

Impact study on model livestock community development programme in some selected areas of Bangladesh

M.T. Uddin^{1*}, M.M. Islam² and M. Nasrin¹

¹Bangladesh Agricultural University, Mymensingh- 2202, Bangladesh, ²Socio-Economic Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh

Abstract

With a view to increase the productivity of existing backyard livestock and poultry production systems and thereby to improve the socio-economic status of the rural people, BLRI in collaboration with the Department of Livestock Services (DLS) initiated the study since April 2010. The specific objectives of the study were to disseminate the livestock technologies for increasing productivity through training and demonstration and to assess the impact of technological interventions on livestock productivity, socioeconomic improvement and changing livelihood status of rural farm families. The study was implemented initially at Kadamtoli under Belkuchi Upazila under Serajganj district and Chakpara and Bichamara villages under Naikhongchari Upazila under Banderban district which was later extended to Talukhabu village of Gongachara Upazila under Rangpur district. Through this project, technological support was provided to a total of 321, 218 and 780 farm households in Belkuchi, Naikhongchari and Gangachara upazila, respectively. In order to conduct the impact study, 90 farmers taking 30 from each Upazila were selected through simple random sampling technique. The 'before' and 'after' comparison was followed for assessing the impact. The t-statistic was applied to test the significance of relevant parameters. It was revealed that technological intervention has resulted to increase in livestock and poultry population and increase in productivity of milk (19-40%), duck and chicken eggs (22-36%) both horizontally and vertically. There was no occurrence of death of cattle, goat and poultry birds. Farmer's overall income was boosted up which has contributed to possession of new household assets and addition of the already available assets. The consumption of all food items was increased as well. It was recommended that the programme may be replicated to other locations with new interventions.

(Key words: Production system, productivity, livelihood and technological intervention)

Introduction

Given the basic structure of Bangladesh agriculture, virtually livestock and poultry are kept in small farms for which animal raising is a secondary and generally supportive activity to crop farming. This sub-sector contributes significantly to the

health and economy of rural communities and the nation as a whole. In addition to main economic trains, livestock and poultry also contributes to the production of organic fertilizer and fuel and in the use of marginal nutritional resources which are not directly accessible to mankind.

*Corresponding author: tajbau@yahoo.com

The backyard livestock and poultry production especially goat and poultry farming are less capital-intensive than larger enterprises and can often be financed by dormant rural savings. Livestock is owned by individual households and mostly maintained under scavenging system with little or no inputs for housing, feeding or health care. Indigenous animals and birds still meet more than 50% of meat and egg requirement.

With variety of advantages, this sub-sector especially backyard system has not yet been developed in relation to crop. A considerable number of animals and birds die each year due to outbreak of different known and unknown diseases. A number of development programmes has so far been launched by GOs and NGOs for the development of backyard production system in addition to commercial/semi-commercial one for the sake of improving livelihood of rural people. Bangladesh Livestock Research Institute (BLRI) also lies in the stream with slightly different views and perspective.

With a view to increase the productivity of existing backyard livestock and poultry production systems and thereby to improve the socioeconomic status of the rural people, BLRI in collaboration with Department of Livestock Services (DLS) initiated this study since April 2010.

The study was planned towards reducing morbidity and mortality of livestock animals and poultry birds through routine vaccination and proper medication,

awareness build-up for technology adoption through training, increasing productivity of existing stock under subsistence farming conditions through technological interventions and livelihood improvement of livestock community including women empowerment. The study was undertaken with the following specific objectives:

- i. To disseminate the livestock technologies for increasing productivity through training and demonstration; and
- ii. To assess the impact of technological interventions on livestock productivity, socio-economic improvement and livelihood changes of rural farm families.

