

Article

Socio-economic status of buffalo farmers and management practices of buffaloes in selected areas of Jamalpur district in Bangladesh

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Abstract: A field survey was conducted to investigate the farmers' socio-economic status and management practices of buffaloes along with profitability analysis of buffalo rearing at Madargonj upazila of Jamalpur district. The data were collected during October to December 2018 from 60 buffalo keepers randomly selected from four unions of Madargonj upazila through pre-tested and pre-designed interview schedule. Buffalo rearing was practiced by the middle (30-40 years) aged farmers (51.7%) and almost three fourth of the farmers were illiterate. Buffalo keepers (40%) had medium sized family and belonged to small category of farmers (50%). Farmers usually purchased one pair of buffaloes and reared for 2 years but they (86.7%) reared buffaloes as their family heritage without any training. Majority of the farmers reared crossbred buffaloes having herd size of 4-10 buffaloes. Buffalo houses were constructed by straw (63.4%), tin (28.3%) and only 8.3% half building. Buffaloes were fed usually with locally available river side grasses and concentrate feeding was not found in majority of cases (75%). Natural service was the major practice for breeding of their buffaloes. The most prevalent disease is foot and mouth disease although buffaloes were affected by others. Most of the farmers (66.7%) performed wallowing of their buffaloes once a day. Yearly expenditure, gross income and net income were Tk. 9570, Tk. 26400 and Tk. 16830; respectively indicating that buffalo rearing is highly profitable in Madargonj. The annual food and cloth purchasing capacity of the buffalo farmers were found to be increased to 65.60 and 57.24%, respectively along with other parameters. The findings of this study clearly indicated that socio-economic profile of buffalo farmers was improved through buffalo rearing although the management practices need to be improved with scientific approaches.

Keywords: socio-economic status; livelihood improvement; management practices; buffalo; cost-benefit

1. Introduction

Agriculture is the backbone of rural economy in many developing countries of the Asian region including Bangladesh and livestock plays a pivotal role in agriculture. Buffalo (*Bubalus bubalis*) is one of the important livestock species that holds strategic place next to the cattle in overall livestock economy of Bangladesh and it alone contributes about 2.0% and 0.94% to the total milk, and meat production in the country, respectively (DLS, 2015). Buffalo attributes to the farmer's household livelihood generating draft, meat, by-products, milk and milk products, especially as a lucrative income provider (Wanapat and Ampapon, 2017). Buffalo is an important animal to boost up agricultural economy in many tropical and subtropical countries (Suhail *et al.*, 2009).

There are 1.485 million buffaloes in Bangladesh (BER, 2018) which are found mostly in the Brahmaputra-Jamuna flood plain of central Bangladesh and Ganges-Meghna flood plain of southern Bangladesh and in institutional herds (Faruque, 2000). Buffalo has seldom been appreciated or recognized and remained neglected species in Bangladesh despite its important role in the national economy. Buffaloes rearing play an important role in improving the livelihood status of the rural farmers especially women and development of this sector could be a potential pathway for rural prosperity (Kalash *et al.*, 2009).

In fact, buffaloes are known for their hardiness, disease resistance, better capacity of converting coarse feed stuffs into quality milk and meat, survival on little inputs, outstanding draught capacity and adaptability to climatic hazard prevalent in Bangladesh. Due to geographical location, favorable weather, abundant natural green grasses in the river basin of old Brahammaputra and Jumuna River, ecology and lack of employment opportunities, people at Madargonj upazila of Jamalpur district in Bangladesh are involved in buffalo rearing extensively. The performance of buffaloes in the region appears to be at low level and the factors responsible need greater attention.

However, performance of buffaloes depend on both the genetic makeup and environment i.e., management practices under which they are reared and these managerial practices exhibits high variation across various agro-ecological regions. The adoption of management practices by buffalo keepers usually depends on the type of production in which they are involved. Adoption of good management practices ensures better health of buffaloes that promotes their productivity. Exposure and use of appropriate information by buffalo owners will help them to improve knowledge enabling them to obtain more output from their buffaloes, thereby help them to move out from the poverty.

