



PREVALENCE OF FOOT DISEASES IN CATTLE IN TWO DAIRY FARMS

Sharmin Sultana^{1*}, Md. Akhtar Hossain, Mirza Abul Hashim, Tahmina Begum¹, Bayzer Rahman¹ and Maksudur Rashid¹

Department of Surgery and Obstetrics, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh; ¹Department of Livestock Services, Dhaka-1215, Bangladesh

*Corresponding author: Sharmin Sultana, E-mail: ssultana2310@gmail.com

ARTICLE INFO

ABSTRACT

Received
20 November, 2017

Accepted
26 December, 2017

Online
31 December, 2017

Key words

Foot diseases
Hoof problems
Lameness
Cattle
Prevalence

The prevalence of claw affections was investigated in 602 cattle in two organized dairy farms during June 2010 to May 2011. Of these cattle 176 were from Bangladesh Agricultural University Dairy Farm (BAUDF) and 426 were from Central Cattle Breeding Station and Dairy Farm (CCBSDF). These animals were studied under 6 groups: calf, heifer, pregnant cow, lactating cow, dry cow and breeding bull. Out of 426 cattle in CCBSDF, 85 animals were affected with various claw affections, the prevalence being 19.95%. The prevalence in BAUDF was 22.72%. Claw affections causing lameness comprised sole ulcer (3.82%), heel erosion (2.49%), interdigital necrobacillosis (2.15%), sand crack (1.82%), hoof overgrowth (3.32%) and white line disease (2.32%). The prevalence of lameness in BAUDF was 13.06% and that in CCBSDF was 11.50%. Sole ulcer (3.82%) was predominantly associated with lameness in both farms while the lowest prevalence of lameness was encountered with interdigital dermatitis (1.39%). The lowest prevalence of lameness was observed in calves in both BAUDF (0.56%) and CCBSDF (0.93%). Pregnant cows were the most vulnerable to claw diseases and manifested lameness of varying degrees. Hind limbs were more frequently affected with claw affections than fore limbs. Animals of over 5 years were mostly affected with foot diseases. Breeding bulls showed 2.27% prevalence of lameness in BAUDF and 1.87% CCBSDF. Among various affections sole ulcer ranked the highest in both the farms. Sand crack and interdigital necrobacillosis registered the lowest prevalence in BAUDF and interdigital dermatitis was the lowest in CCBSDF. Sole ulcer ranked the highest among all claw affections. Pregnant cow were more vulnerable to lameness. Hind limbs were frequently affected with various lesions than the forelimbs.

To cite this article: Sultana S, MA Hossain, MA Hashim, T Begum, B Rahman, M Rashid, 2017. Prevalence of foot diseases in cattle in two dairy farms. Res. Agric. Livest. Fish., 4 (3): 193-199.



This is an open access article licensed under the terms of the Creative Commons Attribution 4.0 International License

www.agroaid-bd.org/ralf, E-mail: editor.ralf@gmail.com

INTRODUCTION

Diseases are one of the major constraints of animal agriculture. Three major diseases affecting the dairy industries are mastitis, infertility and foot disease (Das, 2004). Among these diseases foot affections appear to be devastating disease of farm animals manifested by lameness. It incurs considerable economic loss due to decrease in milk yield (Lucey *et al.*, 1986), ranking third after mastitis, infertility and possibly metabolic diseases (Weaver, 1988) and increased risk of culling (Esslemont and Kossaibati, 1997). The majority of bovine lameness involves structures of the digit (Jubb and Malmo, 1991). The performance of cattle is significantly reduced due to claw affections. Majority of lameness in cattle occurs as a result of foot problem which may be caused by managerial and environmental factors, poor hygienic and nutritional practices (Blowey, 1993). Foot disease may be infectious or non-infectious or of traumatic origin (Scott, 1988). The present research work was carried out to study claw infection in two organized farms Bangladesh Agricultural University Dairy Farm (BAUDF) and Central Cattle Breeding Station and Dairy Farm, Savar (CCBSDF) with the following objectives: a) to study of the effect of age, sex and breed on the occurrence of foot disease, b) to determine prevalence of various foot diseases in cattle in organized farm and c) to study the influence of pregnancy and lactation on the claw affections.