Materials and Methods

The study was implemented at Belkuchi Upazila under Serajganj district and Naikhongchari Upazila under Banderban district. Kadamtoli village under Belkuchi Upazila and Chakpara and Bichamara villages under Naikhongchhari Upazila were selected as the study villages. Later, the study was expanded at Talukhabu village of Gongachara Upazila under Rangpur district in 2011. Through this project, technological support was provided to a total of 321, 218 and 780 farm households in three Upazilas, respectively. Among them, thirty farmers from each district (a total of 90 farmers) were selected for assessing the impact of technological interventions.

The field survey was done with a structured questionnaire. The data and information collected from field surveys, interviews,

discussions and communications were scrutinized, classified, edited and coded. For analyzing the data, descriptive statistics such as sum, average and percentages were used. The 'before and after' comparison was followed for assessing the impact of technological interventions. The average impact on farmers' income was measured as follows:

$$\bar{I} = \frac{1}{n} \sum_{i=1}^n (O_i^T - O_i^C) \text{ (Ravallion, 2008)}$$

Where, I = Impact (also known as causal effect or gain); O = Value of the interpretable impact indicator; T = Treatment group; C = Control group; i = Sample units; and n = Sample size.

The t-statistic was applied to test the significance of relevant parameters. Expenditure elasticity was also estimated using the following formula:

$$EY = \Delta Y / \Delta I \cdot I / Y$$

Where, EY = Expenditure elasticity;

ΔY = Change in Expenditure;

ΔI = Change in income;

Y = Expenditure before intervention;

and I = Income before intervention.

The major activities of the project were: baseline survey, distribution of improved Black Bengal buck among the farmers, vaccination and healthcare services, demonstration and field day, farmers' training, monitoring and advisory services, video documentation and impact study.

Results and Discussion

Farm and Family Information

It was revealed that about 33 farmers in Belkuchi upazila and 8 farmers in Bangachara had no homestead land of their own. They used government/khash land for homestead usually by the side of embankment/road. Again 148 and 24 farmers possessed no cultivable land at all in Belkuchi and Gangachara, respectively. They were mostly labourers involved predominantly in fabrics manufacturing along with seasonal agricultural activities in the village. Average farm size was higher in Naikhongchari (2.411 acres) than Gangachara (0.550 acre) and Belkuchi (0.251 acre) upazilas (Table 1). In all the Upazilas, each farm family had almost equal proportion of male and female members. On an average, Naikhongchari had a higher family size (6.15) followed by Belkuchi (5.09) and Gangachara (4.74). However, the family size in Naikhongchari and Belkuchi was higher than the national average (4.9) of the country (BBS, 2010). Agriculture was the main occupation of the farm families whereas agriculture plus service was the second major occupation in Belkuchi and Naikhingchari areas. In Gangachara, agricultural activities and labour selling in seasonal agricultural operations, industry, etc. (43.02%) were the prominent occupation (Table 2).

No land was spared for fodder cultivation, even in the *Rabi* season. Other than cropping season, crop fields were remained fallow for a short time period after harvesting the crops.

Table 1. Farm and family information

Particulars	Belkuchi	Naikhongchari	Gangachara
A. Farm family (No.)	321	218	780
B. Farm size (acre/farm)			
i. Homestead	0.041 (16.53)	0.261 (10.84)	0.139 (25.27)
ii. Pond/ditch	0.011 (4.57)	0.572 (23.72)	0.036 (6.55)
iii. Cultivable land	0.197 (78.51)	0.631 (26.18)	0.373 (67.82)
iv. Fallow/seasonal fallow	0.002 (0.71)	0.947 (39.24)	0.002 (0.36)
Total	0.251 (100.00)	2.411 (100.00)	0.550 (100.00)
C. Family size (No./farm)			
i. Male	1.83 (35.95)	1.78 (29.34)	1.76 (37.13)
ii. Female	1.67 (32.81)	1.74 (28.74)	1.66 (35.02)
iii. Child	1.60 (31.43)	2.63 (43.34)	1.32 (27.85)
Total	5.09 (100.00)	6.15 (100.00)	4.74 (100.00)

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Note: Figures within the parentheses indicate percentages of total.

