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Feeds and fodder dynamics in selected river basins of Bangladesh

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Abstract

A baseline survey was conducted with the objectives to determine seasonal availability, utilization of feeds and fodder resources and livestock production systems in different river basin areas and to identify the constraints of fodder production in selected river basins of Bangladesh. Based on cattle population, 2 upazilas from each of 10 districts were selected for household survey (HHS). A randomly selected 50 farmers from each upazila were considered for collecting information. After screening a total of 963 HHs were considered for statistical analyses. Results show that about 51%HHs were landless. Having an average population size of 3.3, about 99% HHs in the surveyed areas was keeping cattle, whereas, buffalo was not found in all regions which were found only in1.7% HHs with an average population size of 2.31 per buffalo keeper HH. Sheep was found only in about 1% HHs with an overall number of 3.22 per sheep keeper HH. About 16% HHs were keeping goats with an average size of 2.9 per sheep keeper HH. Significant differences on performance potentials were found both in native and crossbred cows among different regions. It was observed that all types of farm categories HHs reared cattle and most of them reared by tethering (around 23%) and free grazing (around 22%) management systems but semi-grazing was followed by around 14% HHs. Rest of the farmers followed different combinations of methods. Rice straw and naturally grown green grasses were the main roughages for feeding their cattle. About 95% HHs fed rice straw and about 81% HHs fed cut and carry green grass to their cattle. There were no seasonal variations on feeding rice straw but variations occurred for supplying cut and carry green grasses. Concentrates provided to animals in the surveyed areas were mainly rice polish, wheat bran, broken rice, pulse bran and mustard oil cake, among which rice polish and wheat bran were supplied by more HHs (about 93% and 75%, respectively). The variations of supplying concentrates among seasons were very negligible. Although, there were about 1.14% HHs who cultivated some fodder crops, they harvest grains for human consumption and residues for their cattle. However, high yielding varieties of fodders are very rarely cultivated by the farmers for feeding cattle in the riverside regions. The reason not to cultivate fodder and main constraint behind it was not accurately mentioned by the farmers. In the survey among different riverside regions, about48 different native green fodders were obtained in different agro-ecological zones, among which most available native green fodders were *Durba, Badla, Kawn, Shama, Khesari, Gamma, Ura, Gobra, Shama* and *Maskalai*. Most of the native grasses are grown more in summer and some others like *Kawn, Khesari* and *Maskalai* are grown in winter. Finally, it may be concluded that extensive fodder cultivation program by motivating farmers through training and demonstrating high yielding fodder crops are essential in the riverside regions for increasing productivity of livestock in the respective areas.

Key words: fodder, forages, seasonal availability, native grasses, feeding system

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Introduction

The acute shortage of feeds and fodder is one of the most important obstacles to livestock development in Bangladesh. Ruminants are mostly thriving on naturally grown grasses, various crop residues like straws, stovers, stalks and cereal by-products. Naturally grown green grasses are mostly available in the fallow land, playground and waysides which are major sources of green forages for ruminants in Bangladesh (Islam *et al.,* 2002). However, natural pasture availability, biomass productivity and quality vary according to seasons and annual rainfalls. This cannot fulfill the adequate plane of nutrition to the animals. According to Sere *et al.,* (2008) inadequate livestock nutrition is a common problem in the developing world, and a major factor affecting the development of viable livestock industries in poor countries. In livestock farming, optimum production may not be achieved without ensuring abundant supply of feeds and fodder to the animals. Zaharaby *et al.*, (2002) reported that, feeds and fodder are considered as the biggest problem for obtaining optimum return from livestock and their development in the country. According to a previous study, only

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about 44% of the dry matter, 26% of the crude protein and 17% of the energy requirements are met by the available feed resources in the country (Saadullah, 1995). According to a published report the average availability of green grass is only 2.5 kg/h/day (Sarker *et al.,* 2016). The demand and supply gaps of feeds and fodders (Huque and Sarker, 2014) and seasonal and regional variations in biomass availability (Huque and Sarker 2014) often limit ruminant production and productivity in many developing countries including Bangladesh. The nutritive values of the local indigenous grasses were reported earlier by Amin and Alam (1991) and Islam and Alam (1996).In Bangladesh, plenty of information on seasonal feeds and fodder dynamics are very scanty. Thus, the present study was carried out with the objectives to collect the information on feeds and fodder availability, utilization, production potentials of existing cattle resources, constraints to production of feeds and forages as well as to identify the opportunities for development of smallholder livestock production in the river basin areas of the country. 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 river side areas of Bangladesh.