MATERIALS AND METHODS

Animals used in the study

The study was conducted in Bangladesh Agricultural University Dairy Farm (BAUDF) and Central Cattle Breeding Station and Dairy Farm, Savar (CCBSDF) from June 2010 to May 2011. A total of 602 cattle including 176 from BAUDF and 426 from CCBSDF were investigated (Table 1). The surveyed animals were categorized as calf, heifer, pregnant, lactating and dry cows and breeding bulls.

Table 1. Cattle surveyed in Bangladesh Agricultural University Dairy Farm and Central Cattle Breeding Station and Dairy Farm

Category of animals	Number of cattle examined in BAUDF	Number of cattle examined in CCBSDF	Total number of cattle examined
Calf	32	64	96 (15.94)
Heifer	28	56	84 (13.95)
Pregnant cow	10	43	53 (8.80)
Lactating cow	56	134	190 (31.56)
Dry cow	28	66	94 (15.61)
Breeding bull	22	63	85 (13.78)
Total	176	426	602 (100)

Values within the parenthesis indicate percentage of total population

Clinical examination

Inspection

The gait and posture of cattle were observed to identify the gross affection in the claw. In presence of lameness, the claws were meticulously examined. For convenience of better examination, the claws were thoroughly cleaned with running water from a hose pipe. Gross pathological lesions were detected visually. Some claws required paring with knife.

Palpation and percussion of the claw

After proper controlling of cattle these two methods were performed to detect the painful condition of the affected area of the claw. Both claws were subjected to pressure applied with hoof tester in order to determine their sensitivity. Percussion with small hammer was used for locating painful lesion on the solar surface.

Detection and scoring of lameness

The posture and gait of animal was closely watched to detect the evidence of lameness. The animals were inspected from front side, from behind and from either side. Evidence of swelling, atrophy, wounds etc. was recorded. The animals were allowed to walk to detect any abnormality.

Scoring of lameness

Scoring of lameness in the present study was made following the method of Manson and Leaver (1988) as follows:

Score 0 :	No lameness. Normal gait and behaviour.
Score 1 :	Slight lameness, uneven gait or appear tender, possibly with downward extension of head and neck.
Score 2 :	Moderate lameness, difficulty in turning and walking.
Score 3 :	Severe lameness, difficulty in turning, affecting rising and normal behavior, mostly lying down.

Exploration with needle

If the affected area was swollen, needle exploration was performed for the diagnosis of the disease.

RESULTS AND DISCUSSIONS

Claw affections recorded in Central Cattle Breeding Station and Dairy Farm and Bangladesh Agricultural University Dairy Farm

At CCBSD, Savar 426 animals were inspected to detect claw lesions regardless of clinical signs. Of the total animals 19.95% were found to possess lesions of different types.. Among different category of animals examined lactating cows were found to possess the highest prevalence (6.80%) followed by breeding bulls (3.28%), pregnant cows (3.28%), heifers (2.82%), dry cows (2.11%) and calves (1.64%) (Table 2).

Table 2. Claw affections recorded in Central Cattle Breeding Station and Dairy Farm

Claw affections	Calf	Heifer	Pregnant cow	Lactating cow	Dry cow	Breeding bull	Total
Hoof overgrowth	2	1	2	4	2	2	13 (3.05)
Interdigital dermatitis	-	-	1	3	1	-	5 (1.17)
Interdigital necrobacillosis	1	2	1	4	1	1	10 (2.35)
Interdigital hyperplasia	1	2	3	6	1	1	14 (3.28)
Sand Crack	1	-	1	2	-	4	8 (1.87)
Sole ulcer	2	2	3	5	1	2	15 (3.52)
Heel erosion	-	3	2	2	2	2	11 (2.58)
White line disease	-	2	1	3	1	2	9 (2.11)
Total	7 (1.64)	12 (2.82)	14 (3.28)	29 (6.80)	9 (2.11)	14 (3.28)	85 (19.95)

Values within parenthesis indicate the percentage of occurrence

A total of 176 cattle were examined to detect the presence of claw affections irrespective of clinical signs. The highest claw affection was recorded in lactating cows (7.95%) while the lowest (1.13%) was obtained in calves (Table 3.)

