



## Feeds and Forage Availability, Utilization and Management Practices for Livestock in Some Selected Coastal Areas of Bangladesh

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### Authors' contributions

This work was carried out in collaboration between all authors. Author NRS designed the study, wrote the protocol and wrote the first draft of the manuscript. Author MKB reviewed the experimental design and all drafts of the manuscript. Authors MAH and NRS managed the analyses of the study. Author MRA identified the plants. Authors FT and DY performed the statistical analysis. All authors read and approved the final manuscript.

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### ABSTRACT

The study was carried out to determine management and utilization of feed resources in the coastal regions of Bangladesh. For these purpose, a well structured questionnaire was developed to collect information by door to door household survey (HHS). Based on cattle population, 2 Upazilas from each of 10 districts which were adjacent to the coastal regions of Bangladesh were selected for HHS. A randomly selected 50 farmers from each Upazila were considered for collecting information. After screening a total of 915 HHs were considered under statistical analyses. Result shows that about 58% HHs were landless and average of about 89% HHs in the surveyed areas were keeping

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cattle among which 78.5% of them kept indigenous local cows with an average number of about 3.0 cattle per HH. Buffalo was not found in every region which was found only in 1.75% HHs with an average population size of 0.06 per HH. Sheep was found only in 0.4% HHs with an overall number of 0.02 per HH. About 17% HHs were keeping goats with an average size of 0.54 per HH. Significant difference on performance was found in native cows among different regions but not in crossbred cows. It was observed that majority of the landless HHs reared their cattle by tethering (49%) and extensive management systems (57%) but stall feeding was most preferable system by medium (47%) and large farm HHs (60%). Native pastures, crop residues (rice straw), grazing of crop stubbles and fallow lands were the major feed resources for feeding cattle in those areas. About 87% HHs fed rice straw and about 66% HHs fed cut and carry green grass to their cattle. The seasonal variation of feeding roughages was not too much more but acute shortage of green grasses was seen in winter. Concentrates fed by the farmers in the surveyed areas were mainly rice polish, wheat bran, broken rice and mustard oil cake, but rice polish was the most available concentrate feed ingredients fed by about 82% HHs. Only about 12% HHs cultivated fodder, but about 38% HHs had opportunity to cultivate fodder if they are given technical supports. Most of the HHs had no any specific causes for not to cultivate fodder although they rear cattle. Also, most of them had no idea about the constraints to cultivate fodder. Although natural pastures and crop residues were produced not sufficiently but their full and efficient utilization for livestock feeding has been hindered partly by economic problems and inadequate knowledge about the methods, lack of finance and accessibility to the methods. Finally it may be concluded that raising the productivity of the pasture land by adopting sound management practices, growing productive and nutritious forages in association with food crops are the options for resolving livestock feed shortage around the year. However, training of farmers about feed resources utilization, management and the involvement of government in improving the financial capabilities of farmers are very important.

*Keywords: Feed resources; fodder; forages; coastal areas.*

## 1. INTRODUCTION

The acute shortage of quality feeds and fodder is one of the single most important obstacles for low productivity in livestock development in Bangladesh [1]. Animal feeding systems in this country is mainly based on crop residue and native pasture, which are deteriorating in production and quality, which vary seasonally resulting in poor animal performance. The major problem to livestock productivity is scarcity of livestock feeds in both quality and quantity, especially in the dry season. Notwithstanding the continued reduction in the size of grazing lands and forest areas to crop production to feed the ever-increasing human population, ruminants will still continue to depend primarily on crop residues and forages from nature pasture. Only 44% dry matter (DM) and 26% crude protein (CP) requirements are met by the available feed resources in the country [2]. According to a published report the availability of green grass is only 0.1% [3]. The naturally grown green grasses are mostly available in the fallow land, playground and waysides which are the major sources of green forages for rural people of Bangladesh [4]. Livestock feed supply from natural pasture is characterized by seasonal fluctuation in total dry matter (DM) production