Materials and Methods

The present study was conducted in 10 river basin districts of Bangladesh (Rajshahi, Bogra, Kurigram, Lalmonirhat, Faridpur, Kushtia, Jamalpur, Tangail, Munshiganj and Chandpur). From each district, 2 (two) upazillas were selected on the basis of livestock density. Fifty farmers (50) in each upazilla were selected randomly and data were collected by direct interviewing from the respondents in the respective households. After screening, a total of 963 households from 20 upazilas were considered under this study which covered seven agro-ecological zones (AEZs) of Bangladesh namely AEZ 1 (Old Himalayan Piedmont Plain and Tista Floodplain included the districts of Dinajpur, Panchagar,Thakurgaon, Rangpur, Gaibandah, Nilphamari, Kurigram and Lalmonirhat), AEZ 4 (Karatoya Floodplain and Atrai Basin included the district of Rajshahi, Nawabgonj, Naogaon, Natore, Bogra and Joypurhat), AEZ 7 (Brahmaputra- Jamuna Floodplain included the districts of Jamalpur, Sherpur,Tangail, Mymensingh, Kishoregonj and Netrakona), AEZ 11 (High Ganges River Floodplain included the districts of Pabna, Sirajgonj, Jessore, Jhenaidah, Magura, Narail, Kustia, Meherpur and Chuadanga), AEZ 12 (Low Ganges River Floodplain included the districts of Faridpur, Rajbari, Gopalgonj, Madharipur and Shariatpur), AEZ 15 (Arial Bil included the districts of Dhaka, Gazipur, Manikgonj, Munshigonj, Narayangonj and Narshingdi) and AEZ 30 (Akhaura Terrace included the districts of Comilla, Chandpur and Brahmanbaria). Prior to final survey, field visits were made to each district and secondary information relevant to the study was collected from all possible sources focusing on types of major feed resources, their utilization, seasonal availability and management and associated constraints in relation to livestock production in the respective areas. The information was gathered through the above process summarized and used as a basis to design a well-structural questionnaire to quantify the most important parts of the study and households were taken as a unit of analysis. Before conducting the formal survey, the structural questionnaire was also pre-tested by interviewing some households and subsequently corrections and refinement were made based on the observations. Data were collected with the help of some trained enumerators under the close supervision of BLRI scientists. A stratified random sampling technique was followed to select sampling units. The collected household's data were summarized according to fixed variables as farm category viz. landless (having 0 to 49 decimals of land), marginal (having 50-125 decimals of land), small (having 126-249 decimals of land), medium (having 250-749 decimals of land) and large (having more than 750 decimals of land), AEZ, season and district and analyzed statistically with SPSS, version 17.0.

Results and Discussion

Socio-economic status of the households

Table 1 shows that almost all households had their own homestead land, but most of the HHs (about 51%) were landless, however, only<1% of them were large farmers (Table 2). Besides, HHs utilized their lands for different purposes like cereal crop cultivation, vegetable and fruit garden, pond, fodder cultivation etc. Only 1.14% HHs cultivated fodders and 0.73% HHs let their land as abandoned. Other farm categories with land utilization are given in Table 1.

