Bangladesh Journal of Extension Education *ISSN 1011-3916*
Volume 21, No. 1&2, 2009: 105-116 *Research Article*

Impact of Livestock Services on Socio-economic Status and Livelihoods of Farmers and Service Providers

A.B.M. Khaleduzzaman[1], A. Reza[2], M.Z. Abedin[3] and L. Nahar[4]

Abstract

The study was designed to assess the effectiveness of Union Livestock Service Centre (ULSC) under the Food Security for Sustainable Household Livelihoods (FoSHoL) project implemented by ActionAid, Bangaladesh. The study was conducted at 8 unions of 4 districts. Forty four service providers (vaccinators) and 120 households were selected as samples of the present study. The data were collected by using interview schedule through direct interview and personal visits to the houses of respondents. Majority of service providers (73%) and farmers (75%) were female having an average age of 37.25 and 36.39 years respectively. Among service providers, 59% had below secondary level education and 37% and 25% of the farmers in the study areas had the primary and below secondary level education, respectively. The average family size (4.28) was slightly higher among farmers than service providers (4.13). The land ownership of service providers (homestead and cultivable) and farmers (borgha) significantly ($P<0.05$) changed after getting livestock services from the FoSHoL project. The number of poultry of service providers and farmers increased significantly but the cattle numbers remained same. The average annual income, expenditure and the share of livestock and products in total income of service providers and farmers increased significantly ($P<0.01$). The livestock services provided by FoSHoL increased ($P<0.01$) the hand savings, savings in society and bank deposits of service providers and farmers as well. With the total income increased, the expenditure increased mainly on food, education, recreation and festival after implementation of the project indicating the improvement of their livelihood.

Keywords: *Livestock service, ULSC, socio-economic status, vaccinators.*

Introduction

Livestock sector has proved to be a useful tool for poverty reduction, income generation and meet up the nutrition deficiency. Livestock plays an important role in the national economy of Bangladesh with a direct contribution of around 3% to the agricultural GDP and providing 15% of total employment in the economy (Bangladesh Livestock Policy, 2007). With the rapid population growth and income increase, the demand for livestock and poultry products (e.g. meat, milk and eggs) will continue to rise. However, the major limitations of this sector in Bangladesh is that it is primarily a subsistence production organization which is individual family-based, small-scale and dispersed and is not capable of ensuring stable supplies to the major centres of demand.

The support and services from Upazila-based office of the Department of Livestock Services (DLS) to the farmers' door for scientific livestock rearing still remains inadequate and sometimes impossible. The actual causes which prevent the livestock support services to the farmers' door are: a) distance between villages and Upazila Livestock Offices; b) limited number of field

[1&2]Dept. of Animal Nutrition, Bangladesh Agricultural University, Mymensingh, Bangladesh , [3]International Rice Research Institute, Bangladesh Office (IBO), Bonani, DOHS, Dhaka, Bangladesh and [4]Action Centre la Faim (ACF), Bangladesh, Gulshan-2, Dhaka, Bangladesh.

staffs; c) paucity of inputs and scarcity of equipment; d) lack of infrastructural facility at union level; e) lack of trained and skilled manpower; and f) limitations of policy framework for decentralized the livestock activities at farmers level. In order to solve this problem, approaches that guarantee effective linkages of the farmers to the extension workers, decision-makers and researchers are needed (Misra *et al.*, 1997; Conner *et al.*, 1998; and Reddy *et al.*, 2005). Therefore, ccommunity-based organization for support services, production and processing of livestock products are also required (PRSP, 2005).

The Food Security for Sustainable Household Livelihood (FoSHoL) project financed by European Commission and implemented by ActionAid, Bangladesh has come forward with a new idea to disseminate the livestock services at farmers' door through a root level organization called "Union Livestock Service Centre (ULSC)". In FoSHoL livestock development activities, a total of 175 vaccinators (service providers) were trained. They are working actively in their respective areas with limited input support from the government livestock office and under intensive technical and management support by Community Development Facilitators (CDFs) of FoSHoL project. Vaccinators were assigned to provide their services to secure household cattle and poultry resources from different contagious diseases as well as giving technical advices for increased production not only to FoSHoL target groups but also the whole community. Therefore, the present study was undertaken to analyze the impact of livestock services from FoSHoL on livestock population and socio-economic status of farmers and service providers within the following objectives:

i) To analyze the livestock services and infrastructural facility provided by FoSHoL project.

ii) To determine and describe the socio-economic characteristics of farmers and service providers.

iii) To describe the changes of annual income and expenditure, household assets and savings of farmers and service providers before and after implementing FoSHoL project.