and nutritional quality because of the distinct seasonal variation in plant growth, in relation to the annual rainfall pattern. The nutritive values of the local indigenous grasses were reported earlier by Amin and Alam [5] and Islam and Alam [6]. In Bangladesh, seasons and region based data on feeds and fodder production and their utilizations are very scanty. Therefore, the main reason for selecting different districts of Bangladesh was substantial potential and opportunities for development of improving smallholder livestock production. In the study areas, good attention was focused for efficient utilization of local feed resources and mainly on exotic forage development. The results of our study may contribute to identify the existing practices of utilization of feed and to find ways and means to improve these practices. In addition, the study will help to define the prospects for future interventions in developing livestock feeding systems to enhance productivity and viable integration of the crop and livestock sectors in the certain reason among the districts of Bangladesh. Accordingly, the study was conducted to assess and evaluate the management and utilization practices of the available livestock feed resources, identify major constraints and opportunities for efficient utilization of feed resources of different areas of

Bangladesh as influence by different agro-ecological zones (AEZs). Thus the present study was conducted to fulfill the following objectives:

1. To know the production and utilization of feeds and fodder resources in different coastal areas of Bangladesh.
2. To determine the seasonal scarcities and availability of feeds & fodder in different coastal areas of Bangladesh.
3. To identify the problems related to the feeds & fodder availability faced by the farmers.

## 2. MATERIALS AND METHODS

The materials and methods followed for this study are described here below:

### 2.1 Place of Study

The study was conducted with the financial and logistic supports of a research project entitled "Fodder Research and Development Project" at Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka 1241 during July 2013 to June 2014.

### 2.2 Coverage of Studied Areas

The study was conducted in 10 districts located in different coastal regions of Bangladesh. A total of 19 Upazilas taking 2 (two) from each district were selected on the basis of livestock density which covered three Agro Ecological Zones (AEZs) of Bangladesh.

### 2.3 Characteristics of Studied Areas

Bangladesh consists of 30 agro-ecological zones (AEZ's) those are overlapping with each other has been divided on the basis of some definite characteristics and they are physiography (it is defined as soil parent materials and land forms of a particular area), hydrology (it is determined on the basis of water holding capacity of soil and the water level of agricultural land), cropping pattern (it is done on the basis of Length of Rabi and Kharif season and major and minor agricultural crops which are cultivated in a particular area), season (it is done on the basis of the Depth and duration of seasonal flooding in a particular area), soil types and tidal activity. The names of the studied regions with included districts and their nature are shown in Table 1.

## 3. TOOLS OF THE STUDY

### 3.1 Type of Survey

The study was survey based regarding production, utilization and management of feeds, fodder and forages for livestock production in the coastal regions of Bangladesh. So, it was a purposive survey which may not reflect the overall situation of the country or report of other surveys in the similar field of study.

### 3.2 Informal Survey for Secondary Data Collection

Prior to actual survey, visits were made to the respective district livestock offices and secondary information relevant to the study was gathered from all possible sources. The information gathered through secondary data sources was used as a basis to design a semi-structured questionnaire to quantify the most important parts of this study.

### 3.3 Formation of Questionnaire

Based on the purposes of the study along with secondary information a semi-structural questionnaire was formulated including some demographic information, livestock population and their major feed resources and their utilization, seasonal availability and management and associated constraints in relation to livestock production in the respective areas. In the prepared questionnaire, there were both closed ended (yes or no) question and open question with single and multiple responses. Single response were those question where the sample households had a single reply and multiple response questions were those questions where the individual household could give more than one answer and in that case the percentage of responses would be greater than 100%.

### 3.4 Pre-tested Questionnaire

Before going to formal survey, the semi-structured questionnaire was also pre-tested by interviewing some households and was subsequently refined.

### 3.5 Sample Size

A stratified random sampling technique was followed to select sampling units. For this study, the districts were stratified in to two (Upazilas) based on livestock population density and adjacent to the coastal region. About fifty farmers

from in each Upazilla were randomly selected for collecting data. After screening, a total of 915 households were considered for analysis.

### 3.6 Formal Survey

A single-visit formal survey method [7] was applied to gather information and all data were collected by direct interviewing from the respondents in the households with the help of some trained enumerators under the close supervision of BLRI scientists.

### 3.7 Data Analysis

The collected data were summarized wherein each household was taken as a single unit of analysis. Data compiled accordingly were then analyzed using statistical package for the social sciences, (SPSS, version 17.0). Descriptive statistics such as frequency, percentage, mean, and standard deviation along with level of significance was used to present the results.

