Research article

Management Practices and Welfare Issues in Commercial Dairy Farms in Chittagong

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ABSTRACT

Livestock rearing is an integral part of people's livelihood in Bangladesh and it is being intensified as the commercial dairy farming has been grown up where the farmers usually not well aware about welfare issues of animals. The aim of this study was to study different factors associated with welfare issues of dairy animals in terms of management and health status. With these view a cross-sectional study was performed for a period of 10 months in urban (Chittagong City Area), peri urban (Sikolbaha) and Rural area (Potiya, , Anowara, Bansnkhali Sitakunda and Mirsharai) through a pretested questionnaire survey followed by comprehensive survey in selected dairy farms. In the studied farms, the following parameters were found highest in proportion: medium size farms (49%) , stall type (82%) could be due to unavailability of land and money for expansion of the farm, smooth floor surface (57%) would be a factor for physical injury of animals, clean floor surface (80%) is not up to the mark due to the lack of man power facilities and water sources and space allocation (short in width) for individual cows (83%) which need to be improved. Nearly 70 % farms had good ventilation facilities still under the standard level, 66% farms were infested with fly which caused restlessness of the cow that lead to decreased milk production and also contaminated milk and feed with other microorganisms. Almost 93% farms did not use footbath with antiseptic solution where awareness program for remaining farmers are required on this issue. In 15% farms, cows were observed in frustrated (stereotype) condition resulted from scarcity of grazing facilities and 82% farms did not have land for grazing or exercise of cows which is a factor for economic profitability of the farms. The highest percentage (61%) of farms' dairy cow got three times water supply and 92% farms used tube well water this suggests available water supply in the farm is the most important necessary factor for profitable dairy farming.

Almost 84% mastitic cows was found in stall feed condition and 51% of mastitis case was found in medium size farms where brick coated with cement floor was responsible for 49% of the total mastitis case that could be due to the unhygienic condition of the floor. Nearly 49% of the recorded farms were located in village which indicates livelihood of the peoples mostly depends on the agriculture associated with livestock. The highest proportion of laminitis (89%) was found in stall feed condition 39 % in medium size farms and (39%) that resulted from lack of movement facilities. Hoof lesions were found in (83%) stall house, (46%) in medium size farms, (50%) in village level farms and (50%) in brick floor coated with cement floor house. The highest percentage (42%) of leg lesions was found in medium size farms and 88% of neck lesion was found in stall house since the animals are more prone to injury and

fly infestation. Those diseases found in the study were not statistically significant that could be due to sampling variations. However recorded all types of diseases (mastitis, laminitis, hoof lesions and neck lesions) were predominated in stall feeding condition, medium size farms, farms brick coated with cemented floor. There is a significant variation of laminitis of animals in various locations of the farms.

INTRODUCTION

Livelihood of the most people in Bangladesh is dependent on cropping and livestock farming. Contribution of livestock farming in Bangladesh is almost 6.5% of the GDP, 13% of the total foreign exchange earnings and provides employment to 20% of the population (BBS, 2004). The rural people, particularly landless, marginal, small farmers and women get animal originated food to fulfill the nutrient requirement cheaply from livestock. Moreover it is an important sector for the people to create self employment opportunity to increase their family income. Thus, livestock sector plays an important role in the national economy and in the socio-economic development of the country.

Primarily dairying is not only an earning source to both small/marginal farmers and agricultural laborers but also a growing industry. It also provides a good source of organic matter for improving soil fertility and crop yields and generation bio fuels from the dung. The surplus fodder and agricultural by-products are gainfully utilized for feeding the animals. Dairy cow is almost one 8th of the total cattle population in Bangladesh, contributes 14% of the total milk requirement, about 92 percent of the dairy cattle is non descriptive indigenous and only 8 percent is reported to be crossbred (BBS, 2006). The majority of the rural households in Bangladesh have 1-3 dairy cows (Hemme, 2008). Sometimes these cattle are used as dual purpose for milk and draft power within mixed farming system in Bangladesh (Saadullah, 2001), a predominant source of income, nutrition and jobs (Haque, 2009). To fulfill the demand of increasing population and creation of more employment opportunity, household intensive dairy farming is increasing day by day. In Bangladesh, the government has been trying to boost up domestic milk production through giving incentives among farmers to encourage the establishment of mini dairy farms of cross bred cattle. Since cross bred cattle are more than twice as productive as local breeds (Alam, 1995). There has been a significant increase in the number of commercial dairy farms in recent years. The number of high yielding cross breed cattle has been increasing,

