



Socio-economic status of buffalo farmers and the management practices of buffaloes in plain land of subornachar upazila in Bangladesh

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Abstract

The experiment was conducted to investigate the present status socio-economic and potentialities of buffalo production at Subornochar upazila of Noakhali district in Bangladesh. Data were collected from January to June 2014 through an interview schedule personally from 30 respondents in 6 villages of Subornochar upazila who were involved in buffalo production. All studied buffaloes were indigenous. All farmers used natural grass grown in plain land. About 7% farmers used mixed feed which was buying from local market and none used vitamin mineral supplementation. All farmers used natural breeding methods. About 40 and 67% farmers practiced vaccination and de-worming, respectively. About 27% farmers removed sick animals from healthy stock. Ninety five percent farmers allowed access to outdoor and pasturing and no farmers reared male and female buffalo separately. About 97% farmers did not keep livestock record and only 3% farmers kept their livestock record. Most of the farmers were middle aged categories (47%). Education level of farmers' had no schooling (20%), primary (50%), secondary (20%), higher secondary (7%) and graduation (3%), respectively. The involvement of respondents in farming, business and government job were 80, 13 and 7%, respectively. Respondents used own capital, bank and NGO loan for buffalo production were 80, 13 and 7%, respectively. Lack of pasture land, technical knowledge, training facilities, unavailability fresh drinking water, higher cost for cowboy and parasitic infestation about buffalo production were 53, 80, 80, 30, 50, and, 40%, respectively. There are great potentialities of buffalo production by improving socio-economic status in Bangladesh both for satisfying animal protein requirements and production of quality meat.

Key words: Buffalo production, indigenous, management practice, socio-economic status, problems

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Introduction

Livestock resources of Bangladesh are mainly based on cattle, goat, sheep, buffalo, and poultry. Although the growth of livestock production is the second highest among all other sub-sector of agriculture in Bangladesh (BER, 2012). The production and consumption of livestock products is still much lower in consumption with other countries. The increasing trends of meat consumption have already been evident in several Southeast Asian countries such as Indonesia, Malaysia,

Philippines and Thailand (Skunmun *et al.*, 2002). The quantitative production of meat in Bangladesh was 71.54 lakh metric tons against total requirement of 71.35 lakh metric tons (DLS, 2017). According to DLS meat production was surplus (0.19 lakh metric tons). Sustainable meat production is the main objectives of DLS to ensure protein security for building meritorious nation of country.

The requirement of meat per head per day is 120 g whereas the availability is 121.74 g (DLS, 2017). About 1.47 million buffalo are distributed throughout the country (DLS, 2017). For sustainable animal protein requirements, buffalo can play an important role. It is also an emerging sector for employment and improving socio economic condition of rural masses by generating employment and augmenting family income particularly small and marginal farmers in rural areas. Due to their contribution and importance, buffaloes are being concentrated in particular agro-ecological zones of Bangladesh. Despite their important role in the national economy, buffaloes are often neglected animals in Bangladesh. They are non-descriptive types. Saadullah (2012) stated that like other developing countries, systems of buffalo production vary widely in accordance with climate, soil and socio-economic opportunities in Bangladesh. Buffaloes in Bangladesh can be classified into two categories: (i) indigenous buffaloes, found in the coastal areas and marshy land of the country, (ii) migrated buffaloes from India and Myanmar. Buffaloes are raised mainly to provide draught power in crop production. The feed resources consists of crop residues, household wastes, tree leaves, roots and tuber, grain by-products and anything edible found in the immediate environment.

Buffaloes are raised under an extensive system in costal and hilly areas where large scale pasture land and enough green forage are available. Buffaloes are raised under a semi-intensive system on plain and marshy land areas where there is limited pasture land. The husbandry practices and care of animals differ somewhat in two systems. These common practices are: no housing, no artificial insemination system, no routine vaccination program and no animal identification and record-keeping system. Organic buffalo production is a means of food production with a large number of rules directed towards a high status of animal welfare, care for the environment, restricted use of growth promoters and the production of a healthy product without chemical residues. Livestock production is productive and sustainable (Reganold *et*

al., 1993). Now, day by day consumers are becoming more aware of safety and quality of food products consumed by them. Further, as Purchasing Power (PP) of common people is increasing persistently, they are interested to consume safer product without bothering to pay more. So, the production of safer meat products without any chemical and microbial residues is order of the day. Therefore, greater emphasis on livestock farming can help us to produce safer meat products without compromising the animal welfare. Many agencies, non-governmental organizations (NGOs) and individuals have started experimenting with organic methods of food production in the recent years.