## 4. RESULTS AND DISCUSSION

### 4.1 Household Characteristics and Socio-economic Status

From this survey all households (HHs) were categorized according to the size of lands owned by the HHs. Most of the HHs (about 58%) were landless, however, only about 1% of them were large farmers. Highest landless HHs were found in AEZ 19 (63%), followed by AEZ 13 (58%) and AEZ 23 (50%). Other farm categories with land utilization are given in Table 2.

The studied households had an average family size of 5.6 (landless = 5.4; marginal = 5.6; small = 5.9; medium = 7.3; large = 9.0; AEZ 13= 5.3; AEZ 19= 6.4 and AEZ 23= 6.6) and the age of the respondents varied between 12 and 110 years with an average of 40.33 years. It was found that about 45% HHs had 5-6 family members and 28% had 3-4 members and these are comparable to the figures given by Statistical Year Book of Bangladesh [8]. Farm animal like cattle, buffalo, goat and sheep are kept both by farm households (having 0.05 acre or more cultivable land) and non-farm households having less than 0.05 acre or no cultivable land [9]. During survey the literacy of the household's head were assessed and given in Table 3.

All household heads were literate in AEZ 23 with an overall literacy rate of about 80.3%. The literacy is lowest (about 78%) in landless farmer and highest (100%) in large farmers. Low level of

education of the households can have an influence on the transfer of agricultural technologies and their participation in its development. There are plenty of works available on the study of socio-economic status of HHs in Bangladesh conducted by several NGOs which are the basis of development work of NGOs. Results found in this study may vary with their reports due to purpose of survey. In this survey most of those HHs were selected who kept livestock specially cattle, buffalo, goat and sheep. So, comparison of socio-economic status between this study and others is not significant.

### 4.2 Livestock Keeping and Production Status

The availability of different livestock population varied among different coastal regions of Bangladesh. An average of about 89% HHs in the surveyed areas was keeping cattle with an average number of about 3 cattle per HH. Buffalo was not found in every region which was found only in 1.7% HHs with an average population size of 0.06 per HH. The scenario of sheep availability was same as buffalo (found only in 0.4% HHs) with an overall number of 0.02 per HH. However, about 17% HHs were keeping goats with an average size of 0.54 per HH. The current livestock population dynamics in different AEZ are given in Table 4.

It was observed that all categories of farmers equally kept cattle (overall about 89% HHs), but little bit less percentage of cattle were reared by medium farmers. However, the mean population size of 7.8 cattle per HH was observed in large farmers. The highest 9% of medium category farmers kept buffalo. Goats were reared almost equally in all farm categories HHs. Sheep rearing was not seen in small and large farm HHs. It is usually said that landless or small and marginal farmers keep small livestock like goat and sheep more than large farmers who keep large livestock like cattle and buffalo more. But the present study does not agree that. However, the number of cattle population per household (2.99) is not concomitant with 3.50 [10] and that of 0.94 for all household [11]. Huque, [12] shown that even a landless farmer keep dairy animals for supporting his or her livelihood. Livestock holding among the farms categories is important to determine the comparative advantage of domestic production of milk, meat and eggs that have the appropriate policy interventions and strategic development programme. Livestock availability and population size in different farmer's category is given details in Table 5.

**Table 1. Name of the regions and their characteristic features**

Name of region	AEZ covered in the region	Districts included in the region	Land and soil type	Fertility condition and organic materials
Ganges Tidal Floodplain	AEZ 13	Barisal, Bhola, Jhalkati, Pirojpur, Barguna, Patuakhali, Khulna Bagerhat, Satkhira	Medium low, low Heavy silt clays, alkaline	Medium to high Medium
Lower Meghna River and Estuarine Floodplain	AEZ 19	Feni	Medium, high-medium, low Silt loam, Silt clay	Medium Medium
Chittagong Coastal Plain	AEZ 23	Chittagong and Cox's bazaar	High, medium high, medium low Grey silt loam, Silt clay loam	Medium and low Low to moderate low