however, their welfare issues at any level especially commercial dairy farming conditions are not studied yet. Indeed most of the farmers are not well aware about the standard management practices such as housing, feeding, and watering and health condition of farm animals which are very much important for better production and welfare of dairy cattle.

Many factors and diseases are associated with health status of dairy cattle among which lameness is one of the most important welfare issues for dairy cattle since it is the top three most common disorders such as mastitis, infertility in dairy herd (Enting *et al.,* 1997) and reduces the ability to function of the cattle (Whay, 2002) resulting in increased cost of production and deteriorate health status of the them (Whay *et al.,* 1998). A primary cause of lameness is corium tissue damage leading to the development of claw horn lesions. While estimates of the prevalence of claw horn lesions among dairy cattle vary, there is agreement that the majority of animals are affected (Bradley *et al.,* 1989). Likewise information pertaining to management practices thought to influence hoof health (Bell and Weary, 2000) and components of the diet and feeding practices thought to influence the development of claw horn lesions (Bell and Weary, 2000).

The idea that concrete flooring might be detrimental to claw health no matter what treatment the surface is given is supported by the recent work of Somers *et al.* (2003) who found that greater than 80% of cows housed on concrete floors in their study had at least one claw disorder when examined, which was 20-25% more cows than those housed in straw yards. (Vokey *et al.,* 2001) found that rubber mats covering concrete alleyways afforded little benefit in terms of preventing claw horn lesions or clinical lameness when compared to grooved concrete, suggesting a need for future research on alternative flooring surfaces for indoor-housed cattle. In research on the effects of claw trimming, Manske (2002) found that trimming helped prevent lameness and decrease the prevalence of hind-claw lesions in cows housed in tie-stall barns with concrete or rubber, or in free-stall barns with concrete alleys.

The above discussions have shown how important is the welfare of the animals for production as well as for the wellbeing of a living being. Considering the above backgrounds the present study aimed to know the socioeconomic status of the farm owners, the information on management of dairy farms (herd composition, housing and feeding and watering), health status of the cow and calves and welfare of dairy employee.

MATERIALS AND METHODS
Study area
A cross sectional study was carried out in urban (Chittagong City Corporation), peri-urban (Sikolbaha) and rural areas (Potiya, Anowara, Bansnkhali Sitakunda and Mirsharai under Chittagong District for a period of 10 months from March, 2011 to December, 2011 using a pre-tested questionnaire with face to face interviewing of both farmers and employees as well as observation of the farm management and health condition of animals by physical inspection.

Sampling Procedure
A list of 1000 dairy farmers was collected from the Directorate of Livestock Services (DLS) and local veterinary practitioners of the three study areas. From the list a total of 332 farms were selected simple random sampling which contains at least 3 milking cows. A total of 89 dairy farmers from urban area (Chittagong City Corporation), 79 (peri-urban Sikolbaha) and 164 (rural area: Potiya, Anowara, Bansnkhali Sitakunda and Mirsharai) were finally selected and included in the study.

Data collection
Before conducting the main cross sectional study, a pre-testing of the questionnaire was done on 10% randomly selected dairy farms in the study areas and necessary changes were incorporated before embarking on the actual study. The farmers on the list were then contacted by the author along with a trained local veterinary doctor and informed them for the purpose of visit and requested to react on the questionnaire. A formal consent was therefore received from the farms and farmers. The data were collected according to questionnaire.