In Noakhali district large numbers of buffaloes are found. Most of the buffaloes are reared by the traditional methods. The information related to organic buffalo production by farmers in Bangladesh is very limited. Detailed study is needed in different district of Bangladesh to know the present status and recommended organic buffalo production program for the farmers as an income generating activities. There is a great potentiality of organic buffalo production in Bangladesh both for satisfying animal protein requirements and production of quality meat. For this, it is a prime importance to find out present status of organic buffalo production in Bangladesh. Hence, the present study was undertaken to investigate the present socio-economic status of buffalo production farmers, explore the potentialities of safe buffalo production and identify the problems in buffalo production.

Materials and Methods

Study area and selection of farmers: The study was conducted in three unions namely Char Jubli, Char Amanullah, and Mohammadpur under Shubornochar upazila of Noakhali district. Preliminary visits were made for selection of study area. Data were collected through interview selecting 30 respondents of three unions who were involved in buffalo farming. Farmers were randomly chosen from each union.

Preparation of interview schedule: A structured interview schedule was carefully prepared keeping the objectives of the study. The questionnaire contained in the schedule was simple, direct and easily understandable by the respondents. The schedule contained closed and open form of questions. Some scales were included in the schedule, wherever necessary. The draft interview schedule was pre-tested in study area.

Collection of data: Data were collected from January to June 2014 through an interview schedule personally from 30 respondents in 6 villages of Subornochar upazila who were involved in buffalo production. 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. The relevant data for this study were collected without biasness. Respondents had no specific written documents of their own. So, they had to rely on memory. In order to minimize owner's memory bias, two visits were made in a season and questions were asked in a logical sequence so that the respondents could recollect facts easily. Interviews were normally conducted in respondent's house during their leisure time.

Parameter studied: The following parameters were studied.

A) Check list for organic buffalo production (Chander et al., 2011). Origin of livestock feeds and feeding, breeding, health care, living condition and record keeping of animals for farmers.

B) Factors related to organic buffalo production: Gender, age of the farmers, education level, household size, occupation, land size, training, source of capital, number of buffalo, description of the buffalo like breed, age, weight and problems and probable solutions

Data analysis: Collected data were coded after ending of data collection and then compiled, tabulated and analyzed the data. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring technique. Data were carefully tabulated and analyzed with simple statistical method to fulfill the objectives of the study. The collected data were first transferred to master sheets and compiled to facilitate the needed tabulation. Tabular technique was applied for the analysis of data using simple statistical tools like average and percentages through SPSS-v-16 computer package program.

Results and Discussion

Types of buffalo reared: Types of buffalo reared were classified into two categories. One was indigenous buffaloes and another was crossbred buffaloes. Table 1 show that all farmers reared indigenous type for buffalo production. Most of the farmers (80%) used own source for buffalo production, 20% farmers purchased buffalo occasionally from market or other farmers. In organic buffalo production indigenous breeds are preferable than crossbred because indigenous breeds are adapted to local climatic condition and resistance to disease. All indigenous buffaloes are considered to be organic buffalo production for their better survivalists.

Mating system: Table 1 show that all farmers (100%) used natural mating for buffalo production. Hossain et al., (2016) stated that 13% farmers used natural breeding and 73% use AI for their livestock breeding. In organic buffalo production, mating system should be natural. Artificial insemination is allowed only upon veterinary necessity. Hormonal treatment for more meat production should be prohibited. Fortunately, in the study area all the farmers used natural mating system for breeding.

Table 1. Type, source and breeding method of buffalo

Parameters	Categories	Number of respondents	Percent of total respondents
Origin of buffalo	Indigenous	300	100
	Crossbred	0	0
Source of buffalo	Own source	24	80
	Purchase	6	20
Breeding method	Natural	30	100
	A.I.	0	0

Livestock feeds: Livestock feeds were classified into two categories. One was roughage and another was concentrate. Table 2 shows that no farmers used cultivated fodder like Napier, Jamboo, Maize, Kheshari (*Lathyrus sativas*) etc and all farmers used naturally grown grass.