**Table 2. Amount of land and utilization according to farm categories**

Type of land	Land occupied by different category of farmers									
	Landless (0-49 dec.)		Marginal (50-125 dec.)		Small (126-249 dec.)		Medium (250-749 dec.)		Large (>750 dec.)	
	%	Av. (d)	%	Av. (d)	%	Av. (d)	%	Av. (d)	%	Av. (d)
Homestead	99.0	11.2±0.3	100	16.7±0.88	100	25.4±3.03	100	32.9±5.06	100	89.2±29.39
Cropland	35.0	19.1±1.2	92.3	54.8±1.6	92.8	119.9±4.7	97.9	276.3±18.7	100	1224.8±221.4
Fodder	02.9	8.0±1.1	06.4	11.40±1.4	08.2	19.0±4.9	17.0	28.81±7.4	10.0	60.00
*Garden	29.5	8.57±0.40	54.5	14.96±1.0	63.9	21.16±3.5	66.0	35.03±7.64	60.0	103.58±69.75
Pond	38.6	5.44±0.26	58.7	8.32±0.71	70.1	16.45±3.3	57.4	31.55±17.4	100	126.1±64.13
Fallow	00.8	12.25±1.3	0.0	0.0	05.2	129.0±44.5	02.0	200.0	0.0	0.0
Total	57.5	24.5±1.9	25.7	81.0±1.6	10.6	174.4±7.6	05.1	357.6±17.9	01.1	1508.3±221.9

\*fruit, flower, vegetable etc

**Table 3. Educational levels of the household heads in different AEZ**

AEZ	Educational levels of the household heads (%) in different AEZ				
	Illiterate	Basic (read, write, sign & pre-primary)	Primary to junior secondary	Secondary	Higher than secondary
AEZ 13	22.9	36.8	31.0	5.2	4.1
AEZ 19	14.6	12.5	47.9	20.8	4.1
AEZ 23	0.0	0.0	75.6	14.9	9.5
Total	19.7	30.3	37.3	8.1	4.6

\*dec.= decimal (436 sq. feet land area)

**Table 4. Livestock population according to different AEZ of Bangladesh**

AEZ	Livestock keeping status and population							
	Cattle		Buffalo		Goat		Sheep	
	Mean±SE	% HH	Mean±SE	% HH	Mean±SE	% HH	Mean±SE	%HH
AEZ-13	3.37±0.11	97.1	0.04±0.02	1.4	0.47±0.06	13.3	0.01±0.01	0.5
AEZ-19	2.63±0.12	97.0	0.02±0.02	1.0	0.94±0.17	39.4	0.00±0.0	0.0
AEZ-23	1.61±0.17	47.4	0.18±0.09	3.9	0.55±0.14	15.8	0.07±0.07	0.7
Overall	2.99±0.09	88.9	0.06±0.02	1.7	0.54±0.05	16.5	0.02±0.01	0.4

**Table 5. Livestock population according to different farmer's category**

Farmer's category	Livestock keeping status and population							
	Cattle		Buffalo		Goat		Sheep	
	Mean±SE	% kept	Mean±SE	% kept	Mean±SE	% kept	Mean±SE	% kept
Landless	2.79±0.08	90.1	0.03±0.01	1.1	0.49±0.07	15.6	0.01±0.01	0.4
Marginal	2.80±0.13	90.2	0.05±0.03	1.7	0.57±0.10	19.6	0.02±0.02	0.4
Small	3.82±0.30	88.7	0.05±0.04	2.1	0.64±0.19	16.5	0	0.0
Medium	3.51±0.30	68.1	0.51±0.31	8.5	0.57±0.32	10.6	0.02±0.02	2.1
Large	7.80±1.41	90.0	0	0.0	0.80±0.69	20.0	0	0.0
Overall	2.99±0.09	88.9	0.06±0.02	1.75	0.54±0.05	16.5	0.02±0.01	0.4