Table 2. Occupation of farm family (% of population)

Occupation	Belkuchi	Naikhongchari	Gangachara
i. Agriculture	30.10	38.44	-
ii. Labour (agril. and non -agril. activities)	13.12	2.05	23.61
iii. Service	2.72	2.70	-
iv. Business	1.15	3.15	4.07
v. Agriculture + Service	22.30	21.00	10.1
vi. Agriculture + Labor	15.15	10.46	43.02
vii. Business + Service	2.12	0.45	-
viii. Service + Labor	0.65	0.45	-
ix. Business + Labor	3.02	0.45	0.86
ix. Agriculture + Business	4.22	14.00	14.46
x. Agriculture + Service + Labor	3.45	0.86	-
xi. Agriculture + Business + Service	1.05	5.50	1.88
xii. Agriculture + Business + Labor	0.95	0.49	2.00
Total	100.00	100.00	100.00

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Therefore, there was no scope of fodder crop production in the villages away from cropping season. After the intervention, BLRI developed HYV Napier 1 was delivered to 14 farmers of Belkuchi covering the area of 100 decimals and 18 farmers of Gangachara in order to expand such improved feed cultivation among the livestock rearers and thereby to improve livestock productivity.

Information on livestock productivity livestock and poultry possession

Table 3 reflects a positive change of possession of livestock and poultry species in three locations which is presumably due to proper and timely vaccination in the areas that ultimately reduced mortality. The number of livestock species in each farm family was very small before the

Table 3. Change of possession of livestock and poultry in three locations (Number)

Species	Belkuchi			Naikhongchari			Gangachara		
	Before	After	% change	Before	After	% change	Before	After	% change
Cattle	0.82	0.93	+ 13	1.90	2.04	+ 7	1.21	1.57	+ 30
Goat	0.19	0.22	+ 16	1.01	1.07	+ 6	1.15	1.53	+ 33
Sheep	0.11	0.14	+ 27	0.06	0.07	+17	0.13	0.16	+23
Chicken	6.07	8.92	+ 47	13.46	15.77	+ 17	4.71	5.48	+ 16
Duck	7.56	8.20	+ 10	1.24	1.35	+ 9	0.92	1.17	+ 27
Pigeon	0.37	0.59	+ 59	0.76	0.98	+ 30	0.81	1.09	+ 35
Pig	-	-	-	0.13	0.17	+ 28	-	-	-

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

intervention. Most of livestock species were indigenous/local. Some people in Belkuchi and Gangachara reared crossbred cattle but there were no crossbred cattle in Naikhongchari. Some of the tribal farmers used to rear pig of cross-breed type. With a few exceptions, almost all farm families were rearing poultry either chicken or duck or both. Some people also reared pigeon predominantly.

Number of all animals and birds were increased within one year period, the incremental rate is higher in Belkuchi (10-59%) followed by Naikhongchari (6-30%) and Gangachara (16-35%).

Livestock productivity

A positive impact on productivity of animals and birds was observed in the villages. All these changes in production were statistically significant as tested by the t-statistic (Table 4). Higher milk production in Belkuchi (40%) is attributed due to feeding BLRI developed Napier 1 compared to Gangachara and Naikhongchari regions.

Before the programme, productivity of existing stock in the villages was low due to inadequate feed and fodder along with poor genetic characteristics. But after the programme, productivity of dairy cattle, poultry and duck was increased horizontally as there is no death occurrence and vertically due to de-worming, routine vaccination of all animals, good feeding and health management.

Product marketing

The villagers usually sold their product mostly in the local markets. Some farmers sold their product directly from farmgate/homestead.

Necessary input suppliers are now available at the villages and they sell the inputs including feed to the farmers in the agreement that owners will sell their products to the same input suppliers in order to pay back the outstanding amount.