Management information
The types of selected farms were small (1-3 cow/farm), medium (4-10 cow/farm), large (>10 cow/farm). The housing pattern of the animals were loose (Remain in the field at day time), stall (Remain in farm at day and night) and mixed (Remain few hours of the day in free in the farm premises). The floor surface were smooth (brick coated with cement), uneven (ups and down) and rough (concrete/brick floor without slippery). Floor conditions were clean (No dung or urine retain all the time of the day after regular washing with water or cleaning with coconut stick) and dirty (Presence of dung or urine retain most of the time after cleaning). Space allocation for individual animals were standard (Standing platform 150 cm), Short in length and Short in width. Ventilation status of the farms were categorized as good (Windows at both side), moderate (Animal shed contain one windows or hole) and poor (No window in animal shed). Fly infestation patterns were categorized as severe (approximately 25 fly/square meter/24 hours), moderate (approximately 5 fly/square meter/24 hours) and no infestation (No fly observed/24 hours). Besides information on body condition score, disease status (mastitis, laminitis, leg lesions, hoof, neck joint swelling and skin condition) were also recorded. The diseases of the animals were diagnosed by visual inspection health status of the animals was diagnosed in the following ways: Mastitis was diagnosed by observing physical changes of milk and presence of clinical signs of the udder. Laminitis was diagnosed by clinical signs include lameness, inflammation, and increased temperature in the hooves. It also characterized by inflammation of the digital laminae of the hoof. Lesion was diagnosed with the presence of any erosion, abrasion, ulceration or any type of abnormalities. Hoof and Neck lesions were characterized in the presence hoof abnormalities (outward growth and erosion) and neck lesion by erosion on the skin of neck region.

Data Analysis
The collected survey data was coded and analyzed using MS Excel-2000 followed by Statistical Package for Social Sciences (SPSS version 9.0) for windows. In which the following major parameters: household characteristics (age, sex, occupation of respondent, number of dairy cattle) and general management (housing, feeding and health management), welfare issues of dairy cattle were considered. A descriptive statistics was done to express the results as percentage, mean and standard deviation. Student "t" was used to know the p>value at 1% level of significance.

RESULTS
Management information on studied dairy farms is summarized in Table 1. 49% farms were medium in size followed by large (26%) and small size farm (25).

Among the studied farms stall housing was in the highest percentage (82%), followed by mixed and loose housing. Surface condition of the animal house floor was categorized in 3 types namely smooth, uneven and rough. Among three types of floor smooth surface prevailed most (58%) followed by rough (25%) and uneven (18%). Most of the animal houses were found in clean condition (80%) and the rest dirty that could be due to lack of man power and carelessness. Space allocation for an individual cow was satisfied (83%) followed by short in length and by a few short in width (11%). Ventilation status of the animal house was categorized in three classes. Most of the animal houses had good ventilation (70%) facilities and followed by moderate facilities (28%) and poor facilities (2%). Overall ventilation facilities were good but not up to the satisfactory level. It was revealed from data that among the recorded farms, almost 3% was severely infested with fly while moderately infested farms were 66% and the remaining farms had no fly infestation (31%). But it needs more attention to reduce fly infestation.

Table 1 Management information of commercial dairy farms

Variable	Category	Frequency (%)
Herd Size	Small(1-3 cow/farm)	25
	Medium(4-10 cow/farm)	49
	Large(>10 cow/farm)	26
Types of house Housing Loose and Management	(Remain in the field at day time)	3
	Stall (Remain in farm at day and night)	82
	Mixed (Remain few hours of the day in free at field.)	15
Floor types Surface of the floor	Smooth(brick coated with cement)	57
	Uneven(ups and down)	18
	Rough(concrete/brick floor without slippery)	25
Floor condition	Clean (No dung or urine retain all the time of the day after regular washing with water or cleaning with coconut stick)	80
	Dirty (Presence of dung or urine retain most of the time after cleaning)	20
Space allocated for individual	Standard	82
	Short in length	11
	Short in width	7
Ventilation status	Good (Windows at both side)	70
	Moderate (Animal shed contain one windows or hole)	28
	Poor (No window in animal shed)	2
Fly infestation	Severe(approximately 25 fly/square meter/24 hours)	3
	Moderate(approximately 5 fly/square meter/24 hours	66
	No(No fly observed/24 hours)	31
Water supply	Once/day	2
	Twice/day	23
	Thrice/day	61
	Ad libitum	14
Source of water	Tube well	9
	Pond	5
	Open source (Canal)	3
Facility for grazing or exercise	Yes	18
	No	82
Foot bath with antiseptic	Yes	7
	No	93
Stereotype	Yes	15
	No	85