In the survey of 915 HHs, 813 HHs had cattle among which only 8.4% of them kept crossbred dairy cows and 78.5% kept indigenous local cows. The performance potentials of crossbred cows were obviously better than those of local indigenous cows although not too much encouraging (Table 6). An interesting finding of this survey was found that, although performance potential of native cattle and their conventional feeding and management are almost alike throughout the country, but there were significant variations of production performance among different AEZs which could be due to availability and supply of green grasses and different management systems provided by the farmers. On the other hand there was no significant difference of performance for crossbred cows among different AEZs except lactation length which differed significantly. Crossbred cattle was mainly reared by intensive management system and feeding and management systems followed by the farmers are more or less same throughout the country that could be the reason for non-significant variations of crossbred cow's

performance among regions. The production performances observed in this study both in native and crossbred cattle in rural farm condition are in general agreement with Habib et al. [13] who reported daily milk yield of local and crossbred cattle in rural farmhouse as 1.88±0.25 and 6.02±1.16 kg, respectively. Huque [12] said that, Friesian x Sahiwal was a top milk producer (2239 litres lactation yield) among the assemble genotypes follow by local crosses with Friesian (1956 litres) or with Jersey (1605 litres).

#### 4.3 Livestock Rearing and Feeding Status

In the surveyed areas, farmers reared their cattle by tethering; stall feeding, semi-intensive and extensive management systems.

Table 7 shows in details about the seasonal variations of management systems followed by the farmers. Most of the farmers (about 42%) rear cattle by tethering system and is followed during the season when main crops remain in the field and varied duration (4-7 hours in a day) in

different seasons. Only about 1% HHs reared cattle by semi-intensive system. It was also observed that majority of the landless HHs reared their cattle by tethering and extensive management systems (49 and 57%, respectively) but stall feeding was most preferable system by medium and large farm HHs (47 and 60%, respectively). Based on AEZ, tethering system was more existence (77.8%) in AEZ 19, extensive system in AEZ 13 (22%), semi-extensive and stall feeding system in AEZ 23 (7 and 100%, respectively). The management system of animals depends basically on type of cattle, availability of grazing or communal land and green grasses and also on farmer's solvency. In AEZ 23, peoples are comparatively richer than all other AEZs. So, 100% HHs rearing cattle by stall feeding method in that region is justified for that reason. However, farmers in all reasons having crossbred cattle follow stall feeding rearing system. The feeding status of roughage in different seasons was also observed from the survey which is shown in Table 8. It was observed that rice straw and naturally grown green grasses were the main roughages for feeding their cattle. About 87% HHs fed rice straw and about 66% HHs fed cut and carry green grass to their cattle. The seasonal variation of feeding roughages was not

remarkable, although in rainy season 100% HHs fed rice straw to their cattle due to heavy rainfall that affect grazing of cattle. Cut and carry green grasses were supplied to the cattle by 75% HHs in summer and 67% HHs in winter. Scarcity of local green grass was seen in winter resulting lower % of HHs those were capable to supply green grass. The amounts of rice straw and green grasses in different seasons are given in Table 8.

Rice straw and green grasses were fed almost equally irrespective of different farm categories, although medium categories HHs were somewhat more (94 and 75%, respectively) who supplied those roughages to their cattle. There are about 98.8%, 97.9% and 100% HHs supplied rice straw to their cattle irrespective of seasons in AEZ 13, AEZ 19 and AEZ 23, respectively. Further, cut and carry green grasses are fed more by farmers in AEZ 23 (89%) followed by AEZ 13 (72%) and AEZ 19 (67%) irrespective of seasons. Continuous change of eco-system and climate, Bangladesh required dynamic approaches in better understanding of feeds and fodder production in terms of land use, production of cereal crops, plantation and their economic use and also minimize the negative impact on environment as a whole.

**Table 6. Production performance of cows reared in conventional system in different AEZ**

Name of AEZ	Milk production parameters for local indigenous and crossbred cattle					
	Av. lactation length (days)		Av. total milk yield (kg)		Av. daily milk yield (kg)	
	Indigenous (n=633)	Crossbred (n=77)	Indigenous (n=633)	Crossbred (n=77)	Indigenous (n=633)	Crossbred (n=77)
AEZ 13	206.9 <sup>a</sup> ±1.90	259.5±11.37	372.1 <sup>b</sup> ±84.11	1518.1±189.9	1.79 <sup>c</sup> ±0.04	6.0±0.74
AEZ 19	225.2 <sup>a</sup> ±4.25	240.0	477.4 <sup>a</sup> ±25.56	877.5	2.10 <sup>b</sup> ±0.07	3.7
AEZ 23	193.9 <sup>a</sup> ±2.58	228.9±02.57	486.2 <sup>a</sup> ±15.13	1505.0±085.9	2.42 <sup>a</sup> ±0.07	6.5±0.35
Overall	208.2±1.64	238.1±04.09	393.5±07.98	1499.7±081.2	1.88±0.03	6.3±0.33
Significance	***	**	***	NS	***	NS