Table 4. . Impact on productivity of livestock and poul

Parameters	Belkuchi			Naikhongchari			Gangachara		
	Milk (litre/day)	Chicken egg (number /year)	Duck egg (number /year)	Milk (litre/ day)	Chicken egg (number /year)	Duck egg (number /year)	Milk (litre/day)	Chicken egg (number /year)	Duck egg (number /year)
Before	1.8	52	72	0.89	58	65	1.55	51.50	77.02
After	2.15	68	86	1.25	65	73	1.92	70.20	94
Change in production (Ravallion test result)	0.35 (+19)	16 (+30)	14 (+19)	0.36 (+40)	7 (+ 13)	8 (+ 13)	0.37 (+24)	18.7 (+36)	16.98 (+22)
t-value	2.19*	4.51**	3.93**	3.17**	2.42*	2.04**	1.96*	3.11**	2.04*

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Note: Figures with in the parentheses indicate percentage; ** Significant at 5 percent level; and * Significant at 10 percent level of significance.

Livestock and poultry health perspective major diseases

Foot and mouth disease (FMD) was the most widely spread livestock disease affecting health and productivity of cattle in each year. Ruminal impaction and skin disease were more or less common for cattle.

Ranikhet was the most common disease causing massive loss of chicken followed by Pox, NSRD, chicken infectious anaemia and coccidiosis. Similarly, plague was the commonly prevailed disease in duck. PPR and contagious ecthyma were major issues affecting goat health and production in Naikhongchari Parasitic infection was the most common disease in case of pig.

Mortality of livestock and poultry

After intervention, there was no occurrence of death of cattle and goat in the villages due to proper vaccination against fatal infectious diseases (Table 5). It was observed that before intervention a large number of livestock and poultry birds were infected

with infectious diseases resulting to higher percentage of mortality.

Employment generation

Agribusiness was developed and new employment opportunity was created in the study villages. Altogether 12 broiler farms were initiated by the training recipients which were running successfully. Women empowerment was increased and they have participation in different income generating activities. Gender participation in livestock and poultry keeping were assessed with respect to labour hour devoted every day for this purpose (Table 6). Generally, cattle were reared separately from goat and sheep even in the same shed. Chicken and duck were remained in the same house. Labour hour devoted by family members was increased for all enterprises after intervention. Women were spending more time on rearing different livestock animals. Children are also engaged in livestock and poultry rearing in the villages.

Table 5. Impact of vaccination on mortality of livestock and poultry

Species	Name of diseases	Belkuchi		Naikhongchari		Gangachara	
		Before (%)	After (%)	Before (%)	After (%)	Before (%)	After (%)
Cattle	FMD*	1.3 (3)	-	0.3 (1)	-	-	-
	Black Quarter*	0.4 (1)	-	0.7 (3)	-	-	-
	HS*	-	-	0.3 (1)	-	-	-
	Anthrax*	-	-	0.3 (1)	-	-	-
	PPR*	1.7 (1)	-	2.7 (6)	-	-	-
Goat	FMD*	-	-	28.4 (63)	-	-	-
	Contagious ecthyma	-	-	4.1 (09)	-	-	-
	Black Quarter*	-	-	2.3 (05)	-	-	-
Sheep	PPR*	1.4 (1)	-	0.7 (1)	-	0.8 (2)	-
	FMD*	2.1 (2)	-	1.3 (3)	-	0.5 (1)	-
	New castle disease*	32.3 (614)	-	75.0 (2201)	-	14.75 (131.5)	-
	Pox*	6.0 (114)	-	5.4 (157)	-	1.37 (12.25)	-
Chicken	NSRD	1.1 (21)	-	8.8 (257)	-	-	-
	Parasitic infection	-	-	0.9 (25)	-	-	-
	Chicken Infectious anaemia	-	-	4.2 (123)	-	-	-
	Coccidiosis	5.0 (10)	-	-	-	-	-
	Plague*	1.9 (46)	-	21.0 (57)	-	5.39(10.25)	-
Duck	Cholera	-	-	4.1 (11)	-	15.13(28.75)	-

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Note: Figures with in the parentheses indicate actual number. * Vaccines supplied.