Table 3. Claw affections recorded in Bangladesh Agricultural University Dairy Farm

Claw affections	Calf	Heifer	Pregnant cow	Lactating cow	Dry cow	AI bull	Total
Hoof overgrowth	1	-	1	3	-	2	7 (3.98)
Interdigital dermatitis	-	1	-	2	1	-	4 (2.27)
Interdigitalnecrobacillosis	-	1	-	-	1	1	3 (1.70)
Interdigital hyperplasia	-	-	1	3	1	1	6 (3.40)
Sand Crack	-	1	-	1	-	1	3 (1.70)
Sole ulcer	-	1	3	2	1	1	8 (4.54)
Heel erosion	-	-	1	2	1	-	4 (2.27)
White line disease	1	-	1	1	1	1	5 (2.84)
Total	2 (1.13)	4 (2.27)	7 (3.98)	14 (7.95)	6 (3.40)	7 (3.98)	40 (22.72)

Of various claw affections in both CCBSDF and BAUDF, sole ulcer constituted the highest prevalence (3.82%). This finding is supported by Eddy and Scott (1980). Prolonged standing in slurry makes the sole vulnerable to the effects of trauma (Raven, 1989). Poor management system, therefore, may be responsible for higher prevalence of sole ulcer in the present study.

Hoof overgrowth is thought to have genetic linkage (Glicken and Kendrick, 1977). Hereditary etiology has also been reported by Eddy and Scott (1980). Zinc deficiency, therefore, may play a role for hoof overgrowth. Chronic selenium toxicity may also be responsible for this defect (Blowey, 1993). A high prevalence of the interdigital hyperplasia has been observed where slurry was removed by automatic scrapers. Livesey et al. (1998) reported that metabolic stress in late pregnancy or early lactation may have contribution to the development of heel erosions.

Prevalence of lameness due to claw affections

Among different degree of lameness, the prevalence was 11.50% in CCBSD. The highest prevalence of lameness was found in pregnant cows (18.60%) followed by breeding bulls (12.69%), dry cows (12.12%), lactating cows (11.95%), heifers (8.93%) and calves (6.25%). In Bangladesh Agricultural University Dairy Farm, of 176 cattle observed in this study 23 animals showed lameness of varying degrees, the prevalence being 13.06%. Pregnant cow possessed the highest prevalence (20%) followed by breeding bulls (18.18%), lactating cow (16.07%), heifers (14.28%), dry cows (10.71%) and the lowest prevalence of lameness was found in calves (3.13%).

Pregnant cow was found to be more vulnerable to lameness in the present study (19.30%). This finding was supported by Choquette-levy (1985) who reported a higher prevalence (24.6%) in pregnant cows. In cows having an improper hoof shape with metabolic problems, the onset of lameness accelerates (Envoldsen et al., 1991). Impairment of metabolism during pregnancy may be related to increased prevalence of lameness. Lactating cows which showed the second highest prevalence (14.01%) of lameness in the present study is supported by Greenough (2007). There was relationship between the onset of lesion and the stage of lactation (Greenough et al., 1998). They also reported that sole ulcers generally appeared by the third or fourth month of lactation. Eddy and Scott (1980) surveyed two-thirds of these cases (66.4%) occurred within the first three months of lactation. They recoded 12.8% lameness during first lactation which increased by 8% in each additional lactation. The overall lameness ranged from 5.4% to as high as 46.2% (Endres, 2006).

Calves in the present study showed lowest prevalence (4.70%) of lameness among all categories of cattle. Eddy and Scott (1980) found 2.35% calves' lameness in their study. The reduced prevalence of lameness in calves may be due to the fact that they are less exposed to adverse environment and that their hooves were contacted with the floor for shorter period of time. The prevalence of lameness in bulls was 15.43%. Alien (1990) reported a similar prevalence of lameness (16.87%) in bulls. Increased occurrence of claw affections in breeding bulls may be due to their increased body weight, feed, lack of exercise and genetics.