Means with uncommon superscript in the same column differed significantly ( $P<0.05$ ); \*\*\*- $P<0.001$ ; \*\*- $P<0.01$

**Table 7. Feeding system of cattle around the year according to different seasons**

Management and feeding system	% HHs followed	% of HHs followed the systems in different seasons				Duration per day (hours)		
		Summer	Rainy	Winter	Summer	Rainy	Winter	
*Tethering	42.3	38.6	34.7	36.9	06.75±0.13	04.12±0.15	05.94±0.10	
Intensive/stall feeding	36.4	36.8	45.4	37.4	19.75±0.42	21.44±0.30	21.33±0.80	
**Extensive/range	18.3	18.2	09.0	15.9	08.68±0.25	05.09±0.27	07.65±0.22	
***Semi-extensive	01.0	00.7	00.9	00.7	05.50±0.71	05.71±0.83	05.33±0.61	

\*=Animals can move within a circle in the field for grazing at day time; \*\*= Animals are grazed whole day at field;

\*\*\*=Animals are grazed certain period in a day (3-5 hrs per day)

**Table 8. Feeding status of roughage according to different seasons**

Type of roughage	% HHs fed their cattle	% of HHs supplied in different seasons			Amount of roughage supplied to animals in different season (kg/d/head)		
		Summer	Rainy	Winter	Summer	Rainy	Winter
Rice straw	86.9	97.8	100.0	93.0	5.22	5.49	5.50
Green grass (cut and carry)	66.3	74.5	72.5	66.5	9.20	10.57	7.16

The descriptive analysis of concentrate feeding according to different seasons in the year is shown in Table 9. It was found that concentrates fed by the farmers in the surveyed areas were mainly rice polish, wheat bran, broken rice and mustard oil cake. Rice polish was the most available concentrate feed ingredient fed by about 84% HHs. The seasonal variations of feeding concentrates were though negligible but somewhat higher in summer than those of rainy and winter seasons. In rainy season natural grasses are more available, thus farmers reduce the supply of concentrates for their cattle. However, in winter season it is reversible. But in that season why farmers supplied fewer amounts of concentrates than those of other seasons was not understood. The amounts of different concentrate feed ingredients in different seasons are given in Table 9. There were no significant variations of supplying concentrates to cattle among different farm category HHs, although concentrates supply is related with the financial ability of farmers for existing conventional livestock rearing system in our country. On the other hand, it was observed that the number of HHs and amount of concentrates supplied to the livestock varied among different AEZs. Rice polish and wheat bran were supplied to the cattle by most of the HHs but little bit higher in AEZ 23 (about 90 and 93% HHs, respectively). Highest of about 68% HHs in AEZ 19 provided mustard oil cake. On the other hand, few HHs used to feed broken rice to their cattle, but comparatively higher percentage of HHs (about 20%) in AEZ 13 fed broken rice to their cattle. The allocation of concentrate per animal per day was also varied in different AEZs which could be due to difference of financial ability in different regions. Bangladesh produces 2.73 million tons of concentrate feeds [14] and most of the feed is used for commercial poultry production in the country leaving native chicken and duck production on scavenging feeds.

Bhuiyan [15] reported that smallholder farmers maintain the majority of the animal adjunct to crop agriculture as having significant dependence on livestock which are generally

maintained on crop residues and other agricultural by-products. Rice straw is the basic feed item satisfying over 80% roughage needs throughout the country. Grazing animals on roadside, fallow land, riverbank or on lands from where crops has been harvested when available partially fulfilling the green roughage requirement. Rice polish, wheat or pulse bran etc. as concentrate sources are playing important role in livestock enterprises throughout the country in variable level.

#### 4.4 Fodder Production Status

As stated earlier in Table 4 that among surveyed HHs, 89% of them were cattle keeper. To find out the real picture about fodder cultivation status of those HHs in different coastal regions farmers were asked many questions during survey. Their answers of the questions are illustrated in Table 10.