Table 1. Land utilization under different type crops according to farm categories

Type of land	Amount of land (decimal) occupied (mean±SE) by different farm category households					
	Landless	**Marginal**	**Small**	**Medium**	**Large**	**Overall**
Homestead	6.7±0.18 (99.6)	10.5±0.54 (100)	12.5±3.0 3 (100)	13.5±1.69 (100)	6.5±1.50 (100)	9.09±0.25 (99.8)
Cropland	25.0±1.2 8 (27.9)	72.9±1.57 (96.8)	160.5±3. 15 (95.6)	320.9±13.27 (100)	363.0±132.0 (100)	112.3±4.0 7 (61.9)
Fodder	14.5±11. 5 (0.41)	37.7±31.2 3 (01.2)	3.0±0.0 (0.63)	15.4±5.99 (07.7)	-	20.2±8.65 (01.14)
*Garden	4.5±0.39 (26.7)	6.8±0.94 (28.0)	9.8±1.38 (31.45)	11.0±1.41 (49.23)	2.0±0.0 (50.0)	6.7±0.44 (29.39)
Pond	3.04±0.3 0 (07.19)	6.2±1.75 (10.0)	8.4±1.97 (07.55)	22.2±14.29 (15.38)	-	7.1±1.89 (08.52)
Abandoned	-	6.0±4.0 (0.8)	-	34.0±18.0 (3.08)	660.0±0 (50.0)	110.0±91. 87 (0.73)
Overall mean	15.2±0.6 9 (50.6)	84.3±1.59 (26.0)	169.7±3. 90 (16.5)	345.3±12.49 (6.7)	700.5±195.5 (0.2)	

*Fruit, flower, vegetable etc. Figures in the parenthesis indicate % of households' occupied land used for different purpose

The highest landless HHs were found in AEZ 11 (84%) and lowest in AEZ 30 (26%). It was found that about 43% HHs had ≤4 family members, 41% had 5-6members and 16% had ≥7 members with an overall family size of 5.0. According to BBS (2011) the same figures are 31.6%, 35.2%, 33.2% and 4.8, respectively. About 73%of them were literate (at least able to sign). The literacy rate was the lowest (35%) in landless farmers and the highest (100%) in large farmers with the positive trend between land holding and literacy. The highest literacy was found in AEZ 15 (99%) followed by AEZ 30 (97%), AEZ 12 (85%), AEZ 11 (84%), AEZ 7 (80.0%), AEZ 4 (79.0%) and AEZ 1 (77.0%). The availability of different livestock population varied among different river basin regions of Bangladesh. The percentages of households who kept cattle did not varied much. Buffalo was not found in every region which was found only in 1.7% HHs with an average population size of 2.3 per buffalo keeper HH. The scenario of sheep availability was same as buffalo which was found only in 0.9% HHs with an overall number of 3.22 per sheep keeper HH. However, about 16.4% HHs were keeping goats with an average size of 2.9 per goat keeper HH. The current livestock population dynamics in different river basin areas are given in Table 3.

Different districts and agro-ecological zones were not significant predictors for availability of cows rearing, although there were some variations for number of population per cattle keeper household. The highest cattle population (per keeper HH) was seen in Bogra (4.28) and in AEZ 4 (3.96) and lowest in Kushtia (2.48) and in AEZ 11 (2.48). The highest buffalo rearing farmers were observed in Bogra (8.0% HHs) and in AEZ 4 (6.5% HHs), while goat in Rajshahi (68% HHs) and in AEZ 4 (38% HHs) and sheep in Jamalpur (6% HHs) and in AEZ 7 (4.0% HHs) among the selected river basin areas of Bangladesh. The availability and population density of different livestock in different surveyed districts and AEZs are given in Table 3 & 4. As, it was found that irrespective of areas almost all HHs reared cattle, there were no variation among different farm category HHs, which means that all type of farmers equally kept cattle, but numbers of cattle per cattle keeper HH were little bit differ due to their financial capability and availability of resources. Landless and marginal farmers had comparatively less number of cattle population than those of small farmers; however medium farmers had highest number of population than those of others. The availability and population size of buffaloes were found higher in large farm HHs (50% and 3.0, respectively).

