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Article

Existing buffalo husbandry practices at household farming level in selected coastal regions of Bangladesh

Md. Enayet Kabir[1,2,*], Mohammad Moniruzzaman Monir[2], Md. Saiful Islam[1], Md. Jahangir Alam[1] and Falguni Dadok[1]

[1]Department of Animal Production and Management, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh
[2]Department of General Animal Science and Animal Nutrition, Patuakhali Science and Technology University, Babugonj, Barisal-8210, Bangladesh

[*]Corresponding author: Md. Enayet Kabir, Department of Animal Production and Management, Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh. Phone: +8801737308125; E-mail: enayet_apma@sau.edu.bd

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Abstract: The study was attempted to collect information on buffalo husbandry practices existing in household farming level along with farmers' status and problems they faced with probable solutions in selected coastal regions of Bangladesh. Data were collected from eighty (80) randomly interviewed household farmers of two coastal districts (Bhola and Patuakhali) through questionnaire from 1st January to 30th June 2019. Buffalo rearing was practiced by male farmers (85%) in age group of 31-45 yrs (47.5%) having primary level education (51.25%) and belonged to small category of farmers (52.5%) whose main occupation is agriculture (76.25%). About 82.5% farmers used own capital while 96.25% farmers practiced buffalo rearing without any training. Majority (80%) of the farmers had small herd size (<6) where highest number (91.25%) of farmers kept female buffaloes. About three-forth farmers (77.5%) did not care for housing of their buffaloes. Among the sheds provided mainly at night (85%), most of them had tinned roof (91.25%), muddy floor (97.5%), inadequate floor space (70%) and improper drainage system (65%). Maximum farmers (90%) practiced grazing their buffaloes from morning to evening at public land and offered locally collected natural roughages at night but did not practice concentrate feeding. No farmers accepted any feeding technology, used vitamin-mineral supplements or growth promoters and followed balanced ration feeding to buffaloes. Clean drinking water supply (3.75%) was very poor practice although farmers had opportunity. Natural breeding (85%) was more prominent practice and buffaloes mainly showed heat in winter. About 45% and 60% farmers practiced irregular vaccination and de-worming, respectively. Feeds shortage is the most common problem along with others where attention is needed. The overall observations indicated that scientific management practices to exploit inherent capacity of buffaloes were not adopted by farmers and hence, management practices were not satisfactory and need to be corrected through motivation and providing extension services among farmers.

Keywords: socio-economic status; household farming, management practices, buffalo, coastal region

1. Introduction

Agricultural economy is the backbone of Bangladesh where livestock plays a pivotal role. Buffalo (*Bubalus bubalis*), also known as 'Asian Animal', is an important livestock species in many tropical and subtropical countries (Suhail *et al*., 2009) and plays a significant contribution in the rural economy providing milk, meat and draught power (Ghaffar *et al*., 1991). Among the domesticated animals, Asian buffalo holds the greatest promise and potential for production (Cockrill, 1994). In Bangladesh, the total buffalo populations are 14.85 million heads (BER, 2018). Of the total buffalo population of the country about 42.8%, 39.9% and 11.8% buffaloes are found in the sugarcane belt, coastal areas and marshy land, respectively (Faruque *et al*., 1990). The contribution of buffalo in total milk and meat production in Bangladesh is only 2.0% and 0.94%, respectively (DLS, 2015). Although buffalo farming is popular in South-East Asia and South Asia (Banerjee, 2018), it is a

neglected species and did not receive the proper attention from the policy makers and the researchers in accordance with its merits in Bangladesh. Farmers especially women could improve their livelihood through buffalo rearing and it could be a crucial pathway for poverty alleviation of rural people (Kalash *et al*., 2009; Sarkar *et al*., 2013; Amin *et al*., 2015).

In fact, buffalo is highly productive due to higher production potential, better capability of utilizing poor quality roughages, natural disease resistance power and well adaptability to all climatic hazards prevalent in Bangladesh especially in coastal areas. Due to geographical location, availability of grazing areas, favorable weather, and lack of employment opportunities, people of southern coastal region of the country are seen engaged in buffalo rearing extensively. The people of this region rear buffaloes in their households and also collectively by following the *bathan* (free range) system. These types of buffalo farming are not so beneficial for many reasons and the factors responsible need greater attention. However, given the genetic potential of buffalo, its production potential depends mostly on the management practices under which they are reared. Adoption of scientific management practices ensure increased productivity. A better understanding of existing buffalo husbandry practices of coastal regions is necessary to identify the SWOT (Strengths, Weaknesses, Opportunities, and Threats) of the rearing systems and to formulate appropriate intervention policies.

