Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

Amit Baranwal
Ph.D., Scholar, Division of AGB,
ICAR-IVRI, Izatnagar, Bareilly,
Uttar Pradesh, India

Gaur GK
Principal Scientist and Incharge,
LPM Section, ICAR-IVRI,
Izatnagar, Bareilly, Uttar
Pradesh, India

Pruthviraj DR
Ph.D., Scholar, Division of AGB,
ICAR-IVRI, Izatnagar, Bareilly,
Uttar Pradesh, India

Prevalence of lameness in crossbred and Tharparkar cattle: A comparison

Amit Baranwal, Gaur GK and Pruthviraj DR

Abstract
Prevalence study is a significant epidemiological tool to assess burden of disease in a population. Lameness in cattle is economically significant disease associated with production, reproduction and animal welfare. In the present study, year wise prevalence varied from 4.10 to 31.84% in crossbred cattle, while 3.49 to 23.26% in Tharparkar cattle. Average prevalence of lameness in crossbred and Tharparkar was 13.67 and 11.05%, respectively. Occurrence of lameness in crossbred cattle was maximum in rainy season followed by winter and summer seasons.

Keywords: Prevalence, lameness, crossbred, Tharparkar

Introduction

The prevalence and incidence of a disease are among the most fundamental measures in epidemiology. Prevalence is a measure to assess the burden of a disease in a population of a geographical area at a particular time. This epidemiological tool assesses the need for health services and examines trends in disease or severity over time. It can be estimated as number of cases of the condition/ disease at a particular point in time. The study of prevalence of disease is important due to several reasons. Prevalence estimates of a disease provides context for diagnostic, preventive and curative decision-making [1]. Prevalence studies generate an idea about burden of disease, therefore identifies priorities in healthcare and policy making. Assessment of interventions based on baseline risk for a disease in a population and development of health economics models are other outcomes of prevalence studies [2]. Lameness in bovines is a multi-factorial systemic disease, which occurs in several distinct clinical forms and is characterized with local exposition in the claws [3]. Most common clinical manifestations during lameness are tissue damage, pain, discomfort and inability to walk [4]. Lameness can be defined as a clinical sign or symptom of a disorder that causes a disturbance in locomotion or change in gait resulting from pain or discomfort of hoof and leg injuries [5]. Lame cows can experience long-duration pain and discomfort [6]. Recently, lameness and its welfare implications have become one of the most widely acknowledged problem in organized intensive cattle farming system [7, 8]. It is an economically significant production disease [9, 10, 11] and losses include reduced quality and quantity of milk, weight loss and death [12]. Along with infertility and mastitis, lameness is ranked among the top three most common disorders of dairy cows [10, 13]. Decreased productive and reproductive performance [14], premature culling [10] with rising treatment cost are the most common impact of the disease. Culling level is higher for lame cows with claw lesions and reduced milk yield [15]. Approximately, 16% of dairy cattle are culled and slaughtered in the United States due to lameness [16]. Consequently, decreased carcass value is reported in culled cows [17]. Losses due to lameness are 260 US dollars/ year/ cow in the US [18]. Lameness and hoof disorders are also noted in Indian cows [19, 20].

Materials and Methods
Experimental Layout
In present study, prevalence of lameness was explored and compared in crossbred and Tharparkar cattle. For this, all lameness cases, noted between 2008 and 2018 were recorded year-wise from the sickness register of Cattle and Buffalo Farm, IVRI, Izatnagar. The crossbred cattle included in this study was Vrindavani cattle (Exotic: Holstein Friesian, Brown Swiss and Jersey (50-75%) and indigenous: Haryana (25-50%).

Corresponding Author:
Amit Baranwal
Ph.D., Scholar, Division of AGB,
ICAR-IVRI, Izatnagar, Bareilly,
Uttar Pradesh, India

Specifications
Some of the animals were found affected by lameness repetitively. Repetition of lameness in an individual after cure was considered as separate case. Animals more than one year of age were considered at risk for lameness. Mid-Year population was considered population at risk.

Data Analysis
Mid-year population of animal was calculated by taking average of populations at 1st January and 31st December of respective years. Year wise prevalence was calculated using following

$$\text{Prevalence \% (Year wise)} = \frac{\text{Total no. of cases in a year} \times 100}{\text{The mid-year population of the animals at risk of lameness}}$$

Average prevalence for cumulative years was calculated by taking their arithmetic mean. Year wise prevalence of lameness in crossbred and Tharparkar was subjected to arcsin transformation to normalize the data and difference in prevalence of two breeds was tested with the help of SAS using One way ANOVA.

Results
Both crossbred and Tharparkar cattle showed similar trends of year wise prevalence. Prevalence of lameness ranged from 4.10-31.84% in crossbred cattle, while 3.49-23.26% in Tharparkar. Both breeds had lowest and highest prevalence of lameness in similar years i.e. 2012 and 2018, respectively. Year- wise comparative prevalence of lameness in crossbred and Tharparkar cattle are depicted in Table 1 and Figure 1, given below.