Table 2. Farm categories according to different agro-ecological zones

AEZ	Frequency of type of farmers					
	Landless	**Marginal**	**Small**	**Medium**	**Large**	**Overall**
AEZ 1	97 (49.7)	57 (29.2)	31 (15.9)	10 (5.1)	0 (0.0)	195 (100)
AEZ 4	144 (72.4)	31 (15.6)	17 (8.5)	6 (3.0)	1 (0.5)	199 (100)
AEZ 7	59 (31.1)	61 (32.1)	44 (23.2)	26 (13.7)	0 (0.0)	190 (100)
AEZ 11	82 (83.7)	12 (12.2)	3 (3.1)	1 (1.0)	0 (0.0)	98 (100)
AEZ 12	51 (52.6)	17 (17.5)	20 (20.6)	8 (8.2)	1 (1.0)	97 (100)
AEZ 15	30 (33.0)	31 (34.1)	24 (26.4)	6 (6.6)	0 (0.0)	91 (100)
AEZ 30	24 (25.8)	41 (44.1)	20 (21.5)	8 (8.6)	0 (0.0)	93 (100)
Overall mean	487 (50.6)	250 (26.0)	159 (16.5)	65 (6.7)	2 (0.2)	963 (100)

Figures in the parenthesis are percent value

Table 3. Household livestock status and population size in the different riverside districts in Bangladesh

District	**Livestock population (mean±SE) in different river basin districts**			
	Cattle	**Buffalo**	**Goat**	**Sheep**
Rajshahi	3.65±0.15 (100)	1.60±0.40 (5.1)	2.87±0.15 (67.7)	-
Faridpur	3.08±0.14 (100)	3.00±0.0 (1.0)	2.41±0.21 (29.9)	-
Tangail	2.77±0.12 (100)	-	3.29±0.65 (14.7)	4.50±0.50 (2.1)
Jamalpur	3.53±0.23 (100)	-	2.24±0.15 (22.1)	3.00±0.52 (6.3)
Bogra	4.28±0.76 (97.0)	2.88±0.83 (8.0)	2.75±0.70 (8.0)	-
Kurigram	3.18±0.27 (100)	-	8.00±3.00 (2.1)	-
Kustia	2.48±0.18 (94.9)	1.50±0.50 (2.0)	5.30±1.26 (10.2)	-
Lalmonirhat	3.36±0.18 (100)	-	-	-
Munshiganj	3.69±0.18 (100)	-	-	-
Chandpur	2.87±0.11 (98.9)	-	1.71±0.42 (7.5)	2.00±0.0 (1.1)
Overall	3.29±0.10 (99.1)	2.31±0.45 (1.7)	2.90±0.15 (16.4)	3.22±0.43 (0.9)

#Figures in the parenthesis indicate % of households kept livestock species.

Table 4. Average number of livestock per household according to selected AEZs

AEZ	**Livestock population (mean±SE) in different river basin districts**			
	Cattle	**Buffalo**	**Goat**	**Sheep**
AEZ-1	3.27±0.16 (100)	-	8.00±3.00 (1.0)	-
AEZ-4	3.96±0.38 (98.5)	2.38±0.55 (6.5)	2.85±0.15 (37.7)	-
AEZ-7	3.15±0.13 (100)	-	2.66±0.28 (18.4)	3.38±0.46 (4.2)
AEZ-11	2.48±0.18 (94.9)	1.50±0.50 (2.0)	5.30±1.26 (10.2)	-
AEZ-12	3.08±0.14 (100)	3.00±0.0 (1.0)	2.41±0.21 (29.9)	-
AEZ-15	3.69±0.18 (100)	-	-	-
AEZ-30	2.87±0.11 (98.9)	-	1.71±0.42 (7.5)	2.00±0.0 (1.1)
Overall	3.29±0.10 (99.1)	2.31±0.45 (1.7)	2.90±0.15 (16.4)	3.22±0.43 (0.9)

#Figures in the parenthesis indicate % of households kept livestock species

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

Farm category	**Livestock population (mean±SE) in different river basin districts**			
	Cattle	**Buffalo**	**Goat**	**Sheep**
Landless	3.21±0.16 (98.2)	2.36±0.58 (2.3)	2.92±0.20 (18.1)	3.50±1.50 (0.4)
Marginal	3.03±0.08 (100)	1.00±0.0 (0.8)	2.89±0.31 (14.4)	3.50±1.50 (0.8)
Small	3.60±0.22 (100)	3.00±2.00 (1.3)	2.95±0.56 (12.6)	2.75±0.48 (2.5)
Medium	4.20±0.36 (100)	-	2.71±0.32 (21.5)	4.00±0.0 (1.5)
Large	2.50±1.50 (100)	3.00±0.0 (50.0)	-	-
Overall	3.29±0.10 (99.1)	2.31±0.45 (1.7)	2.90±0.15 (16.4)	3.22±0.43 (0.9)