There are several production systems of buffaloes based on management practices and feeding systems in Bangladesh (Saadullah, 2012; Rahman *et al.*, 2018). There are several published reports regarding farmers' socio-economic profile and management practices of buffaloes (Faruque *et al.*, 1995; Sarkar *et al.*, 2013; Amin *et al.*, 2015; Hasan *et al.*, 2016; Uddin *et al.*, 2016; Rahim *et al.*, 2018; Kabir *et al.*, 2020) in various regions of Bangladesh. So far we are aware; a few literatures are available regarding socioeconomic status of the buffalo keepers along with buffalo management practices in the study area. Understanding the husbandry practices prevailed among the buffalo raisers is necessary to find out the strengths and weaknesses of the management systems and also to formulate suitable intervention policies. Therefore, the present investigation was undertaken to obtain first-hand information on the socio-economic characteristics of buffalo keepers and existing buffalo management practices being followed by the buffalo keepers in selected Brahmaputra-Jamuna flood plain river basin area of Jamalpur district along with cost-benefit analysis and livelihood changes of farmers towards buffalo rearing. The information obtained from this study could serve as a basis of exploitation of genetic potentiality of buffaloes, adopting feasible and relevant scientific management practices for buffalo development in the surveyed area.

2. Materials and Methods

2.1. Study site and farmers' selection

The study was conducted at four unions of Madargonj upazila of Jamalpur district in Bangladesh (Figure 1). A total of 60 farmers from four unions namely Balijuri (25), Char Pakerdha (15), Jorekhali (10), Karaichura (10) were selected adopting PPRS (Proportional Probability Random Sampling) technique of Lahiri (Snedecor and Cochran, 1989). Farmers who had at least two buffaloes were involved in this study.

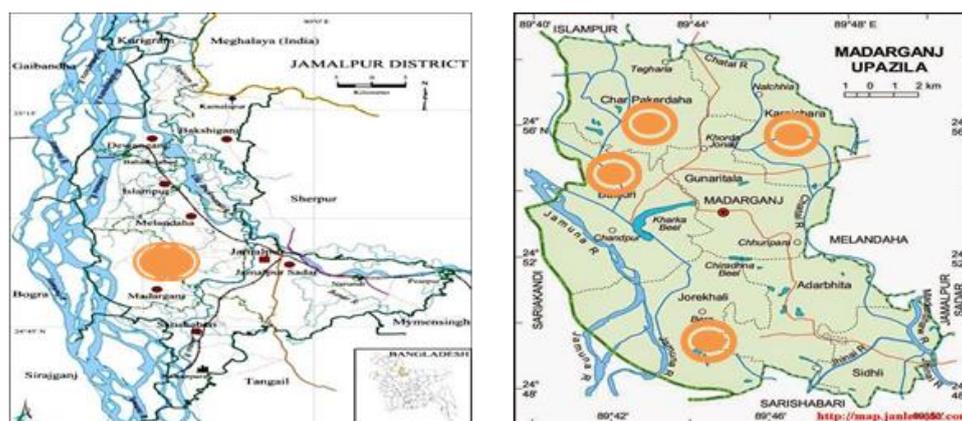


Figure 1. Location map of the study area.

2.2. Preparation of interview schedule and data collection

A structured interview schedule was carefully prepared based on the objectives of the study. The questionnaire contained in the schedule was simple, direct and easily understandable by the respondents. The schedule contained open and closed form of questions. The draft interview schedule was pre-tested in the selected areas and modified accordingly. Data were collected during the period of 5 October to 30 December 2018 through face to face interview from individual buffalo farmers. Before making interview, the objectives of the study were explained clearly to the respondents. Then the questions were asked in a very simple manner with explanation wherever necessary. To collect necessary information from the respondents both interviewing and observation were applied.

2.3. Proximate analysis of available feedstuffs

Proximate analysis of some locally available feeds and fodders fed to buffaloes were done in the Animal Nutrition Laboratory of Department of Livestock Services (DLS), Dhaka. Representative samples of feeds and fodder were collected from the selected areas, mixed thoroughly, dried, grinded by grinding machine (CYCLOTEC 1093 Sample mill Tecator, Sweden) at the size of 0.5 mm for chemical analysis according to the methods of AOAC (2004) and estimated CP (crude protein), CF (crude fiber), EE (ether extract), NFE (nitrogen free extract) and ash of feeds and fodder.

2.4. Statistical analysis of data

Collected data from the farmers were checked and cross checked before transferring to the master sheets. The data was analyzed through SPSS-v-16 computer package program.