Table 2. Livestock feeds and feeding

Parameter	Categories	Number of respondents	Percent of total respondents
Roughage	Natural grass	30	100
	Cultivated fodder	0	0
Concentrate	Compound feed/pellet	0	0
	Mixed feed	2	7
Vitamin mineral supplement	Yes	0	0
	No	30	100
Source of concentrate feed	Produce themselves	0	0
	Buy locally	2	7

Different concentrate feed like wheat bran, rice polish,/bran, kheshari bran, sesame oil cake, mustard oil cake, broken rice, molasses, salt etc were used by some buffalo farmers used but no farmers used vitamin-minerals for buffalo production. Sarkar *et al* (2013) showed that no buffalo farmers used any

concentration feed. These concentrates were bought from local market. About 7 % farmers used own prepared mixed feed for buffalo production.

Health care: Table 3 shows that about 40% farmers vaccinated their buffalo and 60% farmers did not vaccinate their buffalo regularly. No farmers used hormones, antibiotic and growth promoter for higher meat production. About 73% farmers did not remove their sick animals from healthy stock and only 27% farmers removed their sick animals from healthy stock which is important for organic buffalo production.

Table 3. Health care and living condition

Parameters	Percent of respondents practiced	Percent of respondents not practiced
Vaccination	40	60
Hormone, antibiotic and growth promoter	0	100
Removal of sick buffaloes	27	73
De-worming	67	33
Access to outdoor	95	5
Access to pasture	95	5
Separate male and female buffaloes	0	100

Most of the farmers (67%) practiced de-worming their buffalo regularly. Sarkar *et al.*, (2013) showed 88% farmers practiced de-worming and vaccination which was higher than this study. Castration, dehorning, tail docking and other surgical practices were not practiced in buffalo production. Organically raised animals should not be given hormones to promote growth, or antibiotics for any reason. Preventive management practices, including the use of vaccines to keep animals healthy. Producers are prohibited from withholding treatment from a sick or injured animal; however, animals treated with a prohibited medication would be removed from organic operation. In the study area majority of the farmers not removed sick or injured animal from healthy animals. About 100% buffalo are considered to be organic because no hormone,

antibiotic and growth promoter are used in buffalo production in studied areas.

Table 3 shows that 95% farmers allowed animal's access to outdoor and pasture during winter season and 5% farmers not allowed animals access to outdoor and pasture during winter season. Hossain et al. (2016) showed 73% farmers allowed their animals' access to outdoor and pasture. Most of the farmers do not clean housing pens, equipment and utensils regularly. No farmers separate male and female animals. About 27% farmers remove sick animals from healthy stock which is similar with Hossain et al. (2016) but in this areas organic farming were not being practiced.

All organically raised animals must have access to the outdoors, including access to pasture for ruminants. They may be temporarily confined only for reasons of health, safety, the animal's stage of production, or to protect soil or water quality. In study areas most of farmers reared their buffalo in open place and majority of farmers allowed animal access to outdoor and pasture. In the parameter of livestock living condition about 95% buffalo are considered to be organic because animals are allowed access to outdoor and pasture.

Record keeping of buffalo: Organic production generally requires more record keeping than conventional production. However, records are also important to verify the status of the animals and production, harvesting and handling practices associated with them and their products but in study area majority of farmers do not keep livestock record in buffalo production.

Table 4 shows that 97% farmers did not keep livestock record and only 3% farmer kept birth record, breeding record, feed record, health record etc. for buffalo production. Hossain et al. (2016) showed that 3% farmers kept their livestock record which is in agreement with this study.

Table 4. Record keeping of livestock by farmers

Parameter	Number of respondents	Percent of total respondents
Record keeping	1	3
No record keeping	29	97
Total	30	100

Socio-economic factors related to organic buffalo production

There are many factors and constituents attribute that characterize an individual and form an integral part in the development of one's behavior and personality. In this study 30 respondents were interviewed to find out the socio-economic condition of the respondents. The selected characteristics included age of the farmers, family size, education, occupation, land size, training, source of capital, and breed type.

