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Livestock Husbandry Strategy in Alleviating Poverty in the Haor Area of Bangladesh

^{1,2}Talukder Golam Rabby, ¹Leo Jocelyn Fredericks and ³Gazi Mahabubul Alam

¹Faculty of Economics and Administration, University of Malaya, 50603 Kuala Lumpur, Malaysia

²Binary University, Selangor, Malaysia

³Academic Performance Enhancement Unit, University of Malaya, 50603 Kuala Lumpur, Malaysia

Corresponding Author: Gazi Mahabubul Alam, Academic Performance Enhancement Unit, University of Malaya, 50603 Kuala Lumpur, Malaysia Tel: +60322463451 Fax: + 60322463348

ABSTRACT

With an important attention received from the global scholarly podium, it has always been a challenge to develop a realistic, implementable and pragmatic development policy measures for geographically disadvantaged areas. Theoretically proven development policy always fundamentally receives constraints at implementation level. Haor area in Bangladesh is considered as one of the most geographically disadvantaged one. A few researches have been conducted to explore the potentials for the development of Haor area. An exclusive or even an acceptable approach is yet to be received. Considering the fact, this research was conducted to examine the potential of livestock sector for the development of Haor area.

Key words: Bangladesh, poverty, livestock, Haor, development, policy

INTRODUCTION

The economic development of geographically difficult ecosystems presents formidable challenges and barriers to formulating sustainable poverty reduction and livelihood strategies in the emerging countries. Current development and poverty thinking such as rural-urban labor movements negatively impacts the productivity of the traditional sector with its vulnerable ecology and crop seasonality. To override these livelihood limitations, the rural population indiscriminately exploits ecosystem resources accelerating resource depletion and exhaustion, worsening the poverty nexus in an irreversible cycle. Under such conditions, natural resource utilization modeled on a need-based integrated development approach could promote such effective outcomes as *in situ* income diversification opportunities for the poor households, while off-farm sectorial development would broaden their income generating potential. Such an approach, however, requires the incorporation of local cultural knowledge and felt needs (Rabby *et al.*, 2011a; Alam *et al.*, 2012). The invariable ecosystem resources are land, forest and water; thus, livestock and fisheries rank next in importance to crop cultivation. Natural grassland and common water bodies are the natural resources open to the whole community in an ecosystem. Livestock husbandry based on available natural resources may open or extend synergistic benefits to other sectors; as such, this study focuses on the relationship between livestock, development and poverty reduction in a geographically isolated and ecologically vulnerable basin-shaped Haor region in northeaster Bangladesh.

LIVESTOCK AND ECONOMIC DEVELOPMENT

Livestock is a potential income source for ecosystem inhabitants (Millar and Photakoun, 2008), livestock products can be sold or bartered to meet normal consumption expenditure while livestock investments extend the non-farm labor market, supplies nutrients for the human diet and generates cash income and assets. Thus, livestock farming is a viable livelihood strategy although largely limited to small scale and family based activity (Mack *et al.*, 2005). It is feasible for the landless and resource poor households since it requires low investment and low cost technology (Upton, 2004). Using locally available resources reduces input requirements and largely dispenses with costly technology. Accessibility to credit, goods, services, improved husbandry practices and integration into a market system enable the poor and vulnerable to adopt a strategy to alleviate their abject livelihood conditions while also decreasing gender inequality (Al-Amin and Alam, 2011).

While the contribution of cattle cultivation to poverty alleviation is well documented (Millar and Photakoun, 2008), livestock literature in Bangladesh (Islam and Jabbar, 2005; Alam, 1997; Riise *et al.*, 2005; Schleiss, 2001) suffer the preconception that this activity is constrained only to chicken farming and female labour. None of the above studies consider such attributes as geographical and spatial limitations, ecological richness and accessibility to common resources which relate significantly to livestock such as ducks, goats, sheep, cattle, buffalo, oxen and cows.

LINKS BETWEEN ECOLOGY, POVERTY AND LIVESTOCK

Despite the fact that most of the world's extremely poor inhabit diverse agro-ecological regions (Ahmed *et al.*, 2007), there exists limited understanding of the interplay between ecological fragility and natural resource-based livestock production on the dynamics of livelihood maintenance of the poor. The rural, agricultural-dependent poor live in ecological systems where they encounter more vulnerabilities than others in sustaining their livelihoods (Handley *et al.*, 2009); this holds true for the inhabitants in Sub-Saharan Africa, the Vietnamese Highlands, the Philippine Uplands and the Indian drought-prone and hilly-forest based regions.