Methodology

Preparation of Questionnaire

The study was conducted at Aoazbaria and Dadpur, Bogdangha, Pandul, Dulihor, Sarulia, Naihati and Gutbog unions in Noakhali sadar, Kurigram sadar, Ulipur, Satkhira sadar, Tala and Rupsha Upazila (sub-district) respectively for a period of 24 February 2009 to 24 April 2009. An interview schedule was carefully made in Bangla keeping the objectives in view. First, a preliminary survey was designed and after pre-testing, the structured schedule was changed, modified and rearranged based on the preliminary survey. The schedule contained both open and close form questions. The schedule contained the socio-economic characteristics, livestock population, livestock support services provided by FoSHoL and its impact on annual income and expenditure, and livelihood changes of both farmers and service providers.

Collection of Data

The selection of 120 community farmers and/or beneficiaries was made randomly from the respective working areas and

regularly working 44 service providers (vaccinators) were selected as samples of the present study. Data were collected through direct interview of service providers and farmers. Participants were asked to memorize the cattle and poultry numbers, homestead area, household assets as well as annual income and expenditure before starting the FoSHoL project and confirmed the numerical values from a pre-assessment survey at the time of starting FoSHoL project. Participants were also asked the same questions after ending the project which clearly indicated the differences of livestock population, household assets, annual income and expenditure before and after implementing the FoSHoL project. After the interview, group discussions were initiated. To ensure the quality of information, the interview schedule was checked and each of the items had been correctly recorded. If there were any items overlooked and misunderstood or found contradictory, these were corrected through re-interviewing on the spot.

Statistical Analysis

The SPSS (Statistical Package for Social Science) computer package was used to perform the data analysis. Descriptive analysis such as mean, range, number and percentage, standard deviation, rank order were used wherever applicable. The significance of livestock numbers, household assets, annual income and expenditure before and after FoSHoL project was determined by pair *t-test*.

Findings and Discussion

Socio-economic Characteristics of Farmers and Service Providers

The socio-economic profile of farmers and service providers in the study areas is shown in Table 1. Majority of service providers (73%) and farmers (75%) were female having an average age of 37.25 years and 36.39 years respectively. In Bangladesh, women are in general responsible for livestock and poultry rearing. Poultry rearing is a traditional activity performed by women for income generation. Feeding livestock, cleaning sheds, keeping them at shelter for night, and health care are the activities performed by women. Owing to their crucial role in livestock care, women are generally consulted while buying and selling the livestock (Abdullah and Zeidenstein, 1982). Literacy has its own merits and contribution towards the process of development. It is certainly an essential prerequisite for doing livestock services properly as well as husbandry practices. Among service providers, 59% had below secondary level education and 18% and 5% had passed the SSC and HSC exams respectively which seemed to be enough as a vaccinator. Meanwhile, 37% and 25% of the farmers had the primary and secondary level education respectively in study areas which was also satisfactory for keeping livestock. Sixteen percent (16%) of the farmers were illiterate in the study area and no illiterate vaccinators were observed. The average family size was slightly higher in farmers (4.28) than service providers (4.13). In both cases, the average family size was smaller than national average family size of 5 (BBS, 2004).

Table 1. Socio-economic status of service providers and farmers in FoSHoL areas

Sl No	Characteristics		Service providers (n = 44)		Farmers (n = 120)	
1.	Gender	Male	12 (27%)		30 (25%)	
		Female	32 (73%)		90 (75%)	
2.	Education	Illiterate	0 (0%)		19 (16%)	
		Only can sign	3 (7%)		15 (13%)	
		Primary (1-5)	5 (11%)		45 (37%)	
		Below Secondary (6-10)	26 (59%)		30 (25%)	
		SSC	8 (18%)		7 (6%)	
		HSC	2 (5%)		4 (3%)	
3.	Age		37.25 (22-65)		36.39 (14-65)	
4.	Family size		4.13 (2-6)		4.28 (1-8)	
5.	Occupation	Major	Service provider		House wife	65 (54%)
					Agriculture	31(26%)
					Business	8 (7%)
					Daily labor	6 (5%)
					Livestock rearing	5 (4%)
					Service	3 (2.5%)
					Student	2 (1.5%)
		Subsidiary	Agriculture	22 (50%)	Agriculture	47 (40%)
			House wife	10 (23%)	House wife	11 (9%)
			Business	5 (10%)	Livestock rearing	8 (7%)
			Livestock rearing	3 (7%)	Service	5 (4%)
			Service	2 (5%)	Business	4 (3%)
			Daily labor	2 (5%)	Daily labor	2 (1.5%)
			Others	0 (0%)	Others	42 (35.5%)