Age of farmers: According to data, farmer's age ranged from 25 to 65 years. The respondents were classified into three categories, such as young age (up to 35 years), middle age (36-50 years) and old age (above 50 years) on the basis of their age is shown in Table 5. The findings indicate that the highest proportion (47%) of the farmers in study was in the middle aged category compared to 33 % belonging to young aged category and 20% to old aged category.

The results of this study were similar with Rahman et al. (2012) where they reported that 45.3, 16 and 38.7% farmers were in middle aged, young and old aged category, respectively. Almost similar findings were found by Begum et al. (2007) and Ahamed et al. (2010) It was expected that young and middle aged farmers (80% were more active, energetic and enthusiastic in performing livestock related activities. Particularly the middle aged farmers were well experienced and more acquainted with the buffalo production.

Household size: The household size of farmers ranged from 4 to 16 numbers. On the basis of their household size, the families were classified into three categories. These were small family (up to 5 members), medium family (6-8 members) and large family (above 8 members). Data contained in Table 5 shows that the majority (47%) of the farmer had medium sized family,

23% small sized family and 30 % in large sized family. Hossain et al., (2016) average household size were small (43%), medium (37%) and large (20%). These finds were almost similar with the present study. The average family size 6.63 of the respondents in study area was higher than that of the national average of 4.9 (BBS, 2008).

Table 5. Distribution of respondents according to age, household size and land size (n=30)

Parameters	Categories	Number of respondents	Percent of total respondents
Age	Young age (up to 35 years)	10	33
	Middle age (36-50 years)	14	47
	Old age (above 50 years)	6	20
Household size	Small family (up to 5 members)	7	23
	Medium family (6-8 members)	14	47
	Large family (above 8 members)	9	30
Land size	Marginal (up to 1 acre)	5	17
	Small (1-3 acre)	16	53
	Medium (above 3-8 acre)	9	30
	Large (above 9 acre)	0	0

Land size: Table 5 shows that the total land (homestead and cultivable) of the respondents were classified into four categories such as marginal, small, medium and large farmers. The major category (53%) of the farmers belongs to small class which was also a representative of typical land size of Bangladesh. About 17% farmers are marginal and 30% are medium. Hossain et al. (2016) showed that land size were marginal (1acre), small (1-3 acre), medium (3-8 acre) and large (>9 acre) in which small class were 40% which was less than this study. In an experiment Siddiki et al., (2015) reported that land size of marginal, small and medium farmers were 16, 42 and 42%, respectively. These findings are closed related to the present study.

Level of education: The respondents were classified into five categories, such as No schooling, Primary, SSC, HSC and Graduate on the basis of their level of

education is shown in Table 6. Among the total respondents had no schooling, had primary, secondary, higher secondary and graduate level of education were 20, 50, 20, 7 and 3%, respectively. Findings indicate that majority of the farmers had primary education (50%). The results of this study are similar with Begum et al. (2007), where they reported that 20.0% farmer's illiterate, 40.30 and 10 farmers were primary, secondary and above secondary level of education, respectively. It is assumed that people having higher education are more progressive and innovative than those of illiterate and they could perform better in buffalo production.

Occupation: The total respondents were classified into four categories. The major category 24 of the respondents belongs to farming categories, 4 businessmen and 2 government job. Number and percentage distribution of respondents according to the occupation are shown in Table 6. Out of 30

respondents 80% are involved in farming, 13% in business and 7% in government job, respectively. The results of this study are similar with Ahamed *et al.* (2010) where they reported that 70 % farmers were involved in agriculture and 11% in business. Sarker *et al.*, (2013) reported that 30% buffalo farmers of Bagerhat district in Bangladesh were fully dependent on buffalo rearing. In another study Siddiki *et al.*, (2015) reported that 60% farmers were engaged in agriculture with livestock rearing but 40% farmers reared only livestock. Amin et al.,(2015) reported that 68% farmers of Subarnachar upazila in Noakhali district of Bangladesh were engaged in agriculture with buffalo rearing.

Table 6. Distribution of respondents according to level of education and occupation (n=30).