#Figures in the parenthesis indicate % of households kept livestock species

In case of goat, more goats were available in medium farm HHs (22%), but population size per goat keeper HH was found the highest (2.95) in small farm HH. The highest number sheep was observed in small farm HH (2.5% HH) and number of sheep population per sheep keeper HH was the highest (4.0) in medium HH. Table 5, shows the availability and population of different livestock under different types of farmer category. Saadullah and Hossain (2000) reported number of large ruminant (cattle and buffalo) per household to be 2.0, 2.9, 3.7, 4.4 and 3.5, respectively for landless, small, medium, large and all category farm households which mostly agrees with this study.

Out of 963 surveyed HHs, a total of 954 HHs reared cattle among which only 17% of them kept crossbred dairy cows and 62% kept indigenous local cows. The performance potentials of crossbred cows were significantly better than those of local indigenous cows, but, interestingly, significant variations of production performance among different districts were seen within both types of cattle, which could be due to availability and supply of green grasses and different management systems provided by the farmers. Production performance of local and crossbred cows in different riverside districts is given details in Table 6. The production performances observed in this study both in native and crossbred cattle in rural farm condition are in general agreement with Khan *et al.* (2001) 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. Rahman *et al.* (2017) found an average daily milk yield of 1.83 kg for local indigenous cattle in saline prone areas which is in agreement with this study, but they got higher milk yield for crossbred cattle (12.06±1.19 kg) in their study. Table 6, also shows that the highest milk production per head/day (11.5±1.85) was observed in crossbred dairy cows under Kurigram district and the lowest in Chandpur district with an overall average of 6.18±0.20 kg /h/day. This higher milk production in dairy cows under Kurigram district may be due to the better feeding and management practices followed by the farmers. Similarly, the highest production in indigenous cows was observed in Faridpur district and the lowest in Lalmonirhat district which may be due to the better indigenous cows and better improved management compared to Lalmonirhat district.

Table 6. Production system of cattle around the year according to different seasons

Different production system	Duration per day (hours)			% of HHs followed the systems in different seasons		
	Summer	Rainy	Winter	Summer	Rainy	Winter
Tethering	06.54±0.11	05.17±0.07	06.90±0.14	23.46	23.46	23.15
Extensive/grazing	07.86±0.47	08.32±0.45	08.02±0.48	22.53	22.74	22.22
Semi-extensive	03.13±0.17	03.13±0.15	03.21±0.17	13.70	14.33	13.29

Table 7. Availability of roughages to animals under different seasons

Type of roughage	% HHs fed their cattle	Amount of roughage supplied to animals in different season (kg/d/head)			% of HHs supplied in different seasons		
		Summer		Winter	Summer		Winter
		Dry	Wet		Dry	Wet	
Rice straw	95.15	3.63±0.06	4.08±0.08	3.94±0.07	95.33	94.50	95.64
Green grass (cut and carry)	80.69	10.05±0.25	11.45±0.29	9.47±0.21	80.06	78.30	83.72

Livestock production and rearing systems

In the surveyed areas, farmers mainly reared their cattle by the systems of extensive (by tethering or open grazing) and semi-extensive. Table 7 shows in details about the seasonal variations of management systems followed by the farmers. Tethering system is followed during the season when main crops remain in the field and varied duration in different seasons. About 23% HHs allowed their cattle to graze in the grass land from 5-7 hours in a day by tethering system and same percent HHs followed extensive method. Semi-extensive method was followed by around 15% HHs and rest of them followed more than single method.

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 grass were the main roughages for feeding their cattle. About 95% HHs fed rice straw and about 81% HHs fed cut and carry green grass to their cattle. Saadullah and Hossain (2000) in a survey reported feeding of rice straw to an amount of 1.4 to 2.4 kg/head/day which is comparatively lower than this study. Although, scarcity of local green grasses are seen in winter, but farmers try to avail roughages round the year. The amounts of rice straw and green grasses in different seasons are given in Table 8. There seems no variation of supplying roughages to cattle for different seasons. In contrast, Herman (1984) reported seasonal effects on the type and quantity of feed offered to livestock.