Economic profile

Household income

Table 7 reveals the household income of selected farm families from various sources. The table indicates a clear increase in the household income of farm families after the programme. Income from almost all sources was increased. Income from livestock rearing increases at a higher rate than other sources.

After the intervention, a considerable proportion of total income was coming from buck rearing in Naikhongchari (7.13%). The impact of intervention on income in all the areas was statistically significant which was verified by the value of t-statistic. Ravallion test results showed the income was increased by the absolute amount of Tk. 32624.7, Tk. 30296.2 and Tk. 25611.4 due to intervention which were indicated as 38%, 27% and 25% increase in income of Belkuchi, Naikhongchari and Gangachara sampled farmers, respectively.

Table 6. Gender participation in livestock and poultry rearing

Particulars	Belkuchi			Naikhongchari			Gangachara		
	Hour/day/person		% impact	Hour/day/person		% impact	Hour/day/person		% impact
	Before	After		Before	After		Before	After	
A. Cattle									
Male	3.56	3.93	10.39	2.53	3.03	19.76	3.28	3.87	17.99
Female	1.49	1.63	9.40	1.47	2.04	38.78	1.31	1.53	16.79
Child	0.38	0.56	47.37	1.21	1.29	6.61	1.45	1.93	33.10
B. Goat and sheep									
Male	0.92	1.04	13.04	0.96	0.98	2.08	0.92	1.01	9.78
Female	1.20	1.41	17.50	1.33	1.91	43.61	1.21	1.29	6.61
Child	0.09	0.14	55.56	-	-	-	0.99	1.12	13.13
C. Chicken									
Male	-	-	-	-	-	-	-	-	-
Female	0.57	0.72	26.32	0.93	1.24	33.33	0.60	0.97	61.67
Child	0.27	0.32	18.52	0.29	0.33	13.79	0.34	0.53	55.88
D. Duck									
Male	-	-	-	-	-	-	-	-	-
Female	0.55	0.58	5.45	0.54	0.80	48.15	0.54	0.74	37.04
Child	0.31	0.44	41.94	0.29	0.40	37.93	0.30	0.48	60.00
E. Pigeon									
Male	-	-	-	-	-	-	-	-	-
Female	0.25	0.36	44.00	0.85	0.90	5.88	0.61	0.77	26.23
Child	0.37	0.53	43.24	0.29	0.32	10.34	0.20	0.39	95.00

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Household expenditure

After the program, the farmers were in better position to earn more income and lead a better life than before. As a consequence, their household expenditure was increased. Respondents were spending most of their increased income on dwelling houses. Educational expenses were also more than before. However, expenses on health management were decreased as the farm families were consuming more livestock

products (meat, milk and egg). About 69%, 49.39% and 68.13% of total share was spent for food items in Belkuchi, Naikhongchari and Gangachara, respectively. Ravallion test results showed the expenditure was increased by the absolute amount of Tk. 7725.6, Tk. 12728.7 and Tk. 5160.7 due to intervention which were marked as 11%, 13% and 9% increase in expenditure of Belkuchi, Naikhongchari and Gangachara sampled farmers, respectively (Table 8).

Table 7. Annual household income of farm families (Tk.)