In Bangladesh, buffalo production system varies widely based on climate, soil, management practices and feeding systems (Saadullah, 2012; Rahman *et al*., 2018). Buffaloes are managed in household subsistence farming in the villages as well as extensive free range (*bathan*) farming in saline coastal region (Huque and Borghese, 2013). Besides, buffaloes reared under low-input and medium-input production system in Bangladesh are 90% and 10%, respectively (DLS, 2013). Several reports have been published regarding farmers' status and management systems of buffaloes (Faruque and Amin, 1995; Sarkar *et al*., 2013; Amin *et al*., 2015; Hasan *et al*., 2016; Uddin *et al*., 2016) in various regions of Bangladesh. Although the coastal areas are buffalo concentrated belt in Bangladesh, a very few efforts have been made to study the buffalo management practices and problems in that areas of Bangladesh. In order to develop buffalo production at household level in coastal regions of Bangladesh, it would be worthy to know details about existing buffalo management systems followed in household farming. Therefore, the present study was undertaken to obtain first-hand information on the existing buffalo husbandry practices followed by the buffalo keepers under household farming system and to find out the constraints along with possible solutions for buffalo development in coastal areas. The information obtained from this study could serve as a basis for adopting feasible and relevant scientific husbandry practices for buffalo development in the coastal areas.

2. Materials and Methods

2.1. Study area and farmers' selection

The study was conducted in four upazilas of two coastal districts named Bhola Sadar and Burhanuddin upazila of Bhola district, and Dashmina and Bauphal upazila of Patuakhali district of Bangladesh (Figure 1). The investigators contacted with the government animal husbandry and veterinary officers of the selected upazilas to gather information regarding pockets of household buffalo farming in the areas under their respective jurisdiction. The buffalo farmers so identified were also approached for help in locating other farmers in their locality. Having compiled a list of buffalo farmers in each upazila, the survey respondents having at least two buffaloes were selected for the purpose of the study. A total of 80 farmers (20 from each upazila) of household farming were selected adopting PPRS (Proportional Probability Random Sampling) technique of Lahiri (Snedecor and Cochrane, 1989).

2.2. Development of interview schedule and data collection

An interview schedule was carefully prepared that contained both open and closed form of structured questions keeping in mind the objectives of the study. The draft interview schedule was pre-tested in the field among some buffalo keepers and modified accordingly before final data collection. Before interviewing, the objectives of the study were explained clearly to the respondents and convinced to provide as much as accurate information. The questions were asked in a very simple manner with explanation wherever necessary. Data were collected during the period of 1st January to 30th June 2019 through face to face interviewing with the owners and observations were also applied.

2.3. Statistical analysis of data

All the data collected were checked and cross checked before transferring to master sheets. The data was analyzed with the help of SPSS-v-16 computer package program.