The feeding of concentrate 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, pulse bran, broken rice and mustard oil cake. Rice polish was the most available concentrate feed ingredients fed by about 93% HHs. The seasonal variation of feeding concentrates was not too much considerable, although in dry summer season concentrates were supplied little bit more than wet summer season. In wet summer season, natural grasses are more available, thus farmers reduce the supply of concentrates for their cattle. Farmers also supply little bit more concentrates in winter seasons due to minimize the shortage of green grass. The amounts of different concentrate feed ingredients supplied to the animals in different seasons are given in Table 9 which seems no variation among seasons. In contrast, Herman (1984) reported seasonal effects on the type and quantity of feed offered to livestock.

Table 8. Availability of roughages to animals under different seasons

Type of roughage	**% HHs fed their cattle**	**Amount of roughage supplied to animals in different season (kg/d/head)**			**% of HHs supplied in different seasons**		
		Summer		**Winter**	**Summer**		Winter
		Dry	**Wet**		**Dry**	**Wet**	
Rice straw	95.15	3.63±0.06	4.08±0.08	3.94±0.07	95.33	94.50	95.64
Green grass (cut and carry)	80.69	10.05±0.25	11.45±0.29	9.47±0.21	80.06	78.30	83.72

Table 9. Seasonal variations of concentrate feed supply to animals

Type of concentrate	**% HHs fed to cattle**	**Amount of feed ingredients supplied to animals in different season (kg/d/head)**			**% of HHs supply to animals in different seasons**		
		Summer		**Winter**	**Summer**		Winter
		Dry	**Wet**		**Dry**	**Wet**	
Rice polish	92.93	1.47±0.03	1.49±0.03	1.57±0.04	93.77	91.28	93.67
Wheat bran	74.84	0.88±0.03	1.05±0.04	0.92±0.03	77.47	69.37	77.67
Pulse bran	3.50	0.46±0.03	0.25±0.00	0.74±0.18	7.27	0.62	2.60
Broken rice	50.22	0.49±0.01	0.55±0.02	0.51±0.01	52.54	46.42	51.71
Mustard oil cake	11.25	0.29±0.02	0.31±0.02	0.33±0.02	12.05	9.87	11.84

Table 10. List of most available natural grasses under different areas

*Rank	Local name	Taxonomical name	Regions where available	
			AEZ	Districts
1	*Durba*	*Cynodom dactylon*	1, 4, 7, 12	Most of the surveyed areas
2	*Badla*	*Cyperu srotundus*	4, 7, 12	Rajshahi, Faridpur, Tangail, Jamalpur
3	*Kawn*	*Setariaitalica*	1, 11	Kushtia, Kurigram,
4	*Shama*	*Echinochloacolonum*	4, 12	Rajshahi, Faridpur, Jamalpur, Kushtia
5	*Khesari*	*Lathyrus sativus*	1, 7	Jamalpur, Kushtia, Kurigram
6	*Gamma*	*Tripsacum dactyloides*	7, 12	Faridpur, Tangail, Jamalpur, Kushtia
7	*Ura*	*Imperatacylindrica*	12	Faridpur, Kurigram
8	*Gobra*	*Paspalumcomersoni*	1, 4, 7	Jamalpur, Bogra, Kurigram
9	*Hama*	*Echinochloacolonum*	12	Faridpur, Tangail, Kurigram
10	*Maskalai*	*Vignamungo*	7, 12	Faridpur, Jamalpur

*Rank based on availability

Table 11. Availability of local natural grasses under different (AEZs)

Rank	Local name	#Matrix of availability in different AEZs of Bangladesh				
		AEZ 1	AEZ 4	AEZ 7	AEZ 11	AEZ 12
1	*Durba*	*	**	***	-	***
2	*Badla*	-	*	**	-	*
3	*Kawn*	**	-	-	*	-
4	*Shama*	-	**	-	-	*
5	*Khesari*	*	-	**	-	-
6	*Gamma*	-	-	**	-	*
7	*Ura*	-	-	-	-	**
8	*Gobra*	*	*	*	-	-
9	*Hama*	-	-	-	-	**
10	*Maskalai*	-	-	*	-	*