Note: Figures in the parentheses indicate percentage of total respondents
Source: Field Survey, 2009

In addition to livestock services, most of the vaccinators (50%) were engaged in agricultural works and 25% of them were involved in household activities as subsidiary works. Only 7% vaccinators were involved in livestock keeping as subsidiary income source. About 54% of the farmers worked in the house as house wife and 40% of them were engaged in agricultural works as part time work. Among all the farmers, only 4% and 7% reared livestock for major and subsidiary income sources respectively.

Livestock Services, Infrastructure and Service Cost

The Union Livestock Service Center under the FoSHoL project has provided necessary furnitures, thermoflax, kitbox and medicine

equivalent to fifty thousand taka. Service providers were trying to establish a "Centre of Excellence" through shed improvement, deworming, vaccination and primary treatment. The infrastructural facility provided by ULSC is shown in Fig. 1. About 61% vaccinators told that they were sufficient for providing livestock services in their area and 70% of the beneficiaries reported that the medicine storage facility at ULSC was sufficient. Meanwhile, 52% and 59% service providers (vaccinators) reported that the thermoflax for vaccine containing and transport facilities were insufficient respectively.

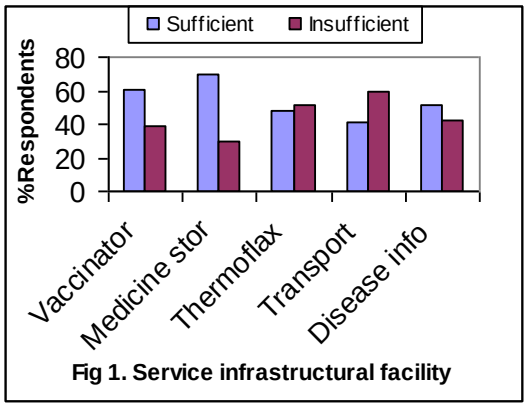

Fig 1. Service infrastructural facility

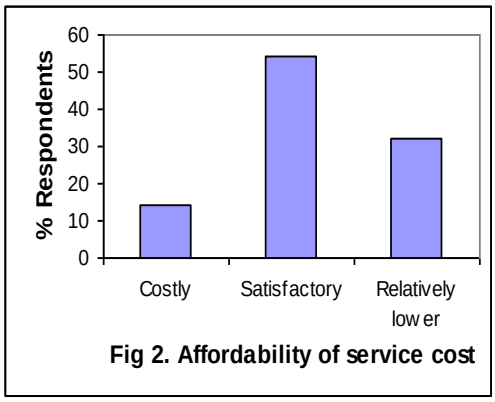

Fig 2. Affordability of service cost

Fifty two percent vaccinators were well informed about disease prevalence and 48% were not informed at all. The annual service cost for each cattle, poultry, goat, sheep and ducks and the affordability of this service cost by the farmers are shown in Table 2 and Fig. 2. The annual vaccine cost per cow, goat, sheep, duck and poultry were BDT 46.92, 19.57, 12.20, 18.32 and 17.59 respectively. Similarly, the annual medicine cost per cow, goat, sheep, duck and poultry were BDT 182.55, 59.73, 71.66, 30.66 and 32.23 respectively. Fifty four percent (54%) of the farmers reported that the service cost was higher while 32% farmers thought that the service cost was relatively lower. Establishment of well functioning infrastructural facilities including services provided by vaccinators increased the farmers annual income ($P<0.01$) from livestock and they could afford the service cost easily. At the same time, 32% farmers thought that the service cost could be increased to facilitate service inputs e.g. thermoflax, transport etc. Hooton *et al.* (2003) reported that the farmers are willing to pay the community health workers for their services. Meanwhile, service cost was considered costly by 14% farmers. However, it would be exceptional to find a community where the poor are not accustomed to paying for a range of services which they receive.