Crop failure exacts a heavy toll on household income sources in fragile and sensitive agro-ecological regions. People force sell assets such as livestock as a coping strategy (Handley *et al.*, 2009) ultimately debilitating their resilience to shocks like ill health or accidents (Rabby *et al.*, 2011a). Unfavourable climatic occurrences such as seasonal floods and droughts make livestock rearing difficult (Sinn, 1988; Rabby *et al.*, 2011b) and additionally, low agro-ecological productivity forces the local population to exploit alternative resources (such as fish) ultimately intensifying poverty in the long run. The rural Bangladesh inhabitants mostly rear poultry followed by goats, cattle, buffalo and sheep (Alam and Masum, 2005; Al-Amin *et al.*, 2011) constrained largely by homestead size.

While land holding size significantly affects poverty status, its quality is strongly linked to its utilization and outcomes. Low fertile grassland would be more suitable for livestock pasture than cultivation (Todaro and Smith, 2008); deforestation and loss of vegetative cover results in fodder deficits and dehydrates water bodies affecting livestock production. Such phenomena intensify the limitations of ecosystem inaccessibility, fragility, marginality and diversity with negative and agglomerative consequences on poverty (Alam *et al.*, 2013).

DISTINCTIVE FEATURES OF THE Haor AREA OF BANGLADESH

This study is focused on the northeaster Haor basin of Bangladesh which is geomorphologically a 'major floodplain basin' (Brammer, 1990) hinting to its inherent vulnerability to habitation. The

Haor basin is a wetland ecosystem covering an estimated 8000 km² (BBS, 2005) Craig *et al.* (2004)¹ or 2,045,000² ha. It comprises five districts, namely, Mowlovibazar, Habigonj, Sunamgonj, Kishoreganj and Netrokona. In the annual deluge (non-crop or wet season), it is under water for 5-6 months; for the rest of the year boro (dry season paddy) cultivation is possible.

Agriculture is the main livelihood source in the study area and, directly or indirectly, all other income streams are subject to this regime. But early flash floods often cause extensive damage to the crops leading to the possibility of Bangladesh facing a severe food crisis by 2050. With climate change and a shift in rain patterns, flash floods can be expected to be even more frequent. Water logging during April-June, the peak boro cultivation period will obviously take its toll on output in the Haor area (<http://www.thedailystar.net/newDesign/news-details.php>).

The incidence of poverty in the area is very high at about 50% (Kam *et al.*, 2005) and in some localities it varies between 61-81% (Rahman and Razzaque, 2000). Poverty incidence fluctuates with crop seasonality (Khan and Islam, 2005).

Haor livelihoods are precarious owing to the failure of governance (Islam, 2004); the BWBD (Bangladesh Water Development Board) flood control measures are often faulty making villages vulnerable to flash flood. Recurrent flash floods transform even rich farmers to marginal farmers pressuring the search for livelihoods elsewhere (Rabby *et al.*, 2011b).

RESEARCH DESIGN

Data collection: The study area is based on the lower poverty incidence map at the sub-district level (Upazila) and high level poverty incidence map in the sub-sub-district level (Union). Population census data (BBS, 2001) reveals that more than 50% of the study village households do not have any cultivable land compared to 45% for the rest of the villages in the Union implying that the study villages are relatively poor. This study is based on data collected from a one-off primary survey and a three-stage procedure to ensure data accuracy and reliability.

Stage 1: To identify the poor and livestock holding households, household income (including, livestock ownership and income), expenditure, family size and household head's occupation of all 1265 households in the five villages were gathered in the initial survey stage in April 2010. The upper income poverty line for 2008 was calculated to categorize poor and non-poor households while a lower poverty line was computed for the extremely poor households (Table 1).