The farmer did not use footbath with antiseptic solution (93%) while a very few (7%) farmers had practice footbath. Almost in 15% of the farm, the cows were observed in frustrated (stereotype) condition. Most of the farms did not have allowed their cows (82%) for grazing or exercise. The highest percentage (61%) of dairy cows got three times water supply followed by twice (23%) and ad-libitum (14%) respectively. Most of the farms used tube well water (92%) followed by pond water (5%) and (3%) collected water from outside sources (canal). There was no facility for grazing or exercise in most of the dairy farms (82%) that needs special care from the farm owners.

Table 2 Proportion of different disease associated with various factors of animal housing of the farms

Variables	Category	Mastitis(N=324)[a]			Laminitis(N=323)[b]			Hoof lesion(N=324)[a]			Leg lesion(N=324)[a]			Neck lesion(N=323)[b]		
		Yes (%)	No (%)	P-value	Yes (%)	No (%)	P-value	Yes (%)	No (%)	P-value	Yes (%)	No (%)	P-value	Yes (%)	No (%)	P-value
Type of House	Loose	2.7	3.2	**1.00**	2.3	3.2	**0.40**	2.8	3.1	**0.985**	0	3.4	**0.07**	6.25	2.75	**0.46**
	Stall	83.6	80.5		88.6	79.9		83.3	80.9		71	82.3		87.5	80.41	
	Mixed	13.7	16.3		9.1	16.8		13.9	16		29	14.3		6.25	16.83	
Herd Size	Small	31.5	21.9	**0.170**	29.5	26.7	**0.30**	30.5	23.3	**0.734**	32.3	23.2	**0.504**	28.1	23.71	**0.34**
	Medium	50.7	49.4		38.6	49.0		45.9	50		41.9	50.5		34.38	51.20	
	Large	17.8	28.7		31.8	24.3		22.2	26.7		25.8	26.3		37.5	25.08	
Type of floor	Concrete	31.5	22.7	**0.235**	34.1	22.9	**0.45**	33.3	23.6	**0.465**	22.6	24.9	**0.985**	15.62	25.43	**0.081**
	Only brick	17.8	13.2		11.4	14.7		8.3	14.9		16.1	14		12.5	14.43	
	Brick coated with cement	49.3	60.6		52.3	59.1		50.0	59		58.1	58.1		68.75	57.04	
	Mud	1.4	3.9		2.3	3.2		8.3	2.4		3.2	3.1		0.30	3.09	
Location of the farm	Urban	30.1	26.7	**0.60**	9.1	30.5	**0.008**	25	27.8	**0.465**	19.4	28.3	**0.067**	15.62	28.86	**0.081**
	Sub urban	20.5	25.5		36.4	22.6		19.4	25		12.9	25.6		40.62	22.68	
	Village	49.3	47.8		54.5	46.9		55.6	47.2		67.7	46.1		43.75	48.45	

*No farmers response (^a 8 and ^b 9)

Overall 23% studied of animals had suffered from mastitis, and the proportion of hoof lesion was found half of the mastitis lesion. Almost 14% examined animals were suffered from laminitis whilst nearly 10 % animals had been suffering from leg and neck lesion respectively. Among the recorded five diseases mastitis was 34% followed by laminitis (20%), hoof lesion (17%), leg lesion (14%) and neck lesion (15%) consecutively.