Sources of income	Belkuchi		Naikhongchari		Gangachara	
	Before	After	Before	After	Before	After
1. Crop production	9016.8 (10.50)	10820.2 (9.89)	27635.0 (25.00)	33162 (23.63)	17705.2 (17.03)	20203.5 (15.96)
2. Livestock rearing						
(i) Backyard rearing	2068.3 (2.40)	8970.0 (8.21)	8553.8 (7.77)	8553.8 (6.10)	3515.5 (3.38)	7178 (5.67)
(ii) Buck rearing	0 (0.00)	0 (0.00)	0 (0.00)	10000 (7.13)	0 (0.00)	0 (0.00)
3. Homestead based enterprises (gardening, non-farm sources, etc.)	625.8 (0.70)	750.9 (0.69)	4669.26 (4.24)	5603.1 (3.99)	764.7 (0.74)	954.5 (0.75)
4. Business	23766.6 (27.70)	28519.9 (26.09)	25965.6 (23.59)	31158.7 (22.20)	23234.8 (22.35)	29845 (23.58)
5. Service	18522.4 (21.60)	22226.9 (20.33)	30522.9 (27.74)	36627.5 (26.10)	25976.7 (24.98)	31500.8 (24.89)
6. Agril. and non-agril. labour	31683.3 (37.00)	38019.9 (34.78)	12688.0 (11.53)	15225.6 (10.85)	32772.9 (31.52)	39899.4 (31.52)
Total annual income	85683.2 (100.00)	118307.9 (100.00)	110034.6 (100.00)	140330.7 (100.00)	103969.8 (100.00)	129581.2 (100.00)
Impact of intervention on income (Tk.) (Ravallion test result)		32624.7*		30296.2**		25611.4*
t-value		2.56		3.11		1.99
Impact of intervention on income (percentage change)		38		27		25

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013. Note: Figures with in the parentheses indicate percentages of total. **Significant at 5 percent level. * Significant at 10 percent level.

Expenditure elasticity

Estimated expenditure elasticities for a group of commodities in three locations after intervention are shown in Table 8. Expenditure elasticity was estimated at 0.34 and 0.36 in Belkuchi and Gangachara, respectively which means that expenditure increased by 0.34% and 0.36%, on an average, due to 1% increase in income, other things remaining the same in two regions. On the other hand, the value of estimated expenditure elasticity in Naikhongchari

(0.53) was higher than other areas which means that the expenditure in Naikhongchari increased by 0.53% in response to a 1% increase in income.

Asset possession

Farmers' overall income was enhanced and as a result they spent more for making dwelling house, furniture, luxury items like mobile phone, TV, fan, etc. Their overall livelihood status was improved.

Table 8. Annual household expenditure of farm families

Particulars	Belkuchi		Naikhongchari		Gangachara	
	Before	After	Before	After	Before	After
Food	41175.7 (69.57)	46157.6 (68.97)	45403.6 (52.06)	49358.0 (49.39)	44957.9 (71.69)	47450.5 (68.13)
Clothing	5391.1 (9.11)	6380.1 (9.53)	9065.6 (10.39)	10714.3 (10.72)	4859.4 (7.67)	5150.4 (7.40)
Health management	3743.0 (6.32)	3649.0 (5.45)	8919.7 (10.23)	8472.6 (8.48)	3528.5 (5.64)	3242.3 (4.66)
Education	3310.4 (5.59)	3975.8 (5.94)	5837.2 (6.69)	6741.9 (6.75)	4513.8 (7.11)	5478.2 (7.87)
Cosmetics	2965.8 (5.01)	3507.7 (5.24)	1567.9 (1.79)	2322.1 (2.32)	2533.1 (4.05)	3320 (4.77)
Others (personal expenses, house construction)	2741.8 (4.63)	3253.0 (4.86)	16418.6 (18.83)	22332.3 (22.35)	2398.6 (3.83)	3000.6 (4.30)
Total annual expenditure	59197.6 (100.00)	66923.2 (100.00)	87212.5 (100.00)	99941.2 (100.00)	62481.3 (100.00)	67642.0 (100.00)
Impact of intervention on expenditure (Tk.) (Ravallion test result)	7725.6**		12728.7***		5160.7*	
t-value	4.51		1.98		2.10	
Impact of intervention on expenditure (percentage change)	11		13		9	
Expenditure elasticity (%)	0.34		0.53		0.36	

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013. Note: Figures within the parentheses indicate percentages of total. ***Significant at 1 percent level and ** Significant at 5 percent level.

Household asset inventory of the farm families indicate that each farm family owned more than one dwelling house for their shelter with an average of 1.97 in Belkuchi, 2.04 in Naikhongchari and 2.07 in Gangachara (Table 9). Number of houses per family amplified with increased farm size. A few people also owned television, fridge and some agricultural implements (crusher, STW and power pump).