Table 1: Poverty line data

Calculation	Group*	Poverty line (per capita in Taka)	Year
Rahman (1996)	2	6287	1994
	3	3757	1994
Rahman and Razzaque (2000)	2	6879	1998
	3	4111	1998
Computed for this study	2	11846	2008
	3	7079	2008

*Upper poverty line (2) and Lower poverty line (3)

¹Bangladesh Water Development Board (BWDB). But by expert 25000 sq. km (banglapedia Bangladesh) the probable reason is that this amount may be included the total submerged area during deluge. This connotation may have supportive ration as Craig *et al.* (2004) state from total 80,500 sq. km (55% of the country) floodplain 26,000 sq. km. , in an average, is submerged on a seasonal basis (June – October) in response to monsoon rains (March - September) and snow melt.

²The World Conservation Office Bangladesh (IUCNB), 2005

Table 2: Population and study sample

Village	V1	V2	V3	V4	V5	Total
The number of households						
Population	147	154	450	65	449	1265
Sample	34	36	104	15	103	292

V1: Chawrapara, V2: Chandpur, V3: Gaglajur, V4: Mohabbot Nagar, V5: Manderbari village

Poverty line calculation: To determine the 2008 poverty line, the ratio of the 2008 and 1998 Rural Consumer Price Indices (RCPI) was calculated and multiplied with the income poverty line of 1998 (Table 1).

Stage 2: To select a representative sample, Krejcie and Morgan (1970) suggestion was followed³. To ensure an equal weight for each category, a random sample of 292 households was selected (Table 2) and structured and semi-structured interviews were administered.

Stage 3: Focus group discussions were held to discover the impact of livestock on the Haor peoples' livelihoods. Based on household attributes like gender, education and household head's occupation, five focus groups of five members each were selected. Focus group participants were encouraged to raise significant issues for clarification and in-depth examination.

RESULTS AND ANALYSIS

The homestead size in the Haor area is relatively smaller than other regions in Bangladesh (Rahman *et al.*, 2009). In the Haor area, households are categorized⁴ into landless (0-49 decimal), marginal (50-149 decimal), small (150-249 decimal), medium (250-749 decimal) and large (>749 decimal) with a mean value of 145.93 decimal (Rabby *et al.*, 2011a, b) which is 26.71 times higher than the mean value (5.46 decimal) of homestead land. Thus, applying the scale-down measurement to the homestead ownership, households can be grouped into five categories (Table 3). The standard definition of homestead (Masum *et al.*, 2008) is not applicable to the Haor area because of its particular geography, ecology and environmental characteristics. Homesteads share common boundaries as they are clustered; even a small hut without a yard or backyard is also considered as a homestead with a minimum size of 0.50 decimal. Households with homesteads below this minimum can be considered homestead-less. Therefore, the Haor homestead distribution can be categorized into homestead-less (0-0.49 decimal), marginal (0.50-1.80), small (1.81-5.60), medium (5.61-9.00), large (9.01-28.00) and very large (>28.00) (Table 3).

The proportional share in between two categories of 'homestead size' and 'farm size' reveals that only the very large homestead owners (>28 decimal) can be considered medium and large farmers. Also, not all landless and marginal farmers are homestead-less. The Haor villages have been dominated by small (41.4%) to medium (17.5%) size homesteads (Table 3) surrounded by small houses and huts.

The Haor inhabitants are predominantly engaged in crop cultivation (60.6% are farmers) and related wage laboring activities. Although livestock animal are important in rural economic systems, livestock rearing, as a dry season occupation, is undertaken by only 0.3% landless but not poor

³The relationship between sample size and total population is based on the assumption that as the population increases, the sample size increases at a diminishing rate and remains relatively constant at slightly more than 380 cases (Krejcie and Morgan, 1970)

⁴In categorization, three types of land (homestead, vegetable and cultivable land) are considered together

households increasing to 0.7% including 0.4% non-poor large landowners involved in wet season livestock rearing. These household heads are young to middle aged males (20-40 years) with an average household size of 3-4 persons below both the Haor village average (5.17) and national average (4.47). The large landowners have large household size (>7 persons) and more than one income earner offering a greater scope for livestock holding.