Table 1: Year- wise prevalence of lameness in crossbred and Tharparkar cattle

Year	No. of animals affected		Mid-year population		Prevalence per cent	
	Crossbred	Tharparkar	Crossbred	Tharparkar	Crossbred	Tharparkar
2008	64	8	452	103	14.16	7.77
2009	25	6	458.5	117	5.45	5.13
2010	43	15	419.5	115	10.25	13.04
2011	28	10	334.5	88	8.37	11.36
2012	12	3	293	86	4.10	3.49
2013	33	7	301.5	91	10.95	7.69
2014	53	4	308	72	17.20	5.56
2015	43	10	334	67.5	12.87	14.81
2016	56	10	330.5	65	16.94	15.38
2017	56	10	307	71	18.24	14.08
2018	93	20	292	86	31.84	23.26

Average prevalence of lameness in Crossbred and Tharparker cattle was 13.67% and 11.05% respectively. There was no significant difference in the prevalence of crossbred and Tharparkar cattle.
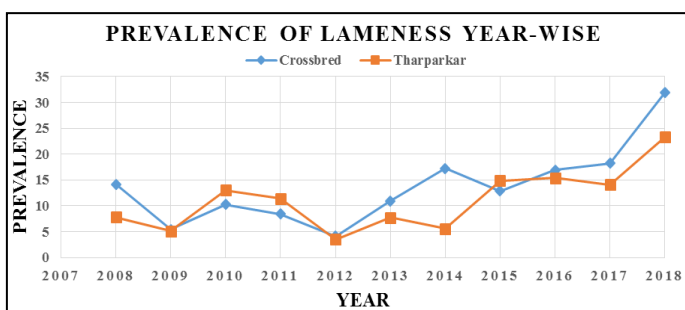

Figure 1: Year- wise prevalence of lameness in crossbred and Tharparkar cattle

Discussion
In our investigation the average prevalence of lameness in Crossbred and Tharparker cattle was 13.83% and 11.05% respectively. In United Kingdom, the prevalence of lameness varied from 25 to 35% [5, 21, 22, 23]. Incidence of lameness in Great Britain ranged from 5.5 to 65% [24, 25, 26, 27]. In New York State, the incidence of lameness within the first 70 days of lactation varies from 27 to 54% [28]. The incidence of lameness in Karan Fries crossbred cows was 65.54% [29] with 22.97% mild, 14.19% moderate, 21.62% lame and 6.75% severe cases. There are several reports of prevalence of lameness from different parts of India like 65.54% in KF cattle in Karnal[29], 9.42% in organized farms of Darjeeling district of West Bengal [27], 5.2 and 2.72% in cattle and buffalo respectively in and around Navsari district of Gujarat [30]. Our results were quite comparable with the studies of [27]. Incidence of lameness in Gir (19.48%) cattle was higher in comparison to crossbred cattle (10.39%) [30]. [31] reported 16.04% prevalence of lameness in a targeted milk producing population of Vrindavani Cattle at IVRI, Izatnagar, Uttar Pradesh. Difference in management is very important factor for the diseases like lameness. Highest and lowest prevalence of lameness for different breeds in same year justifies aforesaid fact. Further, outbreak of some infectious disease like Foot and Mouth Disease, Foot Rot and Bovine Digital Dermatitis may be the cause of higher prevalence in farm and field conditions. In our study, out of total cases of lameness in crossbred cattle, occurrence of disease was maximum in rainy season (43.7%) followed by winter (30.17%) and summer (26.13%). Higher occurrence of lameness in monsoon season may be due to higher humidity. Several researchers have found higher incidence of lameness in winter than in summer [25, 32].

Conclusion
From the current study, it could be concluded that prevalence of lameness do not differ significantly in crossbred and Tharparkar cattle at an organised farm. Year wise variation of prevalence in lameness was mainly due to different managemental practices across the years.

References
1. Ward MM. Estimating disease prevalence and incidence using administrative data: some assembly required. J Rheumatol. 2013; 40(8):1241-1243.
2. Harder T. Some notes on critical appraisal of prevalence studies Comment on: The development of a critical appraisal tool for use in systematic reviews addressing questions of prevalence. Int J Health Policy Manag. 2014; 3(5):289-290.
3. Greenough PR. Bovine laminitis and lameness - A hands-on approach. Saunders Elsevier, Philadelphia. 2007, 311.
4. O'Callaghan KA. Lameness and associated pain in cattle – challenging traditional perceptions. In Pract. 2002; 24:212-219.
5. Clarkson MJ, Downham DY, Faull WB, Hughes JW, Manson FJ, Merritt JB *et al*. Incidence and prevalence of lameness in dairy cattle. Vet. Rec. 1996; 138(23):563-567.

6. Green LE, Hedges VJ, Schuukken YH, Blowey RW, Packington AJ. The impact of Clinical Lameness on the Milk Yield of Dairy Cows. Anim Welfare. 2002; 85(9):2250-2256.

7. Hoblet K, Weiss W, Lowell M, Smilie R. Subclinical laminitis in dairy cattle: Maintaining healthy hoof horns. Compend. Contin. Educ. Proc. Vet. 2000; 22:97-107.