Table 2. Annual service cost for vaccine and medicine

Species	Vaccine (BDT/animal/year)	Medicine (BDT/animal/year)
Cow	46.92	182.55
Goat	19.57	59.73
Sheep	12.20	71.66
Duck	18.32	30.66
Poultry	17.59	32.23

Source: Field Survey 2009

Impact of Livestock Services on Service Providers (Vaccinators)

Changes in land ownership, livestock numbers, savings and assets

The average homestead area and cultivable land (decimal) were 11.97 and 31.64 respectively before starting the project those were changed significantly (P<0.05) to 12.51 and 34.56 respectively after getting services from the FoSHoL project (Table 3). This was due to raise the annual income (P<0.05, Table 4) of services providers which leads to purchase the homestead and cultivable land. The average borgha land (share cropping) was also increased from 9.61 to 12.79 decimal but was not significantly (P>0.05) changed. At the same time, the average land for pond and garden was insignificant during the period of FoSHoL project. The cattle, goat and duck numbers remained same after getting services from ULSC except poultry, the number of which was increased from 8.31 to 11.70 (P<0.05) after FoSHoL project. Poultry would be the most preferential livestock species, especially women can easily rare poultry and can make money by selling to market it quickly. The service providers significantly increased their hand savings, savings in society and bank deposits from BDT 493.18 to 2160.4, 372.7 to 2875.4 and 3284.1 to 4087.0 respectively (Table 3). The household assets of service providers had also increased from BDT 9547.7 to BDT 19902.0 which could be due to increased savings as well as total income. Therefore, the livestock services provided by the ULSC have significantly changed the livelihood standard of the service providers.

Table 3. Average land, livestock numbers, annual savings and assets of service providers before and after FoSHoL project (n = 44)

Parameters	Before FoSHoL	After FoSHoL	P-value
Land, decimal/household			
Homestead	11.97	12.51	0.049
Cultivable land	31.64	34.56	0.028
Borgha land (share cropping)	9.61	12.79	0.310
Leasing land	-	-	-
Pond	4.61	6.50	0.221
Garden	3.18	3.43	0.154
Livestock numbers, per household			
Cattle	1.29	1.18	0.620
Goat	1.25	1.27	0.958
Poultry	8.31	11.70	0.020
Duck	3.38	3.97	0.426
Annual savings and household assets, BDT			
Hand savings	493.18	2160.4	0.000
Savings in society	372.7	2875.4	0.000
Bank/deposits	3284.1	4087.0	0.001
Household assets	9547.7	19902.0	0.000

Source: Field Survey, 2009

Changes in annual income and expenditure

The income generating activities of service providers are mainly the services they provided through ULSC, homestead agricultural activities, livestock and products, labor selling and business. The average annual income of service providers was BDT 11465.9 (Table 4). The next highest income came from crops which was increased (P<0.01) from BDT 11425.0 to 16420.4 after implementing the FoSHoL project. This could be due to significant increase in cultivable land after FoSHoL project. Peeling *et al.* (2004) reported that the integration of livestock into crop farming greatly increases the outputs (results) and sustainability of crop production. Similarly, the income from vegetables, fish, fruits and livestock significantly changed (P<0.01) after joining of service providers in the ULSC. The second highest income generating component was livestock and its products, the values of which were increased from BDT 3261.9 to 9452.3. Livestock services enabled vaccinators to earn income from livestock keeping as well as using common-property resources (World Bank 1999; Turner, 2004). Holmann *et al.* (2005) reported that livestock production provides a constant flow of income and reduces the vulnerability of agricultural production.

Table 4. Impact of ULSC of FoSHoL project on average annual income and expenditure of service providers (n=44)

Annual income (BDT)				Annual expenditure (BDT)			
Items	Before FoSHoL	After FoSHoL	P-value	Items	Before FoSHoL	After FoSHoL	P-value
Services through ULSC	-	11465.9	-	Food	17324.0	20398.6	0.000
Crops	11425.0	16420.4	0.000	House repairing	1822.7	4911.4	0.005
Vegetables	1518.2	2790.9	0.000	Treatment	2417.0	2573.8	0.580
Fish	1493.2	3947.7	0.019	Education	2064.7	3498.8	0.002
Fruits	290.9	639.7	0.015	Festival	1361.3	2029.5	0.002
Forest	386.4	1000.0	0.058	Recreation (Social function)	454.5	792.04	0.000
Livestock & products	3261.9	9452.3	0.000	Livestock purchase	258.5	1131.1	0.117
Labor selling/ Service/Business	4172.7	4897.7	0.016	Loan payment	318.2	2034.1	0.012
Total	**22548.3**	**50614.8**	**0.000**	**Total**	**26021.2**	**37369.5**	**0.000**
Share of Livestock & products (%)	**14.46**	**18.67**		**Share of livestock products (%)**	**0.99**	**3.02**	