With the prevalent high poverty incidence (Table 4), livestock provides direct or indirect income to 79% households of which 70.5% have income from in-house poultry only and the rest (8.2%)

Table 3: Farm and homestead size distribution in the Haor village, 2010

		Farm size (in decimal)					
		Landless (0-49)	Marginal (50-149)	Small (150-249)	Medium (250-749)	Large (>749)	Total
Homestead size (in decimal)							
Homestead-less (0-0.49)	a	38.0	4.0	1.0	0.0	0.0	43.0
	b	13.0	1.4	0.3	0.0	0.0	14.7
Marginal (0.50-1.80)	a	38.0	9.0	3.0	1.0	0.0	51.0
	b	13.0	3.1	1.0	0.3	0.0	17.5
Small (1.81-5.60)	a	68.0	32.0	10.0	10.0	1.0	121.0
	b	23.3	11.0	3.4	3.4	0.3	41.4
Medium (9.01-28.00)	a	5.0	4.0	2.0	5.0	0.0	16.0
	b	1.7	1.4	0.7	1.7	0.0	5.5
Large (9.01 – 28.00)	a	11.0	11.0	9.0	18.0	8.0	57.0
	b	3.8	3.8	3.1	6.2	2.7	19.5
Very large (>28)	a	0.0	1.0	0.0	1.0	2.0	4.0
	b	0.0	0.3	0.0	0.3	0.7	1.4
Total	a	160.0	61.0	25.0	35.0	11.0	292.0
	b	54.8	20.9	8.6	12.0	3.8	100.0

a: count, b: % of total

Table 4: Poverty and livestock holding in the Haor village, 2010

		Livestock holding			
		No Livestock	Poultry only	Poultry and dairy	Total
Extremely poor	a	33.0	91.0	5.0	129.0
	b	25.0	70.5	3.9	100.0
	c	53.2	44.2	20.8	44.2
	d	11.3	31.2	1.7	44.2
Moderately poor	a	16.0	63.0	5.0	84.0
	b	19.0	75.0	6.0	100.0
	c	25.8	30.6	20.8	28.8
	d	5.5	21.6	1.7	28.8
Non-poor	a	13.0	52.0	14.0	79.0
	b	16.5	65.8	17.7	100.0
	c	21.0	25.2	58.3	27.1
	d	4.5	17.8	4.8	27.1
Total	a	62.0	206.0	24.0	292.0
	b	21.2	70.5	8.2	100.0
	c	100.0	100.0	100.0	100.0
	d	21.2	70.5	8.2	100.0

a: Count, b: % within household poverty status, c: % within status of holding livestock, d: % of total

from dairy cattle and poultry. The former engages in very small to small scale in-house poultry rearing whereas the latter are involved in small to medium scale duck farming. In the poultry rearing households, 74.8% are poor (44.2 and 30.6% are extremely and moderately poor, respectively). Among the 21% 'no livestock' households, 4.5, 5.5 and 11.3% are non-poor, moderately and extremely poor, respectively (Table 4). The highest incidence of extremely poor households (31.2%) involved in poultry rearing are among the landless (69.4%). The highest number of households (4.8%) owning 'livestock animals and poultry' are non-poor (Table 4). Inhabitants who live in or build homesteads on relatives' land do not rear any livestock in the Haor villages.

INCOME COMPOSITION OF Haor HOUSEHOLDS

This section focuses on farm households that derive incomes from livestock, crop cultivation and other *in situ* activities and their poverty status as income is the most significant economic variable strongly correlated with poverty (Rabby *et al.*, 2011a).

Homestead ownership, poverty and livestock income share: The Haor homestead mean size (5.46 decimals) is very small and affects the socio-economic conditions of the household. Of the three homestead owner types, people living on relatives' land are mostly poor (81.6%) of whom 55.3% are extremely poor and earn (1301 Taka) which is less than half of the average livestock income of the people homesteading on government land (2624 Taka) (Fig. 1). This higher income is associated with larger homestead sizes and household human capital; the former provides access to Khas land while the latter contributes physical labor, both enhance the household income generating capacity.

However, people homesteading on government land are not all poor (non-poor 16.0%) and their average livestock income (2624 Taka) is two-thirds of the average livestock income of the independent or self homestead households (3532 Taka) (Fig. 1). Self homesteaders have larger space for poultry to search for food and enables livestock rearing. These households are not poor as they have relatively higher resource endowments and income generating capacity.