3. Results and Discussion

3.1. Socio-economic profile of the farmers

The findings (Table 1) revealed that about half (51.7%) of the buffalo farmers were middle aged (30-40 years) since they played a major role in income generation for the family followed by old aged (25%) and young aged (23.3%) farmers. Kabir *et al.* (2020) reported that buffalo rearing was practiced by farmers (47.5%) in the age group of 31-45 years in coastal regions of Bangladesh. Three fourth of the farmers can't read and write, and there were no degree passed or Hon's passed farmer in the study area. About 40% farmers family size was medium (5-7 persons per family). Almost half of the farmers (50%) belonged to small category (0.20-1.0 acres land) of farmers. The highest percentages of the surveyed farmers (50%) were engaged in agriculture including rearing other livestock (Table 1). Most of the farmers (86.7%) practiced buffalo rearing without any training as their family profession and/or by the influence of neighboring buffalo farmers but rest of the farmers (13.3%) took different training on livestock at a short time course by NGO, upazila livestock office etc. on poultry farm management, small scale rural goat farming. The present findings are in accordance with the observation of Siddiki *et al.* (2015) who reported that more than three fourth of the farmers at Lalpur upazila of Natore district practiced buffalo rearing as their family heritage and rest of them were influenced by the neighboring farmers. There were 41.7% farmers who used own capital and rest of them managed capital having loan from bank or NGOs like Action for Social Advancement (ASA), Palli Karma-Sahayak Foundation (PKSF) etc. to and other sources for purchasing and/or rearing buffaloes. Majority (65%) of the farmers took bank loan to purchase their buffaloes and rest of them were used their own capital to rear buffaloes in Bagerhat district (Sarkar *et al.*, 2013). Considering the purchasing ability of farmers, highest percentage (58%) of the farmers purchased two buffaloes at a time for rearing and draught purpose.

3.2. Buffalo herd composition and duration of rearing

The majority (66.7%) of the herds comprised of 4-10 buffaloes and about 18.3% and 15% farmers had 1-3 and above 10 herd size, respectively. More than half (56.7%) of the farmers reared crossbred buffaloes followed by indigenous (33.3%) and mixed, indigenous and crossbred type (10%) buffaloes. Majority of the surveyed farmers kept buffaloes for 2 years.

3.3. Housing of buffaloes

A few number (8.3%) of the buffalo keepers provided half building shed where 91.7% of the farmers used tin shed and straw shed for housing their buffaloes (Table 2). Highest percentage of the farmers (70%) provided open house followed by closed house (30%). In another region of the country, Uddin *et al.* (2012), observed that highest percentage of the dairy cattle farmers (77.5%) provided open house, 22.5% provided closed and semi-closed house. Significantly higher (86.7%) percentage of the respondents had kutcha floor in their buffaloes

shed and about 83.3% had drainage channel. These findings are in line with the observations of Rahman *et al.* (2018) who reported that some farmers constructed floor by brick, some sheds have roofs using tin of Subornachar upazila in Bangladesh. Maximum farmers (86.7%) provided adequate ventilation in buffalo houses/shed. Regarding the summer and winter management in buffaloes, majority of the farmers (66.7%) practiced summer management practices to protect buffaloes from extreme heat and took management care to protect buffaloes from extreme cold.

3.4. Feeds and feeding management

3.4.1. Feed management

The majority (63.3%) of buffalo owners practiced semi-intensive system followed by extensive (36.7%) feeding methods (Table 2). The similar findings were also noticed by Sarkar *et al.* (2013) who reported that semi-intensive feeding system was practiced in the Bagerhat district followed by extensive system but no one practiced intensive feeding system. The highest percentage (58.3%) of the farmers used river side area (char) grass where there was no farmers' who depends on others people land as source of buffalo feed. About 70% of the respondents seemed that feeds and fodder were available in the study area but three fourth of the respondents did not practice concentrate feeding to their buffaloes. Almost three fourth (70%) of the surveyed farmers were habituated in once feeding a day followed by twice feeding a day (30%) to their buffaloes (Table 2). All of the surveyed farmers practiced giving water to their buffaloes *ad libitum* in quantity but restricted in frequencies in which 2 times a day was followed by most of the farmers (80%) while only 20% of the farmers practiced free access of water to their buffaloes. Tanmay *et al.* (2002) reported that water is provided twice a day in summer and once a day in winter to their buffaloes and is a common practice followed by most of the buffalo keepers. Regular practice regarding adding salt or mineral mixture in water for feeding of buffaloes was done by 53.3% (highest) respondents where irregular was done by only 16.7% respondents but 30% respondents did not practice at all (Table 2).