Source: Field Survey, 2009

The share of livestock and livestock products in total income was 14.46% which was increased to 18.67% after ending the project. The income increased from livestock products was due to increase in investment (average BDT 1131.1 which was only 258.5 before starting the project) on livestock purchase as well as technical knowledge applying for rearing livestock. The total income increased from BDT 22548.3 to 50614.8. The total expenditure before starting the project was BDT 26021.2 and

significantly (P<0.01) increased to BDT 37369.5. The expenditure increased mainly on food, house repairing, education, recreation and festival after getting livestock services from FoSHoL project. The treatment cost did not change due to awareness build up of primary health care and was taking better food. The expenditure on livestock purchase was apparently increased but not significantly changed. The share of livestock expenditure in total expenditure was apparently increased (from 0.99% to 3.02%) but was not considerable as the share of livestock contribution in total income (18.67% after ending the project). Though technologies to improve productivity of livestock do exists, however, the rate of adoption of livestock related technologies and investment in root level farming systems worldwide is constantly low, because of the existing research, extension set-up and other related constraints (Francis and Sibanda 2001; Parthasarthy Rao *et al.*, 2005). The findings of the present study confirm the above statement.

Impact of Livestock Services on Farmers

Changes in land ownership, livestock numbers, savings and assets

The average homestead, cultivable and leasing land of farmers did not significantly (P>0.05) changed after getting livestock services from the project (Table 5). At the same time, the land for pond and garden was not significantly changed. But the borgha land (share cropping) significantly changed after getting livestock services from the FoSHoL project (Table 5). The income of the farmers increased through rearing livestock was not as much as in service providers so that they could purchase cultivable land for crops. However, the average number of goats, poultry and ducks were increased from 1.05 to 1.87, 5.97 to 7.68 and 1.52 to 2.94 respectively which enabled the farmers to cultivate borgha land. Most of the beneficiaries were women (75%, Table 1) and they participated to increase in livestock numbers by rearing and nursing them. In addition, women undertook livestock related activities like vaccination, treatment that influenced to increase the number of goats, poultry and ducks.

The cattle number remained same before and after ULSC services. Farmers were not able to purchase cattle with their stipulated income. The livestock services provided from the ULSC significantly increased the hand savings, savings in society and bank deposits of farmers from BDT 475.8 to 1393.4, 39.4 to 1205.7 and 840.8 to 1702.2 respectively (Table 5). The household assets increased from BDT 5103.1 to 12521.4 after getting services from ULSC which was due to increased savings as well as total income. These changes indicate that ULSC has significantly contributed on the living standard of the farmers.

Table 5: Average land, livestock numbers, annual savings and assets of farmers before and after FoSHoL project (n = 120)

Parameters	Before FoSHoL	After FoSHoL	P-value
Land, decimal/household			
Homestead	12.61	12.94	0.605
Cultivable land	28.84	30.81	0.329
Borgha land (share cropping)	17.81	29.57	0.000
Leasing land	3.23	4.63	0.532
Pond	2.98	4.01	0.332
Garden	4.02	4.03	0.987
Livestock numbers, per household			
Cattle	1.02	1.22	0.098
Goat	1.05	1.87	0.000
Poultry	5.97	7.68	0.019
Duck	1.52	2.94	0.000
Annual savings and household assets, BDT			
Hand savings	475.8	1393.4	0.002
Savings in society	39.4	1205.7	0.000
Bank/deposits	840.8	1702.2	0.025
Household assets	5103.1	12521.4	0.000

Source: Field Survey

Changes in annual income and expenditure

The income generating activities of farmers were mainly agricultural components (crops, vegetables, fish, fruits and forestry), livestock and products and daily labor selling/services or business. The major income sources of the farmers were labor selling and services. The second highest income came from crops which were increased from BDT 5908.3 to 9026.6 after implementing the FoSHoL project. This might be due to significant increase in borgha land (share cropping) during the period of FoSHoL project. The income from crops, vegetables, fish, fruits and livestock were also significantly ($P<0.01$) changed. The income from livestock and products increased ($P<0.01$) from BDT 2324.7 to 6632.0 after getting services from ULSC. Livestock produce high value products (meat, milk and eggs) which can be sold or consumed. The demand for livestock products, unlike that for many other agricultural products, is rising rapidly as urban incomes rise, making livestock production a particularly attractive livelihood options for poor farmers (Peeling *et al.*, 2004). The share of livestock and products in total income also increased from 10.19% to 15.02%.