#Matrix based on %HHs ment

Table 12. Availability of local natural grasses in different seasons

Rank	Local Name	Matrix ofavailability in different seasons of the year			
		Dry summer	Wet summer	Winter	All season
1	*Durba*	***	*	-	*
2	*Badla*	***	-	-	*
3	*Kawn*	*	-	***	*
4	*Shama*	***	*	-	*
5	*Khesari*	*	-	***	-
6	*Gamma*	***	-	-	-
7	*Ura*	***	-	-	-
8	*Gobra*	***	-	-	-
9	*Hama*	***	-	-	-
10	*Maskalai*	-	-	***	-

#Matrix based on %HHs mentioned the name of season when local grasses grown more; ***means more available; **medium and *less available

Fodder production status

Among 963 surveyed HHs, there were only 11 households (1.14%) who cultivated indigenous fodder (like *khesari* and *maskalai*) in their lands. But, among them only one household was found who cultivated high yielding fodder. Based on observation, about 48 different types of indigenous grasses were available in the river basin areas under this studied. Islam *et al.* (2002) studied the availability of forages in different AEZs of Bangladesh and reported 51

native grasses in their study. Tareque and Khan (1986) and Reza and Salim (1992) in their studies identified and described about 52 different species of grasses under 12 families. Rahman *et al.* (2016) reported about 40 native grasses in saline, drought and flood areas in which some are common with our findings. Based on much availability, best 10 local green grasses with their availability are given in Table 10. Among local green grasses, *Durba* was the most common and popular grass available in every areas and grown in all seasons which also agreed well by Rahman *et al.* (2016). Islam *et al.,* (2002) 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 some of those were same as found in this study.

Table 11 shows the matrix of availability of top ten native grasses in different AEZs. *Durba, Badla* and *Gobra* were found in several AEZs, but comparatively more available in AEZ 7 for first two and in AEZ 1 for last one. Islam *et al.* (2002) reported native grass of *Durba* to be found in several AEZs which is in agreement with this study. *Shama* was found in AEZ 4 and AEZ 12, *Khesari* in AEZ 1 and AEZ 7 and *Gamma* and *Maskalai* in AEZ 7 and AEZ 12. Islam *et al.* (2002) reported the same grasses to be available in several AEZs in Bangladesh. They noticed that *baksha, lota, poa, khesari, beju, matikalai, kolmi, gamma, badam, durba, chailla, helenvha, shama* were mostly common and more potential native grasses. Rahman *et al.* (2016) noticed *Durba*, *Nona Shapna* (*Panicum sp.*), *Katha Shak*, *Ghimee Shak*, *Baksha*, *Mutha* (*Cyperus rotunda*), *Katla*, *Jaona*, *Shanchi*, *Kolmi*, *Shanti*, *Arail* (*Leersia hexanta*), *Gesha*, *Kochuripana* (*Eichhornia crassipes*) etc. to be most potential native grasses in different agro-ecological regions of Bangladesh.

Table 12 shows the matrix of availability of top ten native grasses in different seasons which shows that most of the native grasses are more available in dry summer (March-June), while some grasses are available in all seasons like *Durba, Badla, Kawn and Shama*. Some fodders are more available in winter like *Kawn, Khesari and Maskalai*. Very scanty literatures on seasonal availability of local grasses in different regions of Bangladesh are available. Saadullah and Hossain (2000) in their study reported most of the green grass to be available from April to September (summer) and November to January (winter) at all locations, which agreed well by this study.

Conclusion

The study reveals that almostall households have cattle, but most of their cattle depend on low quality roughages like straw and locally available natural grasses to fill their stomach which cannot fulfill the actual nutrient requirements of the animals. Further, it also noted that a very few farmers in the studied locations cultivated high yielding fodders which is not only due to shortage of land, but also due to lack of knowledge about high yielding fodder cultivation. Therefore, it may be concluded that large scale fodder production technology needs to be expanded through training and motivation of farmers by demonstrating high yielding fodder cultivation techniques suitable in the river basin of Banglad

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