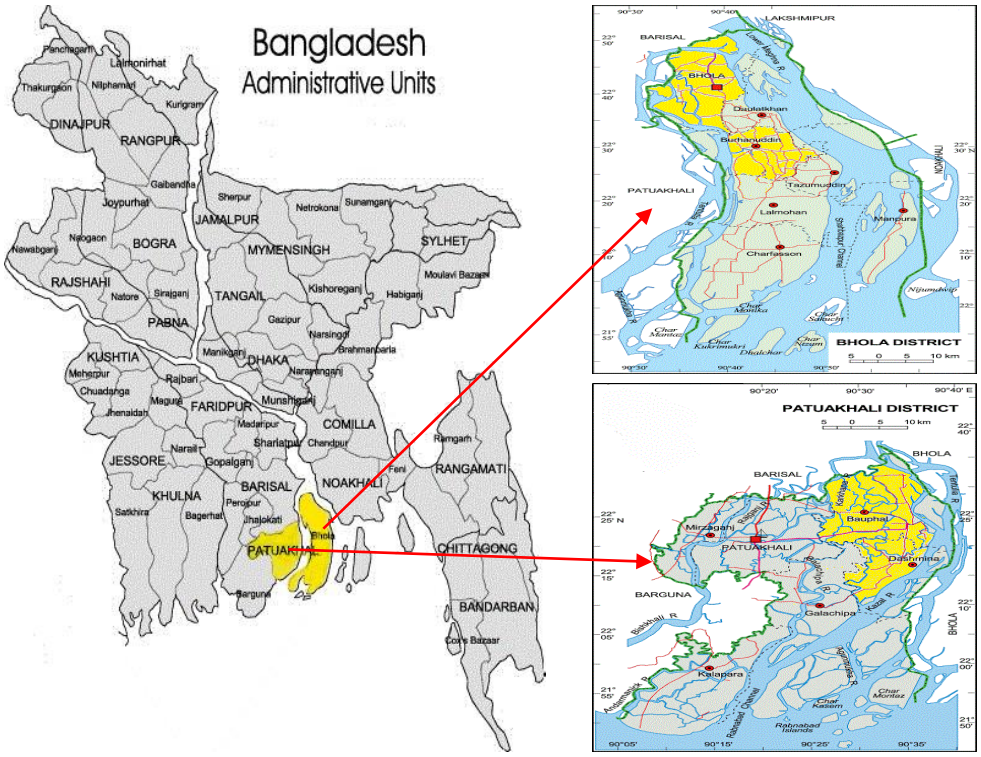

Figure 1. Location map of the study area.

3. Results and Discussion

3.1. Socio-economic status of the farmers

Buffalo farming was a subsidiary source of income for almost all the farmers. People from all strata of the society, irrespective of religion, household size, education, occupation and economic background were involved. Of the eighty (80) respondents, more than three-forth (85%) were male in age group of 31-45 years (47.5%) followed by 46-60 years, up to 30 years, and above 60 years, respectively. About 72.5% farmers' household size was more than five, half (51.25 %) of the farmers had primary level education. About half of the farmers (52.5%) belonged to small category (0.50-2.49 acres land) of farmers. Majority of the respondents (76.25%) were engaged in agriculture including rearing other livestock (Table 1). All farmers had gained their knowledge and experience of buffalo rearing from their family predecessors and/or neighboring buffalo farmers, and a few of them (3.75%) attended training on buffalo management practices. Earlier surveys (Islam *et al*., 2017) had shown that the highest percent of buffalo farmers were in age group 31-45 years, engaged in agriculture and average family size was 6.17 persons per family. Sarkar *et al*. (2013) observed that 30% buffalo farmers of Bagerhat district in Bangladesh were fully dependent on buffalo rearing but none of them got training on buffalo rearing. There were 82.5% farmers who used their own capital and rest of them managed capital having loan from bank or NGOs and other sources for purchasing and/or rearing buffaloes.

3.2. Demographic distribution

About 95% of the farmers reared buffaloes in the study areas were indigenous, non-descript in type with widely differing phenotypes. Rest of the farmers reared crossbred buffaloes and also mixed of indigenous and crossbred type. Hamid *et al*. (2016) reviewed that buffalo in Bangladesh is mainly indigenous in origin and most of them are riverine type with exception of some swamp type in eastern part. Different crossbred population with Murrah, Nili-Ravi, Surti and Jaffrabadi are scantly available surrounding Indian border of Bangladesh (Huque and Borghese, 2013).

3.3. Husbandry practices

3.3.1. Herd size

The majority (80%) of the herds comprised <6 buffaloes within the overall range of 2-10. The small herd size in the household farming is due to the problem of rearing large number of buffaloes in the house rather they prefer to rear in the char or *bathan*. Most of the farmers (91.25%) reared female buffaloes mainly for calf and milk purposes and they usually sell their male buffalo calves at post weaning or at early stage (2-2.5 yrs). The result of the present study are in coincide with the observation of Rahman *et al*. (2018) who reported that the average herd size was 1.80±0.12 in Bhola district under semi-intensive management system. Karim *et al*. (2013) found that the herd size varied from 3-4 buffaloes in coastal areas of Pirojpur and Borguna district. Uddin *et al*. (2016) reported that 82% of the respondents in household farming of non-coastal areas having 1 to 3 buffalo per household and the number of female buffalo were higher in number in household farming.