Farm size and income pattern: Table 5 reveals that farm households receive income from various sources while the dry season dairy livestock provides the highest average livestock income (1644.52 Taka) for household types. There is evidence of high inequality in income distribution consistent with the heterogenous land ownership distribution among farm households. Large farmers have the highest average income from dairy livestock in both the dry and wet season while

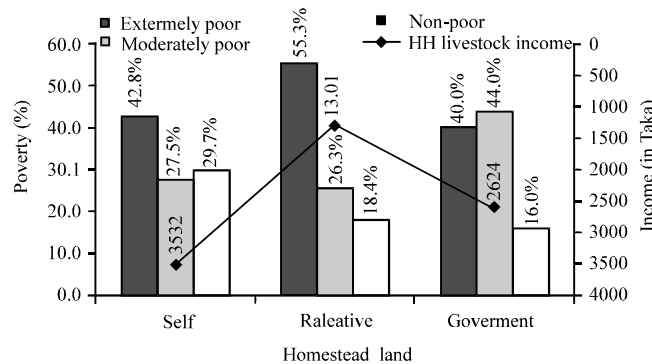


Fig. 1: Homestead and livestock income among 3 Haor household categories, 2010

Table 5: Livestock incomes distribution for different Haor farm households, 2010

		DS cash income		WS cash income		Self consumption from livestock	
		Dairy	Poultry	Dairy	Poultry	DS	WS
Landless (0-49)	a	431.25	260.00	62.50	221.88	377.81	238.12
	b	14.40	48.70	19.20	55.00	41.50	40.80
Marginal (50-149)	a	1557.38	252.46	196.72	201.64	550.66	308.52
	b	19.80	18.00	23.10	19.00	23.10	20.10
Small (150-249)	a	3968.00	532.00	320.00	188.00	668.00	424.00
	b	20.70	15.60	15.40	7.30	11.50	11.30
Medium (250-749)	a	3628.57	351.43	0.00	302.29	665.14	544.00
	b	26.40	14.40	0.00	16.40	16.00	20.40
Large (>749)	a	8181.82	253.55	2000.00	136.36	1063.64	622.73
	b	18.70	3.30	42.30	2.30	8.00	7.30
Total	a	1644.52	292.47	178.08	221.16	499.04	319.90
	b	100.00	100.00	100.00	100.00	100.00	100.00

DS: Dry season, WS: Wet season, a: Mean, b: % of total sum

Table 6: The ANOVA results

			Sum of Squares	df	Mean Square	F	Sig.
Dry season cash income only from dairy * Total land	Between groups	(Combined)	9.788E8	4	2.447E8	5.380	0.000
	Within groups		1.305E10	287	4.549E7		
	Total		1.403E10	291			
Dry season cash income from poultry * Total land	Between groups	(Combined)	1838192.211	4	459548.053	1.782	0.133
	Within groups		7.403E7	287	257927.639		
	Total		7.586E7	291			
Wet season cash income only from dairy * Total land	Between groups	(Combined)	4.029E7	4	1.007E7	5.753	0.000
	Within groups		5.025E8	287	1750712.001		
	Total		5.427E8	291			
Wet season cash income from poultry * Total land	Between groups	(Combined)	360258.856	4	90064.714	0.436	0.783
	Within groups		5.929E7	287	206591.447		
	Total		5.965E7	291			
Dry season self consumption from livestock * Total land	Between groups	(Combined)	7699694.530	4	1924923.633	6.072	0.000
	Within groups		9.098E7	287	316995.948		
	Total		9.868E7	291			
Wet season self consumption from livestock * Total land	Between groups	(Combined)	4115234.023	4	1028808.506	3.053	0.017
	Within groups		9.671E7	287	336968.860		
	Total		1.008E8	291			

the landless and marginal farmers have the lowest. However, the landless farmers receive higher average incomes from poultry rearing than small farmers. The analysis (Table 6) shows that there is no significant relationship between poultry rearing cash income and land in both dry and wet seasons. Thus, landlessness is not a constraint to homestead based in-house poultry farming in the Haor villages.

Household's poverty status and livestock income pattern: The relationship between household's financial status, livestock holding and income is illustrated in Fig. 2. Although the average livestock income differs between seasons, the results confirm its significant impact on household financial status. In the analysis, some issues have emerged: (1) non-poor households

