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ON-FARM WELFARE ASSESSMENT OF DAIRY CATTLE BY ANIMAL-LINKED PARAMETERS IN BANGLADESH

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ABSTRACT

The present study was conducted in 33 dairy farms to evaluate the welfare quality of Australian-zebu cross bred cows through some animal-based welfare indicators. The main aims of this research were to identify welfare issues facing dairy cows and investigate whether indicators are associated with measures of welfare and performance efficiency. The assessment of animal welfare was performed (330 animals) Australian-cross breed in family dairy farms at Sirajganj district of Bangladesh. Data were collected through face-to-face interview with farmers, followed by an inspection and observation of dairy cows. A total 330 females (43 heifers and 287 cows) were included in this study. Body condition, body cleanliness, injury, lameness, health status and milk yield were assessed. Among studied animals, body condition score 2 about (65.5%), hock joint injury (83.6%), knee injury (48.8%), and a pronounced state of poor cleanliness on: dirty udder (55.9%), flank (55.0%) and hind limbs (96.4%) were observed. Health status including diarrhea, respiratory distress, coughing, nasal and ocular discharge were present in some animals. The results indicate that very good BCS and mastitis free cows are related to higher milk yields. Results of this study may indicate the some indicators that influence the animal welfare and productivity in selected farms. As this work was a preliminary study, so the comprehensive research is needed to further develop the prototype protocol.

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INTRODUCTION

Animal Welfare (AW) has been defined by the World Organization for Animal Health (OIE) as the broad term used to describe how an individual is coping with the conditions in which it lives. The welfare of dairy cows encompass nowadays a major concern of public interest extending in most of the countries, due to its impact on health and productions of animals and, implicit, upon public health. Good animal health and welfare is an explicit goal of livestock farming. AW is a relatively new topic which is just beginning to attract attention in Asia including Bangladesh. The welfare of dairy cattle and the risk factors causing poor welfare of dairy cattle in Bangladesh have not previously been determined, hence the relevance and need for the current study. On-farm assessment of animal welfare can be based on the evaluation of the provision of resources and management, direct observation of the animals and examination of farm records (Whay et al., 2003). The basic principles of animal welfare are defined by both the physical health as mental, and include aspects such as absence of prolonged hunger and thirst, thermal comfort, the absence of injuries, inappropriate management-induced pain, diseases, social behavior and expression, human-animal relationship, etc. Thus, the Welfare Quality protocol based its assessment of animal welfare predominantly in animal based measures (e.g., behavior, and health). When this measure is not sensitive or applicable to check a criterion, measures based on the resources (e.g., installations) or in the management (for example, management procedures) are used.

Animal welfare is recognized as an essential component of the social pillar of sustainability for the dairy industry. The animals need to have their feed provision consistent with their needs, easy access to drinking bowls and troughs, and total freedom of movement (Butler and Smith, 1989). In addition, the environment should provide thermal comfort conditions for animal's sufficient size in the rest area, maintain standards of hygiene and cleanliness in order to avoid the proliferation of pathogenic microorganisms (Fonseca and Santos, 2000; Barkema et al., 1998). The increasing attention toward animal welfare has resulted in the formation of many different welfare assessment protocols, such as the newly developed European Welfare quality protocols and Animal Needs Index, both of which include many different welfare indicators. For dairy cattle cleanliness, skin lesions and injury in different body parts, lameness and milk yield recur as important factors contribution to the welfare of the cow or indicating its general condition (Brtussek et al., 2000; Welfare Quality, 2009). The farm animal welfare is provided especially by housing and breeding systems suitable for animal health and behavioral needs and by proper farming practices, as well (Broom, 2004). Welfare is a condition of the animal, not something transmissible to it, and it range between very poor and very good (Loberg and Lidfors, 2001; Broom, 2004). Assessment of animal welfare can be done by several methods. Thus, evaluation can be based on behavioral, physiological, psychopathological parameters or productive performances. All the indicators have inconveniences and, in this way, are not reliable, used as sole assessment techniques. For this reason it was suggested that better results could be obtained in measuring animal welfare by using a system of indicators instead of individual parameters (Winckler et al., 2003; Rousing et al., 2007). Usually, determination of these indicators requires expensive investigations or high experimental effort, therefore they are inadequate in field research. However, the data in this study were collected according to the validated European Welfare Quality protocol (Welfare Quality, 2009) for dairy cattle but in some extend the protocol was modified based on local management system.