The income increased from livestock products was due to increase an investment (average BDT 1126.5 which was only BDT 67.5 before starting the project) on livestock purchase as well as support services received from ULSC for rearing livestock. The increased income also related to develop modalities for channeling funding directly to community based organization and its support services (MoFL, 2004). The total annual income of the farmers increased from BDT 22803.0 to 44144.5. The income from livestock and products enabled farmers to earn more from using common-property resources e.g. vegetables and fruits of fellow land and crops of borgha land (share cropping) (World Bank 1999; and Turner 2004). The total expenditure before starting the project was 25849.6 and significantly ($P<0.01$) increased up to 38873.0 after ending FoSHoL project.

Table 6. Impact of ULSC of FoSHoL project on average annual income and expenditure of farmers (n=120)

Annual income (BDT)				Annual expenditure (BDT)			
Items	Before FoSHoL	After FoSHoL	P-value	Items	Before FoSHoL	After FoSHoL	P-value
Crops	5908.3	9026.6	0.000	Food	18903.7	24543.7	0.000
Vegetables	805.8	1816.2	0.000	House repairing	1451.6	2260.8	0.419
Fish	552.5	2553.3	0.000	Treatment	2135.6	2370.3	0.352
Fruits	770.0	1521.2	0.011	Education	1357.5	2586.6	0.000
Forest	270.8	1570.8	0.000	Festival	1496.2	2254.5	0.000
Livestock & products	2324.7	6632.0	0.000	Recreation (Social function)	277.3	445.4	0.000
Labor selling /Service	8725.0	14899.2	0.000	Livestock purchase	67.5	1126.5	0.005
Business	3445.8	6125.0	0.001	Loan payment	160.0	3285.0	0.003
Total	**22803.0**	**44144.5**	**0.000**	**Total**	**25849.6**	**38873.0**	**0.000**
Share of Livestock & products (%)	**10.19**	**15.02**		**Share of livestock in expenditure (%)**	**0.26**	**2.89**	

Source: Field Survey, 2009

The expenditure increased ($P<0.01$) mainly on food, education, recreation and festival. Livestock plays a valuable role in supporting the livelihoods of many poor peoples. Stewart (1998) reported that over 50% of rural people who lived on US dollar 1 per day or less, rear some form of livestock, often in the form of poultry, sheep and goats. Livestock is financial asset. They are a common means of savings which accumulate over time that can readily be sold to meet large or unexpected cash costs such as food, education and medical expenses. Although the expenditure on livestock purchase significantly increased after getting livestock services from ULSC but the share of investment in livestock (2.89%) of total expenditure was very poor against the contribution (15.02%) in total income. However, the trend (from BDT 67.5 to 1126.5) of increasing expenditure on livestock purchase after getting regular services from ULSC encouragingly indicates the future prospects of this service.

Conclusion

Union Livestock Service Centre is a new approach and has already proved its success. Moreover, it is a self motivated, self sustaining, root level community-based service providing and income generating program. Mostly women are associated in the program which helps them to be empowered. Although there were some limitations in providing livestock services, the ULSC activities have created significant impact on socio-economic status, land ownership, livestock population and annual income to amplify the living standard of service providers and farmers. The share of livestock in total income of service providers and farmers has also improved.

The ULSC activities should be diversified from primary health care to nutrition and feeding, artificial insemination, housing, beef fattening and other technology beneficial for the farmers and service providers. The ULSC should be extended to each and every Upazila and further nourished by the government for visible demonstration of the success of ULSC.

Acknowledgement

The authors gratefully acknowledge the financial assistance of IRRI Bangladesh Office (IBO) in conducting the study. The authors are also grateful to the ActionAid, Bangladesh (AAB) and its partner NGOs, the farmers and extension personnel for their active cooperation in the research programme.