3.3.2. Housing practices

Most of the farmers (77.5%) did not practice of providing shed to their buffaloes (Table 2). They kept their buffaloes near the homestead without any shelter or on raised place in the open yard at day/night which is the poor indices of housing management. Hasan *et al*. (2016) observed that 48.57% farmers did not provide any house for their buffaloes whereas 31.42% farmers had traditional buffalo shed without fencing and 20% farmers had fenced housing system in Bhola district. According to Siddiki (2017), 100% farmers of Subornochar, 80% of Trishal, 70% of Bagha and 45% of Lalpur sub-district didn't care about the housing for buffaloes under semi-intensive system. Among the respondents who provided shed, that was mainly at night, preferred to keep their buffaloes in close proximity of their dwelling house so that they can observe them more frequently. They provided tinned shed, muddy floor but inadequate floor space for their buffaloes. These findings are in line with the observations of Rahman *et al.* (2018) who reported that some farmers constructed floor by brick, some sheds have roofs using tin but most of the house had no boundary wall and roof. Akbar *et al*. (2009) mentioned that most of the dairy buffalo were not housed in extensive system of *bathan* areas but buffaloes which were in the plain land sometime had an enclosure with only roof made by straw or tin without wall and floor was always muddy. About 65% farmers did not maintain proper drainage system in the shed. About 70% farmers provided cemented manger and majority of the farmers (90%) had manure pits nearer to their dwellings or farms. About 35% respondents provided straw bedding during winter. The highest percentage of farmers (97.5%) opined that they have adequate wallowing facilities. Buffaloes were allowed for wallowing in the river, canal and big pond. Saadullah (2012) reported that the buffalo keepers had their own wallowing place, but sometimes the whole village herd down together in mud wallows.

3.3.3. Feeds and feeding practices

Most of the farmers (90%) practiced grazing their buffaloes from morning to evening at public land and then offered green grasses such as Dal (*Saccrolepsis indica*), Durba (*Cynodon dactylon*), Halancha (*Enhydra fluctuens*), Water hyacinth (*Eichhornia crassipes*) etc. collected from river side, road side, fallow land and/or crop residues (mainly rice straw) at night. About 97.5% farmers did not practice cultivation of fodder for their buffaloes (Table 3). Similar findings were observed by Uddin *et al*. (2016) who did a survey in the household farming of non-coastal region. Amin *et al*. (2015) reported that most of the respondents (80%) of Subornochar upazila of Noakhali district were fully dependent on roadside and unused land grasses (*durba, hishra* etc.), rest of the respondents were used cut and carry grasses, water hyacinth, tree leaves and *urigash* where rice straw is the main feed source. Sarkar *et al*. (2013) mentioned that majority of the farmers of Bagerhat district of Bangladesh were fully dependent on grazing. One of the advantages of buffalo management at household farmers' level is that they can use locally available feed resources. They were not adapted to the needs of giving balanced ration to their buffaloes. It is revealed that farmers were very much reluctant to accept any new feeding technology. Improved feeding technologies such as urea-molasses straw/blocks were not fully adopted by any farmers (Rahman *et al*., 2018) and they usually practice indigenous technical knowledge (ITK) on buffalo feeding. A very few number of farmers used small quantities of concentrate but not vitamin-mineral supplements and any type of growth promoters to their buffaloes. Findings of this study are in accordance with the findings of Amin *et al*. (2015) and Sarkar *et al.* (2013) who reported that no farmers were found to supply concentrate to their buffaloes. It was amazing that majority of the respondents (96.25%) depended on river/canal followed by tube-well water as a source of drinking water although tube-well water is available and it's just due to unawareness of the farmers.

3.3.4. Breeding practices

Buffaloes reared under household subsistence farming are mainly subjected to natural mating (85%) and most of the farmers didn't maintain breeding bull (Table 4). The result of this study coincide with the result of Uddin *et al*. (2016) who stated that the natural mating system was practiced by the most of the household farmers (95%) in Bangladesh though the number of breeding bull is very minimum. Rahim *et al*. (2018) reported that all farmers (100%) used natural mating for buffalo production at Noakhali district in Bangladesh. Hasan *et al*. (2016) reported that only 25.71% farmers did AI (artificial insemination) for oestrous synchronization in Bhola district. This variation may be due to farmers' interest, awareness and also lack of available artificial insemination facilities in the respective areas. Most of the farmers reported that buffaloes showed heat mainly in winter and they cannot detect heat properly but no one used teaser bull to detect heat. After insemination, pregnancy diagnosis is crucial for reducing calving interval at door step of the farmers. However, 22.5% farmers ascertained pregnancy based on their own judgment (non-return to estrus). About 77.5% of the respondents have not used the services of Veterinary Field Assistant (VFA)/ Field Assistant (AI) or Veterinarians for pregnancy diagnosis at about three months after breeding performed. It was observed that few farmers were kept the breeding records; however the record keeping were incomplete due to lack of awareness. Rahim *et al*. (2018) showed that 3% farmers kept their buffalo records.