Influence of age on the prevalence of bovine claw affections

Table 4. Prevalence of claw affections with respect to age in CCBSDF

SL No.	Categories of animals	Age group	Prevalence (%)
1	calves	<1 years	10.93%
2	Heifers	1-3years	18.18%
3	cattle	3-5 years	21.64%
4	Lactating and pregnant cows	>5 years	21.70%

Values within parenthesis indicate the percentage of occurrence

Table 5. Prevalence of claw affections with respect to age in BAUDF

SL No.	Categories of animals	Age group	Prevalence (%)
1	calves	<1 years	6.25%
2	Heifers	1-3years	25.00%
3	cattle	3-5 years	26.00%
4	Lactating and pregnant cows	>5 years	28.94%

Values within parenthesis indicate the percentage of occurrence

The disease was predominantly found in the lactating animals which is similar to the earlier observation (Envoldson *et al.*, 1991). Sole ulcer was surprisingly frequent during the first and second months of lactation (42.5% and 63% respectively) (Choquette-levy, 1985). The occurrence of hoof overgrowth was more frequent in the pregnant cows which are more likely to suffer from various deficiencies. In breeding bulls, marked hoof overgrowth was recorded.

Breeding bulls in the present study were also badly affected with interdigital hyperplasia; similar observation has been reported by Cirlan (1990). Lactating cows of over 5 years were more prone to this affection. But Enevoldsen *et al.* (1992) recorded a frequency of less than 1% in first lactation, rising to nearly 6% in later lactations. Lactating cows showed higher prevalence of white line disease than other animals in the present study. Petterson (2001) reported similar prevalence in the lactating cows. Pregnant cows were more affected with sole ulcer than the other category of animals. Increased occurrence of the disease in pregnant cows of over 3 years has been reported by Peterse (1992). He reported that old age and heel erosion acted as a predisposing factor to sole ulcer.

Occurrence of various claw affections with respect to limbs

In CCBSDF, the occurrence of claw affection in the forelimbs was 42.57% while that in the hind limbs was 58.43%. The most common affection affecting both fore and hind limbs was hoof overgrowth. The lowest claw affection was sand crack in case of forelimbs and interdigital dermatitis in hind limbs. In BAUDF, the occurrence of claw affection in the forelimbs was 36.36% while that in the hind limbs was 63.64%. The most common affection affecting both fore and hind limbs was sole ulcer. The lowest claw affection was heel erosion in case of forelimbs and interdigital necrobacillosis and sand crack in hind limbs.

The occurrence of sole ulcer was more frequent in the hind limbs and this is agreeable with the report of Arkins (1981). We found that overgrowth of hoof occurred due to higher weight in hind region during pregnancy. Hind limbs were more affected with interdigital hyperplasia than fore limbs in the present study. This agrees with the study of Rehman and Pearson (1982). We recorded higher prevalence of heel erosion in the hind limbs which correspond to the observations of earlier authors (Russell *et al.*, 1982; Bergsten and Petterson, 1992; Vermunt and Greenough, 1994; Murray *et al.*, 1996). Previously Scott (1988) suggested that an increase in the occurrence of the disease in the hind limbs may be due to increased weight bearing in the pregnant cows.

CONCLUSION

In conclusion, sole ulcer, interdigital hyperplasia and hoof overgrowth predominantly occurred in the animal. Hind limbs were more affected with lameness than fore limbs in the present study.