In Bangladesh, dairy cows in different areas are subjected to production systems that are not friendly to their welfare status of dairy animals, therefore, it is needed to assess the welfare status of zero-grazed dairy cows. For the current study, we measured some anima-based indicators for evaluation of dairy cow welfare in farm level. Globally, AW is considered an important tool for farming of animals, but this issue is a relatively new attractive topic in Bangladesh. To our knowledge, there is no study has been conducted so far to assess the dairy animal welfare in Bangladesh. The present study was conducted in small holder dairy farms to evaluate welfare quality of Australian-zebu cross bred cows through some animal-based welfare indicators validated by the European project Welfare Quality® (Welfare Quality, 2009). The main aims of this research were to identify welfare issues facing dairy cows and investigate measures of welfare and performance efficiency.

MATERIALS AND METHODS

The present study was conducted during the period from February 2016 to April 2016 in Sirajganj district of Bangladesh. During the visit farm, the farmer were informed of the purpose of the study and assured that their participation was voluntary and their identity was kept confidential. The on-farm assessment took an hour long interview and direct observation on ocular discharge; nasal discharge, hampered breathing, diarrhea, body condition score, cleanliness of udder, flank/upper legs and lower legs and lameness. Production and health records were collected from the farmers and record books for each animal.

Selection of farms

The family dairy farms were selected in Sirajganj district for complete the research, as it is the major milk producing district in Bangladesh. In the case of Sirajganj, farms were defined by the criteria (a) location, (b) size and (c) production system so as to cover the farm types that make important contributions to milk production in the region. Nearly half of the milk in Bangladesh is produced on the northern region, where Sirajganj district is located.

Farms and animals

This study involved the collection of data from dairy farm. The study focused on the Australian cross breed, as the majority of dairy cow in Sirajganj. About 33 dairy farm located in Sirajganj, a sample of 330 females that responded to a questionnaire. The herd size of the farms represents minimum 10 female cow (lactating cow, dry cow and heifers). The dairy cattle rearing method was similar (artificial insemination, calves being separate from mother at the age of 1 to 7 days and fed by man) in all family hold farms.

Questionnaire

Face-to-face interviews with the farmers were carried out using a questionnaire with multiple-choice and semi-closed questions to collect animal-linked parameters related to welfare. The first part of the interview covered data on farm characteristics such as number of dairy cattle in each category (total cows, lactating cows and heifers), and total milk production. The second part of the questionnaire referred to the welfare assessment parameters such as BCS, body injury, lameness, poor cleanliness, most important disease (mastitis, reproductive problems, ocular and nasal discharge, diarrhea, or other). At all times, farmers had the opportunity to clarify questions and added personal information and remarks.

Body condition scoring

An average score of 2 is the most desirable for the majority of the herd. A four point body condition score system was used, in which a score of 0 was very thin, and a score of 3 was very fat. These are extreme scores and should be avoided. Because only extreme BCS (too thin or too fat) is likely to have negative effects on animal welfare. Cows were classified as BCS 0 = very thin, BCS 1= thin, BCS 2 = ideal, and BCS 3 = obese. A condition score of 2 is thought to be acceptable for lactating Australian-local cross bred dairy cows.

Cleanliness score

Experimental animals were scored using a modification of the system described by Krebs et al. (2001). A scoring chart divided the animal body into five identifiable areas which were rated on a scale with anchor points at each end (0: clean and 1: dirty). The five regions were: hind limb, Udder, Flanks, dull hair coat, thick and shiny hair coat.

Lameness score

Lameness is painful to the animal, it is a serious welfare issue as cows suffer and is costly to the dairy farm business. Locomotion scoring is based on the observation of cows standing and walking (gait), with special emphasis on their back posture. The lameness score was recorded after the afternoon milking using a scheme proposed by Breuer *et al.*, (2000). Data were collected when cows were present in the shed. A score of 0 to 3 was used, where 0 was assigned when the animal was not lame (normal gait), 1 was given when the cow was mild lame, 2 was indicates, moderate lameness in cow and 3 was recorded when the cow was suffer from severely lame.

Milk yield

Data on milk traits (production) of per day were obtained directly from farmers' question and sore were from record book of farm. Cows which were complete 3 to 6 month lactation were considered. Manual milking was carried twice daily (at early morning and afternoon).

Skin Lesions and injury of body regions

During data collection on farm, cows were inspected for different lesions on different parts of animal body. The lesion and injuries was observed by directly and data was collected by observation of two side of body with some modification: the area around the carpal and tarsal joints, any lesions on head, abdomen and tail and percentage of cows per herd that presented skin lesion in each area was calculated (%).