3.3.5. Health care practices

About 45% and 60% farmers performed irregular vaccination and deworming in their buffaloes, respectively (Table 5)**.** The above findings are close to the findings of Rahman *et al*. (2018) who observed that about 65.2% and 91.3% farmers of coastal area were tried to adopt vaccination and deworming for their buffaloes, respectively. Hasan *et al*. (2016) reported that 74.28% and 71.4% farmers of the Bhola district were conscious about vaccination and deworming, respectively. Islam *et al*. (2017) found that vaccination and deworming were performed by 70% and 90% farmers, respectively in their studies in various regions of Bangladesh. The reason for variation in vaccination and deworming practice may be due to the variation of the survey area and farmers attention. We found that vaccination and deworming practice were higher in Bhola district than Patuakhali. The majority (95%) of respondents treated buffaloes by quack followed by veterinarian only in serious cases. On the other hand, 10 percent farmers showed positive opinion towards good medical services from the upazila livestock hospital (Table 5). Farmers who live nearer the upazila headquarters usually get the medical services easily. The study revealed that buffalo owners were not aware of isolation of diseased animal. No farmers were found to use disinfectants in cleaning buffalo sheds. Similarly, low use of disinfectants was reported by Lal (1999) and Kishore *et al*. (2013). The reasons behind this may be lack of awareness among farmers, a high disinfectant cost and an additional burden which did not give any immediate return to the farmer. Regarding the sanitary condition of shed, 65% was not satisfactory.

3.4. Problems confronted by farmers and their suggestions

The major problems confronted by farmers were scarcity of quality feeds and fodder, lack of grazing land, inadequate veterinary services, lack of quality breed, artificial insemination (AI) problem, insufficient government supports, lack of required training facilities, inappropriate marketing channel for buffalo milk and meat etc. (Table 6)**.** The grazing as well as pasture land are very limited especially during cropping season and dry period in coastal areas in Bangladesh. In order to overcome the problems of household buffalo rearing at coastal areas and making the program more profitable, the buffalo farmers were asked to suggest in their own way. Some of their suggestions were enlisted in Table 6. Amin *et al*. (2015), Hasan *et al*. (2016) and Islam *et al*. (2017) also reported the similar type of problems and suggestions opined by the buffalo keepers.

Table 1. Socioeconomic status of the farmers (n=80).

Variables	Categories	Frequency	Percentage
Age (Years)	Up to 30	11	13.75
	31-45	38	47.50
	46-60	24	30.00
	Above 60	7	8.75
Sex	Male	68	85.00

	Female	12	15.00
Household size (number)	Up to 5 members	22	27.5
	Above 5 members	58	72.5
Level of education	Illiterate	30	37.50
	Primary	41	51.25
	Secondary	7	8.75
	Above secondary	2	2.50
*Land possession	Landless (0.0-0.49 acres)	8	10.00
	Small (0.50-2.49 acres)	42	52.50
	Medium (2.50-7.49 acres)	27	33.75
	Large (7.50+ acres)	3	3.75
Occupation	Agriculture	61	76.25
	Service holder	2	2.50
	Business	10	12.50
	Job seeker	2	2.50
	Others	5	6.25
Training received	Yes	3	3.75
	No	77	96.25
Source of capital/ Financial support	Own capital	66	82.50
	Loan from bank /NGOs	6	7.50
	Others	8	10.00

* Statistical pocket book, 2018

Table 2. Housing management practices (n=80).

Parameters	Categories	Frequency	Percentage
Providing housing/shed	Shed without fencing	12	15.00
	Fenced housing	6	7.50
	No housing arrangement	62	77.50
Housing period	All time	0	0.00
	Only at night	68	85.00
	Only in extreme weather	12	15.00
Housing systems	Inside dwelling house	0	0.00
	Near dwelling house	4	5.00
	Separate buffalo shed	76	95.00
Roof type	Using locally available materials	7	8.75
	Tinned	73	91.25
	Pucca shed	0	0.00
Type of flooring	Muddy	78	97.50
	Pucca (Concrete)	2	2.50
Adequacy of floor space	Adequate	24	30.00
	Not adequate	56	70.00
Drainage system	Fair	28	35.00
	Poor	52	65.00
Manure disposal	Manure pit	72	90.00
	Open place	8	10.00
	Biogas	0	0.00
	Direct application to the crop land	0	0.00
Manger (Cemented)	Provided	56	70.00
	Not provided	24	30.00

Providing bedding materials during winter	Yes	28	35.00
	No	52	65.00
Wallowing facilities	Adequate	78	97.50
	Inadequate	2	2.50

Table 3. Feeding management practices (n=80).