REFERENCE

1. Arkins S, 1981. Lameness in dairy cows, part I and II. *Irish Veterinary Journal*, 35:135-140.
2. Blowey RW, 1993. Common diseases of the foot. *Cattle lameness and hoof care*. Farming Press, Ipswich, UK. 39-55.
3. Bergsten C and Petterson B, 1992. The cleanliness of cows in tied stalls and the health of their hooves as influenced by the use of electric trainers. *Journal of Preventive Veterinary Medicine*, 13: 229-238.
4. Cirlan M, 1990. Hyperplasia interdigitalis in bulls. A genetic and epizootologic 6 year study. *Proceedings of the 4th International Symposium Disorders of the Ruminants Digit*, Paris, France, 54-59.
5. Choquette-Levy L, Baril J, Levy M and St-Pierre H, 1985. A study of foot disease of dairy cattle in Quebec. *Canadian Veterinary Journal*, 26: 279.
6. Das BR, 2004. Claw affection associated with lameness in cattle. PhD Thesis. Bangladesh Agricultural University, Mymensingh-2202, Bangladesh. 56-90.
7. Eddy RG and Scott CP, 1980. Some observations on the incidence of lameness in dairy cattle in Somerset. *Veterinary Record*, 113: 140-144.
8. Enevoldsen C, Grohn YT and Thysen J, 1991. Sole ulcers in dairy cattle: associations with season, cows' characteristics, disease and production. *Journal of Dairy Science*, 74: 1284-1298.
9. Enevoldsen C, Grohn YT and Thysen J, 1992. Heel erosion and other interdigital disorders in dairy cows: associations with season, cow characteristics, disease, and production. *Journal of Dairy Science*, 74:1299-309.
10. Endres JR, 2006. Incidence of lameness in dairy cattle. *Journal of Dairy Science*, 12: 234-256.
11. Glick A and Kendrick JW, 1977. Hoof overgrowth in Holstein Friesian Dairy cattle. *Journal of Heredity*, 68: 386-390.
12. Greenough PR, Weaver AD, Broom DM, Esslemont RJ and Galindo FA, 1998. Basic concepts of bovine lameness. In: *Lameness in Cattle*. Edited by Greenough PR and Weaver AD. Philadelphia, W.B. Saunders. P.10.
13. Greenough PR, 2007. *Bovine Laminitis and Lameness*. Philadelphia, WB Saunders. 199-205.
14. Jubb TF and Malmo J. 1991. Lesion causing lameness requiring veterinary treatment in pastures fed dairy cows in east Gippsland. *Australian Veterinary Journal*, 68: 21- 24.
15. Livesey CT, Marsh C, Johnston AM and May SA, JA. 1998. Hoof horn growth in Holstein Friesian. *Journal of Veterinary Medicine*, 23: 43-47.
16. Lucey S, Rowlands GJ and Russell AM. 1986. Short term associations between disease and milk yield of dairy cows. *Journal of Dairy Research*, 53: 7-15
17. Manson FJ and Leaver JD, 1988. The effect of concentrate; silage ratio and of hoof trimming on lameness in dairy cattle. *Journal of Animal Production*, 49: 191-199.

18. Murray RD, Downham DY and Clarkson MJ. 1996. Epidemiology of lameness in dairy cattle: description and analysis of foot diseases. *Veterinary Record*, 34: 45-47.
19. Peterse DJ, 1992. Judgment of bovine claws by the occurrence of sole lesions. Thesis, Utrecht, Netherlands. *In Practice*, 123-135.
20. Petterson B, 2001. The cleanliness of cows tied in stalls and the health of their hooves. *Journal of Preventive Veterinary Medicine*, 23: 78-79.
21. Raven TE, 1989. Determination of weight bearing by the bovine foot. *Netherland Journal of Veterinary Science*, 4: 354-367.
22. Rehman WC and Pearson EG, 1982. Clinical management of bovine foot problems. *Journal of American Veterinary Medical Association*, 18: 155-160.
23. Russell AM, Rowlands GJ and Shaw SR, 1982. Survey of lameness in British dairy cattle. *Veterinary Record* 111: 155-160.
24. Scott GB, 1988. Lameness and pregnancy in Friesian dairy cattle. *British Veterinary Journal*, 144: 273-289.
25. Vermunt JJ and Greenough PR, 1994. Predisposing factors of laminitis in cattle. *British Veterinary Journal*, 150: 151-154
26. Weaver AD, 1988. Cattle foot problems part 2: Diseases of the horn and corium. *In Practice*, 9: 35-40.