Proportion of association of different diseases with animal housing is summarized in Table 2. The highest percentage (84%) of cows had suffered from mastitis in stall feed condition and reverse result was found in loose house condition (2.73%). According to the herd size, the highest percentage (51%) of mastitis was found in medium size farms, followed by small and large size (p-0.170). Floors of animal houses were categorized in 4 types. The highest percentage (49%) of mastitis was found in brick coated with cement floor. Most of the recorded farms were located in village (49%) followed by urban (30%) and peri-urban (21%). The highest percentage (89%) of cows had suffered from laminitis in stall feed condition. According to the herd size, the highest percentage (39%) of laminitis was found in medium size farms followed by large and small size respectively (p-0.30). Most of the recorded laminitis were found in village (55%) followed by peri urban (36%) and urban (9%). Floors of animal houses were categorized in 4 types. The highest percentage (70%) of laminitis was found in brick floor coated with cement. Hoof lesion of cows was found in stall feed housing condition (83%). According to herd size, the highest percentage (46%) of hoof lesion was found in medium size farms followed by small and large size (p>0.734) which is not statistically significant. Most of the recorded hoof lesions were found in village (56%) followed by urban (25%) and peri urban (19%).Floors of animal houses were categorize in 4 types. The highest percentages (50%) of hoof lesion were observed in brick coated with cement floor. Animal houses were categorized

in loose, stall and mixed. Of the three types of house, stall house was the highest (n-263) in number followed by mixed and loose house. According to the herd size, the highest percentage (42%) of leg lesions was found in medium size farms followed by small and large size (p>0.504). Most of the recorded leg lesion was found in village (68%) followed by urban (19%) and sub urban (13%).Floors of animal houses were categorize in 4 types. The highest percentage (65%) of leg lesion was found in brick coated with cement floor. According to herd size, the highest percentage (38%) of neck lesion was found in large size farms followed by medium and small size farm (p>0.340). Most of the recorded neck lesion were found in village (44%) followed by peri-urban (41%) and urban (15%) farms. The highest percentage (88%) of neck lesion was found in stall fed condition. The highest percentage (69%) of neck lesion was found in brick coated with cement floor.

Table 3 Body condition score related to herd size, type of house, floor and location of the farm (N=286)*

Variables	Category	Body Condition Score (%)						P-value
		1(n-74)	2(n-45)	3(n-57)	4(n-71)	5(n-39)	Proportion of cow (n-286)	
Herd size	Small size farm	18.9	22.22	21.05	21.12	25.64	21.32	0.308
	Medium size farm	45.9	55.55	47.36	54.92	53.84	51.04	
	Large	35.1	22.22	31.57	23.94	20.5	27.62	
Type of house	Loose	4.05	4.44	7.01	1.40	0	3.49	0.000
	Stall	95.9	46.66	77.19	81.69	79.48	78.67	
	Mixed	0	48.88	15.7	16.90	20.51	17.83	
Type of floor	Concrete	14.9	13.33	15.78	23.94	25.64	18.53	0.001
	Only brick	6.75	17.77	24.56	18.30	15.38	16.08	
	Brick coated with cement	78.37	53.33	56.14	57.74	56.41	61.88	
	Mud	0	15.55	3.50	0	2.56	3.49	
Location of the farm	Urban	4.05	24.44	52.63	45.07	33.33	18.53	0.000
	Sub urban	45.94	17.77	21.05	18.30	23.07	16.08	
	Village	50.0	57.77	26.31	36.61	43.58	61.88	

*No response (N=46)

One can observe from data table (table-3) that the body condition score relationship with herd size, type of house, floor and location of the farm. More than half the dairy farms were medium (51%) followed by large (28%) and small (21%) in size. According to the types of houses, body condition score were stall (79%), mixed (18%) and loose (4%) respectively. Body condition scores also varied with floor type. Among the type of floor, brick coated with cement was the highest (62%) followed by concrete (19%), only brick (16%) and the remaining was mud. About 62% of the farms were located in village followed by urban (19%) and sub urban (16%) correspondingly. The types of houses, floors and locations of the farms differed significantly (p>0.000) with body condition score.