Irrespective of regions, about 12% HHs cultivated fodder and 38% HHs had opportunity to cultivate fodder. Fodder cultivation varied among different coastal regions. In Satkhira about 54% HHs cultivated fodder, however there were some regions fodder was not cultivated at all. Few HHs cultivated fodder in different AEZs except AEZ 19, where no HHs was found to cultivate fodder. Fodder cultivation did not varied remarkably in different farm category HHs, but comparatively more cultivation was observed for large farm HHs (40%). Farmers were asked why they did not cultivate fodder in spite of having cattle. Most of them (67%) did not give appropriate answer due to their unconsciousness. About 20% of them said that land shortage was the major cause and 9% of them said the major cause for no training experienced by the farmers. Farmer's feeling on the major causes for not cultivate fodder was more or less same among different coastal regions, AEZs and farm category HHs. Farmers were further asked to know the constraints for fodder cultivation. About 89% of them replied nothing or in other words they actually had no idea about the problem of fodder cultivation.



However, 7% of them noticed about lack of demand. Islam et al. [4] in their study found the major constraint of fodder cultivation for shortage of land. Other constraints realized by them were lack of farmer's awareness, lack of technologies, geographical hazards etc. Though, fodder cultivation as a cash crop in our country is still not popular, farmers are not interested to take any risk to cultivate fodder instead of other popular cash crops for human consumption due to uncertainty of marketing. If farmers become motivated and fodder marketing may have popularity then farmers will be interested for mass cultivation of fodder.

In the survey of different coastal regions more than 75 different local names of indigenous green grasses, farmers fed animals conventionally were obtained. Islam et al. [4] studied the availability of forages in different AEZs of Bangladesh and reported 51 native

grasses in their study. Tareque and Khan [16] and Reza and Salim [17] in their studies identified and described about 52 species of herbaceous plants in 12 families. The higher number of native grass names found in this study might be due to multiple names of the same grass in different regions. Based on farmers' opinion best 10 local green grasses with their availability are given in Table 11. Among local green grasses, *Durba* is most common and popular available in every region. Islam et al. [4] studied on identification, screening and nutritive value of forages available throughout Bangladesh and identified more than fifty different type of local green grasses from different AEZs in Bangladesh among which most of those were same found in this study. They noticed that *baksha*, *lota*, *poa*, *khesari*, *beju*, *mati kalai*, *kolmi*, *gamma*, *badam*, *durba*, *chaila*, *helencha*, *shama* were mostly common and more potential native grasses.

**Table 9. Feeding status of concentrates in all Upazilas according to different seasons**

Type of concentrate	% HHs fed to cattle	% of HHs supply to animals in different seasons			Amount of feed ingredients supplied to animals in different season (kg/d/head)		
		Summer	Rainy	Winter	Summer	Rainy	Winter
Rice polish	82.2	92.5	85.1	83.5	1.23±0.03	1.23±0.03	1.22±0.03
Wheat bran	52.3	58.9	47.8	48.1	0.75±0.04	0.67±0.03	0.65±0.03
Broken rice	16.7	18.8	18.0	18.3	0.51±0.02	0.51±0.02	0.51±0.02
Mustard oil cake	25.2	28.4	26.9	26.7	0.41±0.03	0.41±0.03	0.40±0.03

**Table 10. Number of HHs cultivate fodder and opportunity to cultivate fodder according to different regions, AEZ and farmer's category**