Data Analysis

Percentage (%) of values was calculated for different variable. To find out the significance difference in milk yield in relation to history of mastitis and BCS, student's t test and analysis of variance were done by using SPSS v. 20.

RESULTS

Milk Yield

The mean values of milk yield are reported in Table 1, where milk yield categorized by BCS and mastitis (last 6 months from date of data collection). The average milk production of 173 cows was about 9.34% when cows were free from mastitis condition. On the other hand, high body scoring (3) animals produce higher amount of milk (average 10.32 L) and low body scoring (1) produce lower amount of milk (average 8.56 L). In below table 6, the significant level of mastitis absent cows is higher than mastitis present cows. In BCS case, there is no variation between score 1 and score 2 and milk production is higher than two other.

Table 1. Mean value (± SE) of milk yield

Measure	No. of animals		Milk Yield (Litre) (Mean ± Slandered Error)
History of Mastitis (last 6 Months)	Present	37	7.65 ± 0.42
	Absent	173	9.34 ± 0.21**
BCS	Score 1	48	8.56 ± 0.36 b
	Score 2	134	8.95 ± 0.23 b
	Score 3	28	10.32 ± 0.68 a
Total	**210**		**9.04 ± 0.19**

**=Significant at $p < 0.01$; Values with different letter differ significantly ($p < 0.05$)

Body condition Scoring (BCS)

Body condition is a subjective assessment of the amount of fat or amount of stored energy, a cow carries. In this study, majority of cows in all farms shows scoring 2. The highest percentage about 65.5% and lowest percentage about 10.0% those animals were represents scoring 2 and 3, respectively (Table 2).

Lameness

In that study, majorities of cows were not showed any lameness sign during on-farm observation. The higher lameness percentage about 94.8% that represents animals were free from suffering lameness condition. The percentage of mild, moderate and severe were 1.5, 3.0 and 0.6%, respectively (Table 3).

Table 2. Percentage value of cows according to BCS

Measure		No. of Animals	Percentage (%)
BCS	Score 1	81	24.5
	Score 2	216	65.5
	Score 3	33	10.0

Table 3. Percentage value of cows according to lameness

Parameter		No. of Animals	Percentage (%)
Lameness	Sound	313	94.8
	Mild	5	1.5
	Moderate	10	3.0
	Severe	2	0.6

Absence of injuries

In hock joint condition, in the present study most of the cows (83.6%) show healthy condition of the hock joint. The higher percentage of healthy hock about 83.6% and rest of the animals had swollen and mildly affected the hock joint 8.2% (Table 9). On the other hand during observation of knee injury, the highest percentage of no injury about 48.8%, swollen without skin injury about 19.4 and swollen with skin damage about 31.2% (Table 4).

Table 4. Percentage value of cows according to Leg injuries

Measure		No. of Animals	Percentage (%)
Hock Joint Condition	Healthy Hock	276	83.6
	Mildly affected Hock	27	8.2
	Swollen hock	27	8.2
	No Injury	161	48.8
Knee Injuries			
	Swollen without skin damage	64	19.4
	Swollen with skin damage	103	31.2

Cleanliness

In the present study, majorities of animal was showed dirty condition in different parts of body. The dirty percentage value in hind limbs, udder and flanks about 96.4, 55.9 and 55.0%, respectively (Table 5).

Health condition (Table 6)

In study, percentage of mastitis condition in farm is very lower about 12.6%. The hair loss and non-hock injuries percentage about 5.2 and 7.0%. Several symptoms highlighted an average percentage of cows with hampered respiration of 7.9% and nasal discharge, ocular discharge about 12.7 and 3.6%. Mean no. of coughs express per cow per 15 minutes and average percentage was about 3.3%. In feces condition most cows showed firm feces condition about 61.2% and other case not firm or liquid and liquid feces about 35.2, 3.6% respectively. About 76.4% cows showed normal teat and 23.0, 0.6% showed dry, acute lesion.