Parameters	Categories	Number of respondents	Percent of total respondents
Level of education	No schooling	6	20
	Primary	15	50
	SSC	6	20
	HSC	2	7
	Graduate	1	3
Occupation	Farming	24	80
	Business	4	13
	Govt. job	2	7

Source of capital: The source of capital for buffalo production varies from farmers to farmers. According to these farmers are classified into three categories. Table 7 shows that about 80, 13 and 7% respondents used own capital, bank and NGO loan for buffalo production, respectively. This results are similar with Begum *et al.* (2007) where they reported that 86.7% used own capital for buffalo production. Hossain et al., (2018) showed of capital source (100%) was Social Development Foundation (SDF) and recovery rate was 98-100%. Siddiki *et al.*, (2015) reported that reported that farmers received bank loan/NGO and own capital were 68 and 32%, respectively.

Training: Training experience was an important factor which enhanced the level of knowledge and improves

skills on various aspects of agricultural technologies. Table 7 shows that only 20% respondents had experience on short time training usually for three to seven days in Upazilla Livestock Office, Subornochar, Noakhali for buffalo production. Rest 80% had no experience of training on buffalo production. The buffalo farmers were not aware about various training courses offered by different organization. Hossain et al (2018) showed that 100% farmers received training from Social Development Foundation (SDF). Siddiki et al., (2015) reported that farmers started buffalo rearing without training and influence by neighbor were 83 and 17%, respectively. These findings are agreed with the present study.

Table 7. Distribution of respondents according to source of capital and training.

Parameters	Categories	Number of respondents	Percent of total respondents
Source of capital	Own capital	24	80
	Bank loan	4	13
	Lending	2	7
Training	Have	6	20
	Have not	24	80

In organic buffalo production hormone, antibiotic and growth promoter is prohibited and no farmers use growth promoter for buffalo production so, 100% buffalo are considered to organic. In the parameter of livestock living condition and record keeping about 97 and 3% buffalo are organic, respectively (Table 8).

Problems faced by the farmers and their suggestions:

Lack of pasture land, technical knowledge on buffalo production, training facilities, unavailability of fresh drinking water, and higher cost for cowboy, and disease infestation reported were 53, 80, 80, 30, 50 and 40%, respectively (Table 9). More problems were observed of high yielding fodder, cost of feed, lack of credit, natural calamities, housing problem in rainy season. These are the major problems in buffalo production. Table 10 shows problems and suggestions

Table 8. Present status of organic and inorganic buffalo production

Check list of organic buffalo production	Criteria	Organic (%)	Traditional/Conventional (%)
Breed	Indigenous	100	0
Feed	Roughage	100	0
	Concentrate	Not known	Not known
Breeding	Natural	100	0
	Vaccination	40	60
Health care	Growth promoter	100	0
	Removal of sick animal	27	73
Living condition	Access to outdoor	95	5
	Access to pasture	95	5
Record keeping	Kept	3	97

Table 9. Problems of organic buffalo production

Problems	Number of respondents	Percent of total respondents
Lack of technical knowledge	24	80
Lack of training facilities	24	80
Lack of pasture land	16	53
Higher cost for cowboy	15	50
Disease infestation	12	40
Unavailability of fresh drinking water	9	30

Table 10. Suggestions to improve organic buffalo production

Suggestion	Number of respondents	Percent of total respondents
New char should be allotted as bathan or pasture	24	80
Need government support	18	60
Providing training facilities	14	47
Formation of Community Based Organization(CBO)	12	40
Motivation of the farmers	12	40
Pasture land should be available	6	20

to improve organic buffalo production. Hossain et al., (2018) stated that about 90 to 95% problem on feeding, management and marketing of cattle rearing and provided their proper solution which is agreed with this study.

Need government support , pasture land should be available, new char land should be allotted as bathan, formation of Community Based Organization(CBO), providing training facilities and motivation of the farmers were the most important suggestions by 60, 20, 80, 80, 47 and 40 % respondents, respectively.