Household consumption

Findings indicate that resource poor farm families purchased rice in addition to their own production (Table 10). All of the farm

families bought ata and pulse. Production of culture fish was small as the natural water body was few. Therefore, farmers had to purchase more than 50% of consumed fish.

A considerable amount of fish was procured from open water fishing during monsoon season. Similarly, about two-third of the consumed meat was from exogenous sources i.e. market, neighbours, relatives, etc. A good amount of milk and eggs was supplied from household livestock and poultry resources. Major portion of vegetables were procured from the local market in addition to household production.

Table 9. Asset possession of farm families (Number per farm)

Assets	Belkuchi			Naikhongchari			Gangachara		
	Before	After	% change	Before	After	% change	Before	After	% change
A. House									
i. Dwelling house	1.43	1.97	+38	1.52	2.04	+34	1.96	2.05	+5
ii. Animal shed	0.23	0.33	+43	0.41	0.62	+51	0.94	1.10	+17
iii. Other houses	0.48	0.52	+8	0.17	0.19	+12	0.86	0.88	2
B. Furniture									
i. Cot	1.86	1.92	+3	1.67	1.93	+16	2.08	2.11	+1
ii. Chair	3.25	3.62	+11	2.83	3.12	+10	2.59	2.85	+10
iii. Table	1.01	1.26	+25	0.93	1.08	+16	1.21	1.32	+9
iv. <i>Alna</i>	1.06	1.28	+21	0.81	0.82	+1	1.08	1.10	+2
v. Sofa	0.07	0.13	+86	0.17	0.18	+6	0.11	0.12	+9
vi. Wardrobe	0.09	0.19	+111	0.19	0.21	+11	0.06	0.11	+83
C. Household luxury									
i. Mobile phone	0.71	1.88	+165	0.56	1.32	+136	0.52	0.86	+65
ii. Radio	0.12	0.10	-17	0.04	0.03	-25	0.01	0.00	-100
iii. Electric fan	0.98	1.27	+30	0.59	0.69	+17	0.66	0.73	+11
iv. Television	0.21	0.28	+33	0.13	0.17	+31	0.35	0.41	+17
iv. Fridge	0.03	0.06	+100	0.05	0.08	+60	0.02	0.03	+50
D. Agricultural equipment									
i. Power tiller	-	0.02	-	0.08	0.10	+25	0.01	0.08	+700
ii. Crusher	0.06	0.08	+33	0.07	0.09	+29	-	0.02	-
iii. STW	0.07	0.10	+43	0.05	0.06	+20	0.06	0.08	+33
iv. Power pump	0.01	0.02	+100	0.02	0.02	0	0.12	0.14	+17

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

After the programme, farmers' overall consumption of all food items was increased (from 1147.5 gm to 1177.3 gm per day per capita in Belkuchi, from 1068.4 gm to 1089.6 gm per day per capita in Naikhongchari and 1147.1 gm to 1172.3 gm per day per capita in Gangachara). The changes in per capita daily food intake were statistically significant at 10 percent probability level as confirmed by the values of t- statistic in the areas.

Conclusion

The benchmark findings indicated that a considerable number of farmers had no cropland and were mostly dependent on daily labour selling. Number of livestock and poultry species was lower due to shortage of feed and disease outbreak. Productivity of these animals was also poor in the villages. The FMD and ND were the major diseases heavily affecting morbidity and mortality as well as productivity of animals. After three

Table 10. Consumption of different food items (gm/day/capita)