References

AAB. 2007. *Action Aid, Bangladesh*. Action Aid Reports. July 23, 2007.

Abdullah, T. A. and S. A. Zeidenstein. 1982. *Village Women of Bangladesh: Prospects for Change,* Pergamon Press, Oxford.

BBS. 2004. *Statistical Yearbook of Bangladesh*. Bangladesh Bureau of Statistics. Statistical Division,

Ministry of Planning, GOB, Dhaka, Bangladesh.

Conner, J.R., W.T. Hamilton, D.P. Sheehy, J.W. Smith and U.P. Kreuter. 1998. Grassland Based Livestock Production in Temperate Zones. *World Animal Review*. 90:6-13.

FAO. 2000. *Agriculture Towards 2015/30*. Technical Interim Report, April 2000. Economic and Social Department, FAO, Rome.

Francis, J. and S. Sibanda. 2001. Participatory Action Research Experience in Smallholder Farming in Zimbabwe. *Livestock Research for Rural Development*. 13 (3): 133.

Holmann, F., L. Rivas, N. Urbina, B. Rivera, L. A. Giraldo, S. Guzman, M. Martinez, A. Medina and G. Ramirez. 2005. The Role of Livestock in Poverty Alleviation: An Analysis of Colombia. *Livestock Research for Rural Development*. 17(1): 17011.

Hooton, N., D. Moran, F. Magayane, G. Magoma, J. Woodford and A. Kondela. 2003. The Demand for Community-based Animal health services: Are farmers willing to pay? In community based animal health workers: threat or opportunity? The IDL Group, Crewkerne, 108-116.

Misra, A. K., P. N. Dwivedi, V. S. Upadhyay Bhag Mal and M. S. Dhanoa. 1997. *Socio-economic Analysis of Livestock Production in Smallholder Rainfed Farming Systems in India.* Proceedings of an International Conference on Food, Land and Livelihood, KARI, Narobi, Kenya, Jan. 27-30, pp.157-158

MoFL. 2004. Ministry of Fisheries and Livestock. Summary of the Livestock Sector Review and Future Development Assessment (LSRFDA). Findings, Observations and Recommendations on the Thematic Studies. Dhaka.

Parthasarthy Rao P, P. S. Brithal and J. Ndjeunaga. 2005. *Crop-Livestock Economies in the Semi-arid Tropics: Facts, Trends and Outlook.* Patencheru 502 324, Andhra Pradesh, India. ICRISAT. 68pp.

Peeling, D. and S. Holden. 2004. The Effectiveness of Community-based Animal Health Workers for the Poor, for Communities and for Public Safety. *Rev. Sci. Tech. Off. Int. Epiz.* 2004. 23(1): 253-276.

PRSP. 2005. *Poverty Reduction Strategy Paper*. General Economic Division, Planning Commission, GOB, Dhaka.

Reddy, G. S., B. M. K. Reddy, A. K. Misra, M. Prabhakar, and A. Sambrajyam. 2005. TAR-IVLP: *On-farm Assessment and Refinement of Technologies in Southern Telangana Zone of Andhra Pradesh.* NATP. Central Research Institute for Dryalnd Agriculture, Hyderabd, India. 54pp.

Shamsuddin, M., M. M. Alam, M. S. Hossein, W. J. Goodger, F. Y. Bari, T. U Ahmed, M. M. Hossain, and A. H. M. S. I. Khan. 2007. Participatory Rural Appraisal to Identify Needs and Prospects of Market Oriented Dairy Industries in Bangladesh. *Trop. Anim. Heal. and Prod.* 39: 567-581.

SPSS. 1999. Windows Version-10.0. Microsoft Corporation 1998. Trends

SPSS Inc., Michigan Avenue, Chicago, IL. 19-182.

Stewart, S (Ed.). 1998. *Learning together: The Agricultural Workers Participatory Source Book.* Heifer Project International/Christian Veterinary Mission, Little Rock, Arkansas/Seattle, Washington, D.C. 350 pp.

Turner, R. L. 2004. *Livestock Production and Rural Poor in Andhra Pradesh and Orissa States, India.* Pro-poor Livestock Policy Initiative Working Paper No. 9. FAO, Rome.

World Bank. 1999. *India: Livestock Sector Review: Enhancing Growth and development.* The World Bank and Allied Publishers: New Delhi.