3.4.2. Chemical composition of feedstuffs fed to buffaloes

The local grass in study areas like dhubla/dubra, dhal, helencha contains 16.5%, 8.1%, 20.2% of crude protein respectively. It was observed (Table 3) that helencha contain more crude protein than others and low amount of crude fiber. So, helencha grass is suitable to growth muscle and reproduction of buffalo in this area. Straw contains high crude fiber (CF) which could not easily be digested by buffalo but other grasses in the selected areas easily utilized by buffaloes due to low amount of crude fiber. Lower CF content in the feedstuffs indicated a good quality feeds for buffaloes. Dhal grass contains more ash which supply mineral and dubra contain more dry matter which help to supply better nutrient in buffalo. Among the feeds (rice polish, broken rice, straw), the rice polish comparatively contain more nutrient than others. Reports on similar studies were also available from different authors (Sarker *et al.*, 2013; Amin *et al.*, 2015; Siddiki *et al.*, 2015).

3.5. Breeding practices

The results of the present study revealed (Table 4) that the highest percentage (58.3%) of buffalo keepers practiced only natural mating. Higher proportion of use of natural service may be due to the non-availability of good infrastructure facilities for artificial insemination (AI), preservation and timely AI services in the study area. Sawarkar *et al.* (2001) reported that, most of the farmers preferred natural service only due to various reasons. Hasan *et al.* (2016) observed that only 25.71% farmers practiced artificial insemination for oestrous synchronization in Bhola district. Most of the farmers reported that they cannot detect heat properly but no one used teaser bull to detect heat. These findings have similarities with the observations of Hole (2016) who found that 100% of the respondents detect their buffaloes in heat by using symptoms. Among the various behavioral signs of estrus, majority (41.7%) of farmers believed on mounting and urination as the symptoms of heat, whereas 25% of the farmers trusted on bellowing and discharge, followed by mucus discharge (23.3%) and frequent urination (10%).

3.6. Wallowing of buffaloes

Wallowing is an important way for buffaloes to maintain its physiothermic regulation. In the studied areas, most of the farmers (66.7%) performed wallowing of their buffaloes once a day (Table 4). The buffaloes are interested to wallow but farmers didn't allow too much time to wallow. Maximum farmers maintained wallowing of their buffaloes in beel and river water as there are many rivers (Jhinai, Jamuna, Chatal river) and beels (Chiradhuna Beel, Kharka Beel etc.) in the study area.

3.7. Health care practices

About 66.7 and 60% farmers performed vaccination and deworming in their buffaloes, respectively (Table 4). The incidence of foot and mouth disease (FMD) (56.7%) was higher than other diseases like black quarter (BQ) (20%), anthrax (13.3%) and mastitis (10%). Siddiki *et al.* (2015) found that the incidence of foot and mouth disease, black quarter, anthrax and hemorrhagic septicemia were 53, 25, 15 and 7% respectively at Lalpur upazila of Natore district. Source of vaccines, anthelmintics and medicine is also an important factor to control diseases of buffaloes. Majority of the respondents (65%) depended on local market as source of vaccines, anthelmintics and medicine. Almost three fourth (73.3%) of the respondents were dependent on quacks for the treatment of their sick buffaloes due to ignorance and lack of veterinary facilities in their locality. It was observed that most (78.3%) of the respondents belong to good to satisfactory sanitary system (Table 4).

3.8. Marketing system of buffaloes

Maximum farmers (73.3%) purchased their buffaloes from local market followed by another buffalo farmer (26.7%) (Table 4). Buffaloes were taken to local market for selling, on market days (*Hut*). Highest percentage of the respondents (43.3%) sold their buffaloes to whole seller where lowest percentage (15%) of the respondents sold their buffaloes to consumers. In the process of buffaloes marketing middlemen and butchers are also involved. Buying and selling are completed through bargaining practice.

3.9. Economics of buffalo rearing

3.9.1. Cost of buffaloes

The price of buffaloes varies according to the size, body condition, health status, milk production and utility. The price of a pair of buffaloes for dual purpose ranged from Tk. 90,000 to Tk. 200,000 in this study area. But the highest percentage of the farmers noticed that the average cost of one pair of buffalo purchasing was Tk. 90,000 to Tk. 100,000. Amin *et al.* (2015) found the price of a pair of buffaloes for dual purpose ranged from Tk. 80,000 to Tk. 180,000 at Subornochar upazila of Noakhali district, which is almost similar with the present study.

