs**

  The two factors that come out as the major constraints in the uptake and continuation of the livestock extension are:

  (1) **Irregularities in the supply network:** WLEWs lack the facility of constant and smooth supply of the inputs required for providing the extension services. A possible solution to this problem is to establish a mechanism of placing bulk orders (at the district level or the cluster level) so that they suppliers have an incentive to deliver the goods and the cost of refilling the inventory for WLEWs gets reduced.

  (2) **Social Norms:** Women are not encouraged to work in rural Pakistan (especially this kind of work in which she has to interact with many male members of the village etc.). The uptake of the project has been found to be 60% which is less as compared to the uptake for AITs. The project started its operation only 3 years ago and it will take some time to make this profession acceptable in the rural setting. In order to make the training credible, the project's team should focus more on events that can connect the WLEWs with their community and build their rapport within their area.

- **Farmers**

  This component of the project is doing well. Farmers were found to implement most the best practices such as teat dipping etc. in the routine operations. However, the adoption rates were comparatively low for practices such as shed making, silage etc. which are relatively expensive. Small farmers, face financial constraints in implementing such practices and provision of credit to these farmers can help in alleviating this problem. Credit will allow them to improve their farms and this might increase the growth of dairy sector.

- **AITs**

  The artificial insemination trainings (AIs) is perhaps the most successful component of the project having an uptake rate of around 90% and a healthy average profit as well. This component is meeting the goals of the project, however, the functioning can be improved further by introducing small refresher courses with emphasis on the important details of the insemination procedure and practices that have comparatively low uptake.