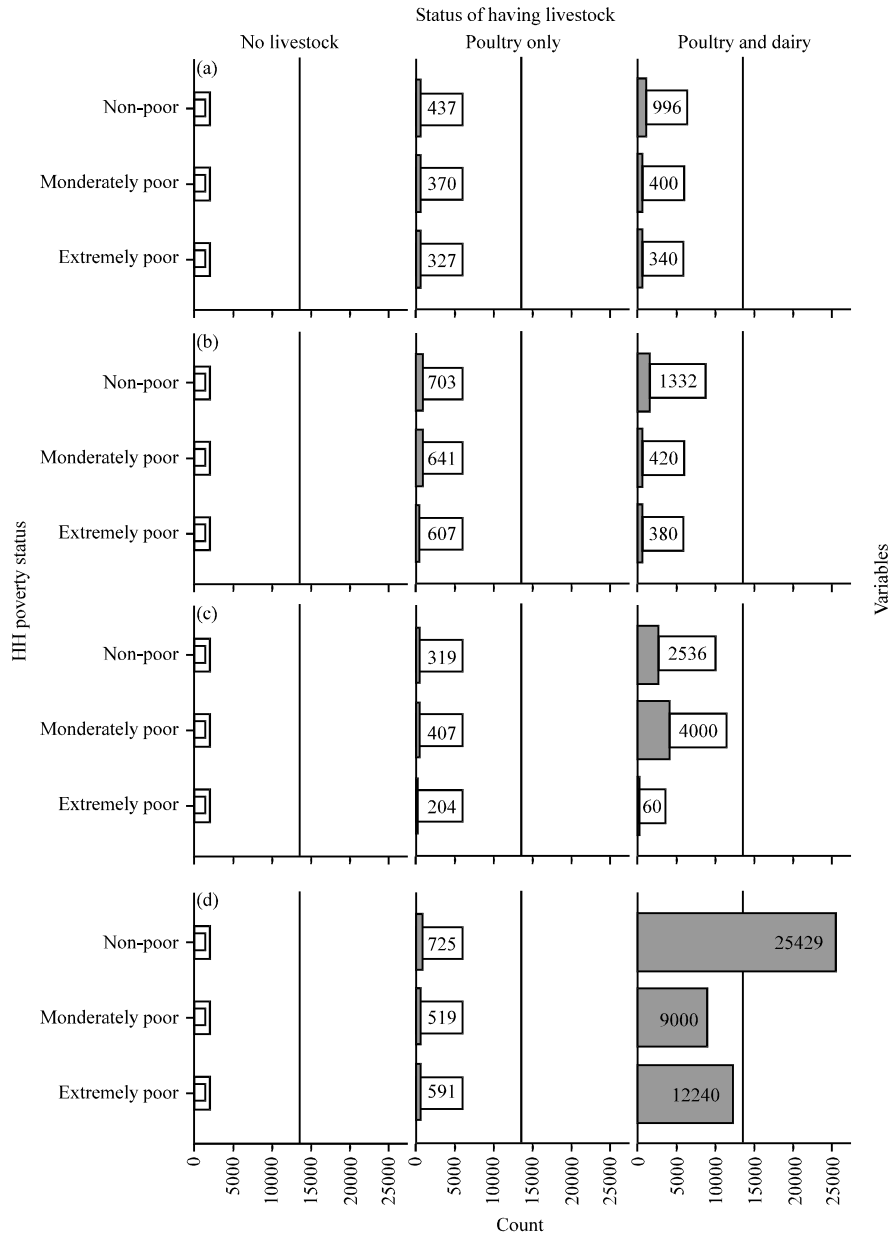


Fig. 2(a-d): Poverty and livestock income between three categories of Haor household, 2010, (a) Wet season self consumption from livestock, (b) Dry season self consumption from livestock, (c) Wet season cash income from livestock and (d) Dry season cash income from livestock

have the highest average livestock income (25,425 Taka) as they are mostly large farmers owning larger homesteads. The extremely poor have the second highest average dry season income (12,240 Taka) from 'poultry and dairy' implies that all large landowners are not non-poor as breaking out of the poverty cycle requires not only land resources but other capital (education, investment, infrastructure) and access to market and institutional facilities, (2) all Haor household types are involved in family based poultry rearing, (3) animal livestock provides relatively higher average

income than poultry rearing and (4) extremely poor households have the lowest average livestock income (146.05 Taka) in the wet season and the lowest mean cash income (60.00 Taka) from 'poultry and dairy'. At the same time, the moderately poor have the highest average cash income (4000.00 Taka) from 'poultry and dairy'. These indicate that the moderately poor have the advantage of tending animal livestock in relatively larger homesteads compared to the extremely poor. However, involvement in the non-farm sector requires financial and quality human capital which non-poor households have some comparative advantage by investing more in stocks, paddy and rice trading, transport (trawler service), seasonal domestic migration to cities and shop keeping and less in animal livestock rearing with lower income potential in the wet season.