3.9.2. Rearing cost of buffaloes

The cost of feeding, breeding, housing, equipment and treatment is presented in Table 5. The average cost of labor (per year) was higher than the average cost of feed, housing and equipment, breeding, veterinary doctor and medicine and vaccine (per year). Farmers generally bred their buffalo from the neighbor's buffalo bull and they sometimes artificially inseminate their buffaloes. For this reason, the breeding cost was low. On the other hand, they usually did not purchase feed for their buffaloes but during scarcity they purchase feed i.e., straw only. The average rearing cost of one buffalo per year was Tk. 9570. Amin *et al.* (2015) reported that the rearing cost of one buffalo was Tk. 6850 in Subornochar upazila of Bangladesh. The rearing cost was found higher in Madargonj than that from Subornochar.

3.9.3. Income from buffalo rearing

The average income per year per buffalo through draught was Tk. 15,000 followed by milk (Tk. 10,000) and dung (Tk. 1,400) (Table 5). The net income from one buffalo per year was Tk. 1,683. It indicates that rearing of buffaloes in the selected areas was profitable. The findings of the present study coincide with the findings of Sarkar *et al.* (2013) who also reported that the annual net income from rearing one buffalo was Tk. 15,630.

3.10. Livelihood improvement of buffalo farmers

The buffalo farmers spent 65.60, 57.24, 40.00, 28.00, 43.61 and 18.18% higher money for purchasing food, cloth, maintaining social status, education, health care and housing respectively (Table 6) after they started rearing buffaloes which indicated that livelihood status of buffalo keeping families was improved in the studied areas. The similar findings were also noticed by Sarkar *et al.* (2013) who reported that livelihood increased dramatically through buffalo rearing in Bagerhat. Hasan *et al.* (2016) stated that buffalo rearing in the coastal areas of Bangladesh was highly profitable. Rahman *et al.* (2008) reported that the benefit cost ratio was 1.31, indicating that buffalo rearing was profitable in Bangladesh which is agreed with the findings of Islam *et al.* (2017) and Siddiki *et al.* (2017) and also support to the findings of present study.

Table 1. Socioeconomic profile of the farmers, (n=60).

Variables	Categories	Frequency	Percentage
Age (Years)	Young aged (25-30)	14	23.3
	Middle aged (30-40)	31	51.7
	Old aged (Above 40)	15	25
Level of education	Cannot read and write	45	75
	Can sign only	8	13.3
	Primary (1-5)	5	8.3
	Below SSC (6-10)	2	3.4
	Higher level (above 10)	0	0
Family size (number)	Small family (up to 4)	17	28.3
	Medium family (5-7)	24	40
	Large family (above 7)	19	31.7
*Farmers' type	Landless farmer (below 0.02 ha)	0	0
	Marginal farmer (0.02-0.2 ha)	9	15
	Small farmer (0.2-1 ha)	30	50
	Medium farmer(1- 3 ha)	20	33.3
	Large farmer(above 3 ha)	1	1.7
Occupation	Only buffalo rearing	22	36.7
	Crop farming	5	8.3
	Agriculture plus livestock rearing	30	50
	Chicken and duck rearing	3	5
Training received	Yes	8	13.3
	No	52	86.7
Source of capital/ Financial support	Own capital	25	41.7
	Loan from bank	27	45
	NGOs	8	13.3
Purchase at a time	One	10	16.7
	Two	35	58.3
	More than two	15	25

*FAO (2008)

Table 2. Housing and feeding management practices, (n=60).

Practices	Parameters	Categories	Frequency	Percentage
Housing management practices	Nature of house	Tin shed	17	28.3
		Straw shed	38	63.4
		Half building	5	8.3
	Housing system	Open	42	70
		Closed & semi-closed	18	30
	Floor type	Pucca	8	13.3
		Kutchra	52	86.7
	Ventilation facilities	Adequate	52	86.7
		Not adequate	8	13.3
	Drainage channel	Yes	50	83.3
		No	10	16.7
Summer and winter management	Practiced	40	66.7	
	Not practiced	20	33.3	
Feeding management practices	Type of feeding methods	Extensive	22	36.7
		Semi-intensive	38	63.3
		Intensive	0	0
	Sources of feed	River side area (char) grass	35	58.3
		Own land cultivated grass	7	11.7
		Others people land	0	0
		Roadside green grass and unconventional feed	18	30
	Feeds and fodder availability	Available	42	70
		Not available	18	30
	Feeding		Homemade concentrate (Rice broken, Rice polish, etc.)	10

	concentrate	Purchased (Wheat bran, Mustard oil cake)	5	8.3
		Not feeding	45	75
	Frequency of feeding	Once	42	70
		Twice	18	30
		Three times	0	0
	Frequency of watering	2 times	48	80
		Free access of water	12	20
	Add salt or mineral mixture in water	Regular	32	53.3
		Irregular	10	16.7
		Not feeding	18	30