8. Nelson AJ, Cattell MB. Culling and laminitis: Real herds, real cows, real deaths. Bovine Pract. 2001; 35:42-45.

9. Fourichon C, Beaudeau F, Bareille N, Seegers H. Incidence of health disorders in dairy farming systems in western France. Livestock Production Science. 2001; 68:157-170.

10. Enting H, Kooij D, Dijkhuizen AA, Hiurne RBM, Noordhuizen- Stassen EN. Economic losses due to clinical lameness in dairy cattle. Livest Prod Sci. 1997; 49(3):259-267.

11. Kaneene JB. Hurd HS. The National Animal Health Monitoring System in Michigan. I. Design, data and frequencies of selected dairy cattle diseases, Preventive Veterinary Medicine. 1990; 8:103-114.

12. Webster AJF. Effects of housing and two forage diets on the development of claw horn lesions in dairy cows at first calving and in first lactation. Vet. J. 2001; 162:56-65.

13. Whitaker DA, Kelly JM, Smith EJ. Incidence of lameness in dairy cows. Vet. Rec. 1983; 113(3):60-63.

14. Sprecher DJ, Hostetler DE, Kaneene JB. A lameness scoring system that uses posture and gait to predict dairy cattle reproductive performance, Theriogenology. 1997; 47:1179-1187.

15. Sogstad AM, Osteras O, Fjeldaas O, Nafstad T. Bovine claw and limb disorders related to culling and carcass characteristics, Livestock Science.2007; 106:87-95.

16. NAHMS – National Animal Health Monitoring System. Reference of Dairy Health and Management in the United States. US Department of Agriculture: Animal Plant Health Inspection Service. Fort Collins: Veterinary Services CO. 2002, 15-19.

17. Van Arendonk JAM, Stokvisch PE, Korver S. Factors determining the carcass value of culled dairy cows, Livestock Production Science.1984; 11:391-400.

18. Guard C. Animal welfare and claw diseases. Proceedings of 13th International Symposium and 5th Conference on Lameness in Ruminants. 2004, 155-158.

19. Chawla SK, Chandra IS, Singh J, Nigam JM, Tyal R, Krishnamurthy D. Incidence of foot disorders in cattle and buffaloes. J. Res. Haryana Agri. Univ. 1991; 21:93-100.

20. Singh S, Prabhakar S, Singh SS, Ghuman S. Incidence of lameness in dairy cows and buffaloes. Indian Vet. J. 1999; 75:51-53.

21. Whay HR, Main DCJ, Green LE, Webster AJF. Assessment of the welfare of dairy cattle using animal-based measurements: direct observations and investigations of farm records. Vet. Rec. 2003; 153:197-202.

22. Haskell MJ, Rennie LJ, Bowell VA, Bell MJ, Lawrence AB. Housing system, milk production, and zero-grazing effects on lameness and leg injury in dairy cows. J. Dairy Sci. 2006; 89:4259-4266.

23. Barker ZE, Leach KA, Whay HR, Bell NJ, Main DCJ. Assessment of lameness prevalence and associated risk factors in dairy herds in England and Wales. J. Dairy Sci. 2010; 93:932-941.

24. Ward WR. Recent studies on epidemiology of lameness. Proceedings of VIIIth International Symposium on Disorders of ruminant Digit. Banff, Canada. 1994, 197-203.

25. Murray RD, Downham, DY, Clarkson MJ, Faull WB, Hughes JW, Manson FJ et al. Epidemiology of lameness in dairy cattle: description and analysis of foot lesions. Vet Rec. 1996; 138: 586-591.

26. Whitaker DA, Kelly JM, Smith S. Disposal and disease rates in 340 British dairy herds. Vet Rec. 2000; 146:363-367.

27. Nandi SK, Roy S, Mukherjee P, Goswami A, Majumder D. Epidemiology of lameness in dairy cattle of hilly region of west Bengal: the influence of pain on performance. LRRD. 2008, 20(1).

28. Bicalho RC, Vokey F, Erb HN, Guard CL. Visual locomotion scoring in the first seventy days in milk: impact on pregnancy and survival. J Dairy Sci. 2007; 90(10):4588-4591.

29. Singh M, Lathwal S, Singh Y, Kumar A, Gupta AK, Mohanty TK et al. Association of lameness with per cent body weight distribution and shifting to individual limbs of static Karan Fries crossbred cows. Indian J. Anim. Sci. 2012; 82(9):962-970.

30. Bhatt HD, Kelawala NH, Dabas VS, Bhatt RH, Jhala SK, Suthar DN et al. Incidence of hoof disorders in bovine of south Gujarat. International Journal of Science, Environment and Technology. 2016; 5(5):3346-3351

31. Prakash C. Identification of single nucleotide polymorphisms associated with tolerance / susceptibility to lameness in vrindavani cattle. M.V.Sc. Thesis. 2016; ICAR-IVRI, Izatnagar, Bareilly.

32. Cook NB. Prevalence of lameness among dairy cattle in Wisconsin as a function of housing type and stall surface. J Am. Vet. Med. Assoc. 2003; 223:1324-1328.