Livestock dynamics in the Haor villages: The focus group discussions reveal that livestock numbers have reduced alarmingly, farmers are used to selling livestock to meet crises but pastures are becoming smaller discouraging livestock rearing. The usefulness of cattle in farm operations has been reduced. Instead of using drought animal farmers can hire machines to cultivate land and thresh paddy. With high population growth, homesteads are becoming smaller inhibiting livestock rearing.

The Haor agricultural land is highly fertile but, to increase land productivity, the excessive use of chemical fertilizers and pesticides have led to a decline in soil fertility. Historically, there was an abundant supply of fallow land in the region used for grazing during the dry season. Currently, to increase crop output, fallow land has been converted into cultivable land. Thus, the right of access to such common land is gradually become difficult and worsened by illegal leasing of such land by local institutions such as mosques and temples. These developments increase livestock tending expenses and inhibit the landless poor from seeking a livelihood alternative in livestock farming.

Share-rearing strategy: The focus group discussants recognize this arrangement of livestock farming as an informal financial institution based mutual benefit or interest. To the poor Haor households, this arrangement reduces financial burdens and provides opportunities (e.g., accessibility to informal sources, increase social capital, extra income from milk and dried cow dung) during difficult times. In this institutional arrangement, the farmer takes care of another person's livestock (cows, goats and poultry) on his/her homestead. Although, the farmer is solely responsible for all associated costs, at the end of the contract, either annually or seasonally, the off-spring or added value have to be shared by both parties. Such share contracts vary with different livestock species although a standard format exists for each species.

In shared undertakings such as livestock rearing where working capital is required, first the extremely poor and then the moderately poor relatives and neighbors are given priority by the non-poor households to earn some income.

DISCUSSION

Though, homestead based in-house poultry farming is the most common practice in the Haor villages, not every household own livestock. The non-poor households own the highest numbers of animal livestock while among the 'no livestock' households, 53% are extremely poor. It confirms that livestock ownership is strongly linked with poverty (Millar and Photakoun, 2008). In holding poultry, the extremely poor represent 44% whereas the moderately poor and non-poor represent

31 and 25%, respectively. They prefer poultry farming although conscious of the higher returns from cattle rearing as they face resource and policy constraints (Handley *et al.*, 2009).

In the Haor area, poultry farming is limited to females who may also be involved in duck and livestock rearing. Children from poor households are employed in herding cattle but such labour inputs reduce average literacy rates.

The homestead is a livestock production unit (Alam and Masum, 2005) contributing income and nutrition to Haor households. Along with ownership, the accessibility to land is crucial to these households. Share based livestock rearing is a social institution providing an additional extra income source for the poor; those with high social capital can more readily avail themselves of such opportunities. Given the ecological context, dry season livestock income is an important contributor Haor household income especially in the wet season.

Resources scarcity forces the extremely poor to chose low risk livestock farming thus affecting their preference for poultry over dairy livestock. Non-poor farmers use livestock rearing as a saving strategy whereas it is a coping strategy for the Haor poor.

Along with land and financial capital, the Haor households encounter problems with livestock feed shortages both in the dry and wet seasons. Gradual transformation of fallow land into cultivable land, over grazing, inaccessibility to pasture and the annual deluge are the constraints limiting livestock rearing in the Haor villages.

CONCLUSION

Extending economic opportunities and increasing income through livestock production is a potentially promising strategy to enhance livelihood development and poverty reduction in the Haor area. But the available and accessible resources are inadequate to establish commercial livestock farming as there exists ecological, geographical and environmental constraints along with a dysfunctional bureaucracy. Huge fallow land and water provide the natural resources base for the intensification of livestock production. Land can be used for grass production for forage and deluge water can minimize the externalities of livestock production by reducing pollution and health risks. However, the policies for commercial grass cultivation, veterinary services, financial services, enterprise development, infrastructural facilities, training facilities, supervision, market creation, marketing and cooperative participation should be developed to alleviate poverty in the Haor ecology. The policies must pursue the economies of scale of production in the long run to enable the poor Haor inhabitants to start up commercial livestock production as a sustainable livelihood strategy.

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