Conclusions

From the study it reveals that all farmers used indigenous type for buffalo production and they used natural breeding for buffalo production. All roughages were organic because they are grown naturally. More than 60% farmers do not vaccinate their buffalo regularly. No farmers used hormones, antibiotic and growth promoter for higher meat production. All buffalo are considered to be organic because no hormone, antibiotic and growth promoter are used in buffalo production in studied areas. Maximum buffalo are considered to be organic because animals are allowed access to outdoor and pasture. The buffalo farmers were not aware about various training courses offered by different organization. Therefore, it is recommended that more number of training courses

like training on fattening, rearing, marketing etc. should be conducted by government and non government organizations. Government owned fallow land should be allotted as pasture land for safe buffalo farming, training facilities as well as government support for the farmers should be provided.

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References

- Ahamed T, Hashem MA, Khan M, Rahman MF, Hossain MM (2010). Factors related to small scale cattle fattening in rural areas of Bangladesh. *Bangladesh Journal of Animal Science*, 39 (1-2): 116-124.
- Amin MR, Siddiki MA, Kabir AKMA, Faruque MO, Khandaker ZH (2015). Status of buffalo farmers and buffaloes at Subarnachar upazila of Noakhali district. *Progressive Agriculture*, 26:71-78.
- BBS (Bangladesh Bureau of Statistics) (2008). Preliminary Report of Agricultural Census, Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh.
- Begum MAA, Hossain MM, Khan M, Rahman MM, Rahman SME (2007). Cattle fattening practices of selected farmers in Panchagarh district. *Bangladesh Journal of Animal Science*, 36 (1-2): 62-72.
- BER (Bangladesh Economic Review) (2012). Ministry of Planning, Government of the People's Republic of Bangladesh.
- Chander M, Subrahmanyeswari B, Mukherjee R, Kumar S (2011). Organic Livestock Production: An emerging opportunity with new challenges for producers in tropical countries. *Rev. Sci. Tech. Off. Int. Epiz.* 30 (3): 969-983.
- DLS (Directorate of Livestock Services) (2017). General information related to livestock. *Annually Fisheries and Livestock Bulletin* published by Fisheries and Livestock Information Office, Khamarbari, Farmgate, Dhaka, Bangladesh.
- Hossain MA, Islam MS, Hashem MA (2018). Phenotypic and productive traits of kurbani bulls as livelihood changes of farmers during Eid-UI-Azha in Mymensingh district. *International Journal of Natural and Social Sciences*, 5(1): 44-51.
- Hossain MA, Islam MS, Rahman MF, Islam MS, Zulfikar MIM (2018). Livelihood improvement of poor women through cow rearing. *International Journal of Applied Research*, 4:24-29.
- Hossain M, Hossain MM, Hasheb MA, Bhuiyan KJ (2016). Organic beef cattle production production pattern at Shahjadpur upazila of Sirajganj district in Bangladesh. *Bangladesh Journal of Animal Science*, 45(1): 25-30.
- Rahman Z, Hossain MM, Hashem MA (2012). Cattle fattening program in Dinajpur district of Bangladesh. *Progressive Agriculture*, 23 (1-2): 1-13.
- Reganold JP, Palmer AS, Lockhart JC, Macgregor AN (1993). Soil quality and financial performances of biodynamic and conventional farms in New Zealand. *Journal of Soil Science*, 260:344-349.
- Saadullah M (2012). Buffalo production and constrains in Bangladesh. *The Journal of Animal and Plant Sciences*, 22(3 Suppl.): 221-224.
- Skunmun P, Chantalakhana C, Pungchai R, Poondusit T, Prucsasri P (2002). Comparative feeding of Nale Dairy, Beef Cattle and Swamp Buffalo. 1. Economics of Beef Production. *Asian-Aust. J. Anim. Sci.*, 15(6): 878-883.
- Sarkar S, Hossain MM, Amin MR (2013). Socio-economic status of buffalo farmers and the management practices of buffaloes in selected areas of Bagerhat district of Bangladesh.

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Bangladesh Journal of Animal Science, 42(2):
158-164.
Siddiki MA, Amin MR, Kabir AKMA, Faruque MO
Khandaker ZH (2015). Socio-economic status of

buffalofarmers and the performances of buffaloes
at Lalpur upazila of Natore district in Bangladesh.
Bangladesh Journal of Animal Science,
44(3):157-165.