Table 5. Percentage value of different parts of cow's body according to cleanliness

Measure		No. of Animals	Percentage (%)
Dirty hind limbs	Present	317	96.4
	Absent	12	3.6
Dirty udder	Present	184	55.9
	Absent	145	44.1
Dirty flanks	Present	181	55.0
	Absent	148	45.0

Table 6. Percentage value of cows according to absence of disease

Measure		No. of Animals	Percentage (%)
Mastitis	Present	41	12.6
	Absent	289	87.6
Hair Loss	Present	17	5.2
	Absent	313	94.8
Non-Hock Injuries	Present	23	7.0
	Absent	307	93.0
Coughing	Present	11	3.3
	Absent	319	96.7
Nasal Discharge	Present	42	12.7
	Absent	288	87.3
Hampered Respiration	Present	26	7.9
	Absent	304	92.1
Ocular discharge	Present	12	3.6
	Absent	318	96.4
Feces	Firm	202	61.2
	Not Firm or Liquid	116	35.2
	Liquid	12	3.6
Teat Scoring Lactating	Normal	252	76.4
	Dry	76	23.0
	Acute Lesion	2	0.6

DISCUSSION

In this study farm were selected in Sirajganj district where large number of animals present and every family rear animals and those area should be selected to know the people should maintain or not maintain animal welfare in their farm. The 33 farms were small sample size and do not necessarily represent the welfare condition of cows throughout the Bangladesh. However the study probably constitutes the largest independently observe assessment of the welfare of dairy cows to have carried out in the Bangladesh. In this study, body scoring 2 animal were available in all farms. A body condition score of 2 may be the most desirable in late lactation. The prevalence of sore 2 is about 65.5% that indicates that those animals are suitable for farmers according to their income level. A condition score of 2 is thought to be acceptable for lactating dairy cow. Studer (1998) explained that high producing cows whose body condition score declines by 0.5 to 1.0 during lactation often experience anoestrus. Body condition affects productivity, reproduction, health and longevity of dairy cows. Dechow et al., (2001) found that higher body condition scores were favorably related genetically to reproductive performance during lactation. While higher body scores during lactation were moderately negatively related to milk production, both genetically and phenotypically. Good health is considered a prerequisite for welfare. Bovine lameness represents a major health problem for the dairy industry. A significant percentage of dairy cattle (59%) have severe lameness, this can be a sign of poor overall welfare standards within the herd. In the study the percentage of sound lameness is about (94.5%) that indicates the farmers were know the effect of lameness in their production and properly maintain their farm management. Hristov et al., (2008) noticed that lameness is indisputably the major welfare problem for the dairy cow. Lameness is a major welfare problem for dairy animals including pain and discomfort of long duration. This disease may be caused by several different factors, such as unbalanced nutrition, flooring and related time spent standing, etc. (Galindo et al., 2000; Winckler and Willen, 2001).

In this study lameness is less appear due farmers had awareness about lameness disease and some farmers kept their animals in pasture land in several times of day and vaccination should be done vaccination regularly. The causes of lameness in cows in the regions need to be investigated, considering that all herds have access to pasture for several hours per day, which is expected to reduce the incidence of the disease (Hernandez-Mendo et al., 2007). In this study dirty hind limb, udder, flanks are most common in all farms. The cows were spent several times in herd. Several dirty particles (such as feces, muds, urine) were present in herd that the cause dirtiness. Cows were several time lie down on floor that cause injury of body and body part show dirtiness. The prevalence of dirtiness was associated with surface of lying area and feeding different types of roughage. The percentage level of dirtiness in study area about 96.4%. The positive association between the prevalence of dirty hindquarters and head lunge impediments seems difficult to explain because more restricted stalls have often been associated with cleaner cows (Fregonesi et al., 2009). Most of the farmers used concrete floor in their farm that cause injury of knee region and few people used carpet or matt over the concrete floor where injury level was lower than concrete floor. The percentage of knee injury about 31.2% due to use of concrete floor and some associated factors. Barker et al., (2007) hypothesized that keeping cows temporarily in straw yards can thin the sole horn, which may lead to sole ulcers when cows are kept on hard floors after calving.

CONCLUSION

This study, the first done at dairy farm level in Bangladesh, is a first step towards finding a tool for veterinarians and farmers to assess dairy cow welfare. It is noted from our study that most of the farmers were not aware about the welfare issue related to dairy production. This study concluded that the most important hazards in relation to animal welfare were injury and dirtiness in different body parts, BCS and lameness. The reductions in productivity have been considered as an indicator of poor welfare indicators like BCS and milk yield was related to mastitis problem. It seems that lameness was the major welfare problem within the studied parameters. As this work was a preliminary study, it is, however, evident, that comprehensive research is needed to further develop the prototype protocol for the different production and housing system over the country.

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