Factor	Name	% HHs cultivate fodder	% HHs had opportunity to cultivate	Major causes not to cultivate fodder (%)			Constraints for fodder cultivation	
				No land	No training	No response	No demand	No response
District	Cox's bazaar	19.0	58.0	00.0	00.0	100.0	15.0	059.0
	Feni	00.0	09.1	00.0	00.0	100.0	33.3	064.6
	Khulna	00.0	33.3	00.0	00.0	100.0	01.1	069.7
	Satkhira	54.3	53.3	00.0	00.0	100.0	00.0	100.0
	Bagerhat	03.2	07.4	00.0	00.0	100.0	00.0	093.6
	Barishal	00.0	06.6	00.0	00.0	100.0	01.1	097.8
	Pirojpur	00.0	07.3	00.0	00.0	100.0	01.0	092.7
	Potuakhali	13.3	35.7	00.0	00.0	100.0	00.0	092.9
	Bhola	11.7	39.4	01.0	16.0	083.0	00.0	100.0
AEZ	Chittagong	11.5	17.3	00.0	00.0	100.0	17.3	075.0
	13	11.6	26.2	10.1	06.8	82.8	00.5	091.9
	19	00.0	09.1	08.1	00.0	83.8	33.3	064.6
Farm category	23	16.4	44.1	23.7	02.0	68.4	15.8	064.5
	Landless	09.9	19.4	02.3	00.2	097.5	07.8	85.7
	Marginal	11.9	30.6	00.0	00.9	099.1	06.4	84.7
	Small	11.3	38.1	00.0	00.0	100.0	02.1	82.5
	Medium	14.9	66.0	00.0	02.1	097.9	02.1	70.2
Overall	Large	40.0	80.0	00.0	00.0	100.0	10.0	60.0
		11.7	37.5	20.0	09.0	067.0	07.0	89.0

**Table 11. Best 10 local green grasses in different agro ecological zones available in different seasons**

Rank	Name (Scientific name)	% availability in different AEZ of Bangladesh			% availability in different seasons of the year			
		AEZ 13	AEZ 19	AEZ 23	Dry summer	Wet summer	Winter	All season
1	Durba ( <i>Cynodon dactylon</i> )	86.0	95.0	02.6	29.0	067.3	01.7	02.0
2	Dal ( <i>Sacrololepis indica</i> )	23.2	00.0	33.6	10.9	072.6	15.9	00.5
3	Jangra ( <i>Hemarthria protensa</i> )	15.5	00.0	00.0	03.4	095.6	00.0	01.0
4	Botol ( <i>Phragmites Karka</i> )	10.2	00.0	00.0	21.4	078.6	00.0	00.0
5	Swapna ( <i>Panicum sp.</i> )	09.0	00.0	00.0	01.2	079.5	00.0	18.3
6	Beju ( <i>Leersia hexanta</i> )	07.5	00.0	00.0	00.0	100.0	00.0	00.0
7	Kolmi ( <i>Murdania nodifllo</i> )	06.9	00.0	00.0	81.1	018.9	00.0	00.0
8	Lona ( <i>Guazuma ulmifolia</i> )	00.9	00.0	21.7	06.4	019.2	61.5	12.8
9	Chiringa	00.0	00.0	25.0	22.9	031.4	45.7	00.0
10	Shama ( <i>Panicum paludosum</i> )	03.6	00.0	09.2	04.3	087.0	08.7	00.0

Table 11 shows about the availability of best ten native grasses in different AEZs and seasons. Among best ten local grasses, only *Durba* was found in all AEZs, however comparatively found more in AEZ 19 followed by AEZ 13 and AEZ 23. *Dal*, *Lona* and *Shama* each of those were found in two AEZs. Other best native grasses like *Jangra*, *Bottle*, *Swapna*, *Beju* and *Kolmi* were found only in AEZ 13 and *Chiringa* in AEZ 23. Most of those native grasses are grown more in wet summer but *Kolmi*, *Lona* and *Chiringa* were grown more in dry summer and winter, respectively. Islam et al. [4] reported native grasses of *Durba*, *Dal*, *Bottle*, *Beju*, *Kolmi* and *Jangra* to be found in AEZ 13 which is in agreement with this study. The native grasses were available mostly in road side and river bank which agreed well by the study of Islam et al. [4]. Some grasses were also available in land divider (alley) in rural areas.

## 5. CONCLUSION

From the results, it was clear that although almost every rural farmer keep livestock but the scarcity of feeds, especially green forages and fodders are not sufficient due to dependency on natural green grasses which are mainly seasonal and not high yielding resulting poor performance of cattle. It was also found that scarcity of green

grasses were not solely due to shortage of land. Consciousness of necessity of green forages and fodders which are directly related to performance of livestock seems to be the major cause of this problem. From the results it should be concluded that mass fodder production need to be expanded by training and motivating farmers by demonstrating high yielding fodder crops throughout the country. Also promising germplasm of native green grasses should be considered for improvement of their biomass yield and nutritive values.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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