Food items	Belkuchi		Naikhongchari		Gangachara	
	Before	After	Before	After	Before	After
Rice own	429.3	431.2	481.8	483.1	436.2	440.1
Rice purchased	349.1	350.5	200.0	201.5	327.8	329.4
<i>Ata</i>	44.0	45.6	40.2	44.2	45.0	46.0
Pulse	26.3	28.3	23.8	25.3	25.9	27.4
Fish	49.4	53.2	37.7	39.8	51.4	55.6
Meat	18.7	21.7	21.8	25.6	22.1	26.1
Milk	46.7	50.4	55.0	57.3	51.1	54.7
Egg	3.1	4.2	4.2	4.9	0.1	0.3
Vegetable	180.9	194.2	203.9	207.9	187.4	192.7
Total	1147.5	1177.3	1068.4	1089.6	1147.1	1172.3
Change in per capita daily food intake	29.8*		21.2*		25.2*	
t-value	2.67		2.02		1.96	

Source: Benchmark survey report, 2010 & 2011 and field survey, 2012 & 2013.

Note: * Significant at 10 percent level.

years, impact study results indicated positive response to technological and health management interventions in regard to reduced mortality and increased productivity. Marketing facilities were improved. New avenues of employment were created. Farmers' income was increased. As a result, their housing and household asset possession were enriched, per capita daily food consumption was improved and thereby their overall socioeconomic conditions was enhanced. Farmers' awareness for technology Table 10. Consumption of different food items (gm/day/capita).

Although there is slight social conflict among the recipients and neighbouring villages, all farmers requested the team members of the impact study to continue the programme for two years more along with the supply of some good breed of buck to

ensure the proper natural services of goat in the villages as the kids were healthy and energetic. However, impact study based on three years data for three locations may not adequately represent the true picture of the community. It is also suggested to add more locations based on geographical variability to test the model prior to large-scale dissemination. Finally, it can be recommended that the programme may be replicated to other locations with new interventions like distribution of buck and sheep and HYV fodder in order to augment farmers' income and livelihood improvement.

References

- BBS 2010. Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

- Begum, J., Raha, S. K., Uddin, M. T. and Fatema, J. 2010. A study on milk marketing in selected areas of Bangladesh. Proceedings of the Annual Research Review Workshop, Bangladesh Livestock Research Institute, Savar, Dhaka, pp 330-348.
- Kamaruddin, K. M. 2002. Goat production in Bangladesh: present status and future prospects. *Khamar: A monthly magazine on poultry, livestock and fisheries*, Dhaka, July-August 2002, 11-15.
- Hossain, S.M.A. and Nessa, J. 2005. Studies on Livelihood Improvement through Integrated Farming. Final Report submitted to the Research Initiatives Bangladesh, Bangladesh Agricultural University, Mymensingh, Bangladesh.
- Rabbani, M.S., Alam, M.M., Ali, M.Y., Rahman, S.M.R. and Saha, B.K. 2004. Participation of rural people in dairy enterprise in a selected area of Bangladesh. *Pakistan Journal of Nutrition*, 3(1): 29-34.
- Rahman, H. 2010. Need assessment on veterinary services: availability and cost of animal health services in MFTS project areas. Final Research Project Report Submitted to Palli Karma-Sahayak Foundation, Sher-e-Bangla Nagar, Dhaka-1207.
- Rahman, M.S., Monaym, M.A. and Rahman, M.H. 2000. Dairy cow rearing efficiency in income and employment: A study of two areas of Bangladesh, *Bangladesh Journal of Animal Science*. 29(1& 2): 11-20.
- Ravallion, M. 2008. Evaluating anti-poverty programs. In T. Paul Schultz & John A. Struass (ed.), *Handbook of development economics*, Elsevier, edition 1, vol 4, no. 5, chapter 59, pp 3787-3846.
- Talukder, R. K., and Uddin, M. T. 2000. Economics of Milk Production in Bangladesh. A Contract Research Report Submitted to Bangladesh Agricultural Research Council, Farmgate, Dhaka-1215.
- Uddin, M. T., Islam, M.M. and Nasrin, M. 2011. Impact of recent changes in livestock production pattern on farm families' livelihood and health in selected areas of Bangladesh. *Bangladesh Journal of Livestock Research*, 18 (1&2): 52-69.