Table 3. Chemical composition of feedstuffs fed to buffaloes in the study areas.

Feedstuffs	Chemical composition (% DM basis)					
	DM	CP	CF	EE	NFE	Ash
Broken rice	88.5	9.2	23.5	2.3	62.7	2.3
Rice polish	92.3	10.7	11.7	10.6	51.2	15.8
Straw	86.8	3.6	35.8	1.5	44.9	14.2
Dhubla/durba grass (<i>Cynodon dactylon</i>)	90.2	16.5	32.6	1.9	36.4	12.6
Dhal grass (<i>Hymenachne amplexicaulis</i>)	89.6	8.1	29.5	1.4	40.9	20.1
Helencha (<i>Enhydra fluctuans</i>)	86.4	20.2	16.8	13.4	43.2	6.4

Table 4. Breeding, wallowing, health care and marketing management practices, (n=60).

Practices	Parameters	Categories	Frequency	Percentage
Breeding management practices	Breeding method	Artificial insemination (AI)	10	16.7
		Both AI and Natural	15	25
		Only natural	35	58.3
	Heat detection	Yes	25	41.7
		No	35	58.3
	Methods of heat detection	Symptoms	60	100
		Teaser	00	00
	Symptoms of heat detection	Mucus discharge	14	23.3
		Mounting and urination	25	41.7
		Bellowing and discharge	15	25
Frequent urination		6	10	
Wallowing of buffaloes	Wallowing frequency	Once a day	40	66.7
		Twice a day	20	33.3
Health care practices	Practice of vaccination	Yes	40	66.7
		No	20	33.3
	Practice of deworming	Yes	36	60
		No	24	40
	Practice to control ecto-parasites	Followed	31	51.7
		Not followed	29	48.3
	Incidence of diseases	Anthrax	8	13.3
		FMD	34	56.7
		BQ	12	20
		Mastitis	6	10
	Source of vaccines, anthelmintics, medicine	Local market	39	65
		Livestock office	16	26.7
		Calling quack	5	8.3
Treatment of sick buffaloes	Veterinary doctor	16	26.7	

	Sanitary condition of shed	Quacks	44	73.3
		Good	21	35
		Satisfactory	26	43.3
		Poor	13	21.7
Marketing system	Purchased from	Local market	44	73.3
		Another farmer	16	26.7
	Sold to	Whole seller	26	43.3
		Middleman	10	16.7
		Butcher	15	25
		Consumer	9	15

Table 5. Cost and returns from buffalo rearing (yearly per buffalo), (n=60).

Cost		Return	
Items	Amount (Tk.)	Items	Amount (Tk.)
Feed	2360	Draught	15000
Housing and equipment	2240	Milk sale	10000
Breeding cost	520	Value of dung	1400
Labor charges	3150		
Veterinary doctor and medicine cost	1000		
Vaccine	300		
Total Cost	9570	Total Return	26400
Net income= Total Cost- Total Return= Tk. 16830			

Table 6. Impact of buffalo rearing on livelihood activities.

Category	Initial value (Tk.)	Final value (Tk.)	Difference (%)	Rank of order
Food Purchasing	860	2500	65.60	1
Cloth Purchasing	620	1450	57.24	2
Health care	750	1430	43.61	3
Social status	1200	2000	40.00	4
Education	540	750	28.00	5
Housing	360	440	18.18	6

4. Conclusions

The results showed that management practices prevailed among the buffalo keepers were not in tune of standard recommendations rather buffaloes were raised depending upon the knowledge from their ancestors from long age practiced. No attempts were made to improve the buffalo management and production techniques. The result clearly indicated that livelihood increases dramatically through buffalo rearing in the study area although the buffalo farmers need to be provided knowledge and skill through training in scientific management practices.

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Conflict of interest

None to declare.

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