DISCUSSION
In this study 332 dairy farms were surveyed principally to observe welfare issues of cows and management practices. Among the studied farms, 49% farms were medium in size which is coincided with the earlier findings who reported the majority of studied farms are being medium in size, due to scarcity of land for green grass production and average net return (CNRS, 1997). Stall housing (82%) was the highest in distribution followed by mixed and loose housing that might be due unavailability of land to allow the cattle for grazing and also the very nature of intensive farming practices. In all three types of houses, smooth floor surface condition was prevalent (58%) in comparison to rough and uneven floor surfaces which might lead to injury to the farmed animals and thereby pose major welfare concern (Graversen, *et al.,* 2001). Unfortunately the farm owners were not seemed aware of the problem generated from smooth floor surface. Most of the dairy farm owners (80%) reported that they tried to keep clean the floor of the animal house to maintain bio-security and comfort for animals

but remaining 20% farmers did not maintain clean floor surface condition that could relate to the unconstructed floor condition those farm have along with limited water facilities. In majority of the farm's (83%) space allocation for individual cow was short in width that could be due to the lack of knowledge for standard space allocation for dairy cows and limited farm space for necessary expansion scope which could lead to sterotypic behavior and contact diseases of animals (Ruegg *et al.,* 2010). Ventilation facilities of the animal house considered to be an important parameter for comfort of animals. Most of the animal houses had good ventilation (70%) facilities and very few recorded with poor ventilation status. Almost 3% farms was severely infested with fly while a moderate proportion of farm (67%) were moderately infested with fly and remaining farms had no fly infestation (31%). Fly infestation in farm indicates poor waste management and therefore related with less taking care of farmed animals. Moreover, fly can act as a carrier of number of infection which also signifies welfare issues (Laveissiere, 1985). Footbath with antiseptic solution (93%) in most of the farms were not observed to have practiced routinely while a very few 7% farmers practiced footbath as farm bio-security practices. In almost 15% of the farms, the cows were observed in frustrated (stereotype) condition. Most of the farms did not have allowed their cows (82%) for grazing or exercise for limited space available. Individual limited cow space, ventilation, and overall poor management could relate with this sterotypic behaviour observed in this present study which indicate presence of welfare issues to be addressed (OIE, 2011). The highest percentage (61%) of dairy cows got three times water supply followed by twice (23%) and ad libitum (14%) in the farm respectively. Most of the farm used tube well water (92%) and pond water (5%) and collected water from outside sources (canal) (3%). There was no facility for grazing or exercise in most of the dairy farms (82%). Frequency of water supply and access to better quality water has been prioritized by different study as prerequisite for milk production, digestibility and overall to the basic need for the cows with respect to farm animal welfare concern (FAO/IAEA ,2009).

Many factors are associated with different infectious and non-infectious diseases of dairy cattle. In this study risk factors associated with dairy cattle farming are mastitis in stall feeding condition (84%), in medium size farms (51%) and in brick coated cement floor condition (49%).%). In case of laminitis similar types of risk factors were stall feeding condition (89%), medium

size farms (39%) while the highest prevalence of laminitis was found in farms located in the village (55%) and in brick coated farm (70%). Similarly, the highest percentage of hoof lesions was also associated with the same factors as discussed above. The highest proportion of leg lesions recorded in different categories was 42% in medium size farms, 68% at village level farms, 65% at brick coated cement farms. At the same time as the primary proportion of neck lesions according to different categories was 38% in large size farms, 44% at village level farms, 88% in stall feeding conditions farms, 69% in brick coated with cement farms respectively. The results of the present study indicate considerable leg, neck injuries, lameness and production limiting disease like mastitis prevalent in studied farms. These injuries could attribute to the defective housing and farmers unawareness which not only expose financial constraints to the farmers but also on the ground of welfare issues pose considerable concern. In an ideal dairy farm context it has been recommended to manage these welfare and economic constraints to keep at its minimum level possible (EFSA, 2009).

CONCLUSION
Highest proportion of medium size farms with stall type housing suggested that lack of financial support and unavailability of land for farm expansion. Highest prevalence of smooth floor surface is the risk factors for physical injury and moderate level of fly infestation indicates unhygienic condition of the farm premises. And most of the farmers were used tube well water but there is lack facility for grazing. Moreover, apparent disease prevalence includes mastitis, laminitis, hoof lesion, leg lesion and neck lesion conditions were the most in the following conditions: stall feeding, in medium size farms, brick coated with cement, village area. To minimize these factors it seems to that farmers need technical and financial support for expansion and well maintenance of farming system.

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