Parameters	Categories	Frequency	Percentage
Type of feeding systems	Cut and carry	6	7.50
	Grazing	72	90.00
	Stall feeding	0	0.00
	Tethering	2	2.50
Sources of feed	Own crop residue	8	10.00
	Purchased	0	0.00
	Collected from fallow lands	72	90.00
Land for grazing	Own	4	5.00
	By lease	4	5.00
	Public land	72	90.00
Fodder cultivation	Practiced	2	2.50
	Not practiced	78	97.50
New feeding technologies	UMS (Urea Molasses Straw)	0	0.00
	UTS (Urea Treated Straw)	0	0.00
	UMB (Urea Molasses Block)	0	0.00
	UMS + Hay	0	0.00
	No acceptance	80	100.00
Feeding of common salt	Regularly	12	15.00
	Occasionally	20	25.00
	Not feeding	48	60.00
Vitamin-mineral premix supplements	Yes	0	0.00
	No	80	100.00
Feeding concentrate supplements	Yes	8	10.00
	No	72	90.00
Sources of concentrate feed	Own agricultural by-products	78	97.50
	Buy locally	2	2.50
Hormone, antibiotic and growth promoter	Yes	0	0.00
	No	80	100.00
Feeding of balanced ration	Yes	0	0.00
	No	80	100.00
Source of drinking water	Tube-well	3	3.75
	Ponds	19	23.75
	River/Canal	58	72.50

Table 4. Breeding management practices (n=80).

Parameters	Categories	Frequency	Percentage
Methods of heat detection	Symptomatic	80	100.00
	Using teaser bull	0	0.00
Breeding method	Artificial insemination (AI)	4	5.00
	Both AI and natural	8	10.00
	Only natural	68	85.00
Breeding season	Summer	0	0.00
	Rainy	16	20.00
	Winter	64	80.00
Pregnancy diagnosis performed by	Veterinarian	0	0.00
	Own judgment	18	22.50
	Not done	62	77.50
Maintaining breeding bull	Yes	6	7.50
	No	74	92.50
Breeding records keeping	Yes	2	2.50
	No	78	97.50

Table 5. Health care practices (n=80).

Parameters	Categories	Frequency	Percentage
Practice of vaccination	Not practiced	44	55.00
	Practiced	36	45.00
Practice of deworming	Not practiced	32	40.00
	Practiced	48	60.00
Treatment of buffaloes by	Veterinarian	4	5.00
	Quacks	76	95.00
Availability of veterinary services	Good	8	10.00
	Fair	20	25.00
	Poor	52	65.00
Isolation of sick buffaloes	Yes	0	0.00
	No	80	100.00
Disinfection of sheds	Yes	0	0.00
	No	80	100.00
Sanitary condition of barn	Satisfactory	28	35.00
	Not satisfactory	52	65.00

Table 6. Problems confronted by buffalo keepers and their suggestions (n=80).

Problems and suggestions	Frequency	Percentage
Problems		
Scarcity/ shortage of feeds and fodder	68	85.00
Lack of grazing facilities	44	55.00
Inadequate veterinary services	66	82.50
Calf mortality	28	35.00
Lack of quality breed	32	40.00
Artificial insemination (AI) problem	56	70.00
Lack of government supports	36	45.00
Lack of training facilities	26	32.50
Low price of milk and meat	54	67.50
Natural calamities	33	41.25
Suggestions		
Fodder cultivation program by Govt. is needed	60	75.00
Subsidy needed on buffalo feeds	56	70.00
Good quality breeding bull/seed	52	65.00
Training and motivation needed in buffalo production	44	55.00
Financial supports to buffalo keepers	64	80.00
Adequate veterinary services	61	76.25
Ensure appropriate marketing channel for buffalo milk and meat	52	65.00

4. Conclusions

The results showed that most of the farmers did not follow scientific feeding, breeding, housing, and health care management practices rather than following traditional backyard rearing system. The progress of buffalo husbandry seems unsatisfactory due to faulty management practices and unawareness about importance of management practices. As farmer's main occupation is agriculture, they consider buffalo rearing as passive income source under household subsistence framing system. Yet now, no mentionable attempt is made to improve the buffalo management and production techniques in the coastal areas. Based on the above facts, it could be concluded that buffalo keepers should be acquainted and motivated through training on scientific husbandry practices. The concerned authorities should take appropriate initiatives accordingly to solve the problems on priority basis.

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Conflict of interest
None to declare.

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