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Prevalence of Foot Affections of Buffaloes (*Bubalus bubalis*) with Their Associated Risk Factors in Rupandehi, Nepal

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ABSTRACT

Buffaloes play an important role in the milk and meat industry in Nepal. Foot affections have a direct impact on production and reproductive performance of the animals. This study was carried out to determine the prevalence of foot affections of buffaloes and to explore the risk factors associated in Siddharthanagar municipality, Rupandehi. Foot affections were physically investigated and examined from October 2022 to January 2023 A.D. Purposive sampling from different free rearing grazing systems and stall-feeding grazing systems was done. The farmers were asked questionnaire along with physical and clinical examination of buffaloes was performed. The cases were classified on the basis of age, sex, floor system, grazing system and limbs involved. Out of 811 buffaloes examined, 52 cases were found with foot affections, resulting in overall prevalence of 6.41%. The foot affections found were Overgrowth of Hoof (4.9%), Corkscrew (0.99%), Digital Dermatitis (0.25%), and Scissor claw (0.25%). The higher prevalence was observed in the age group greater than two years. The females had higher occurrence of foot affections. Stall fed buffaloes had shown more affections than free range grazed buffaloes. Buffaloes kept in concrete floor had shown more affections in comparison to mud floor. The higher occurrence of foot affections was observed in hindlimbs and in medial claws. It is recommended that further studies are required to address the foot affections in livestock and their management.

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Introduction

The contribution of livestock sector is 13% to Gross Development Product (GDP) and 26.8% to Agriculture Gross Development Product (AGDP) (MoALD, 2020/21). The foot diseases have direct impact on production and reproductive performance of the animals (Kalsi et al., 2002). Various foot affections found in livestock are FMD, Foot rot, Abscesses, Contusion of sole, Sole ulcers, Laminitis, Avulsion/Evulsion of hoof, Digital dermatitis, overgrown hoof, etc. (Patil, 2016). Among the various infectious diseases of livestock, Foot and Mouth disease (FMD) being a transboundary disease is a major and highly transmissible infection of cloven-hoofed animals that causes huge economic losses to the livestock industry worldwide. Bovine hooves grow about 1/5th to 1/4th of an inch every month (Hepworth et al., 2004). The foot affections in livestock may depend upon the type breeds, parity, floor, limbs involved, claw involved, trauma conditions, quantity of feed given, etc. Foot diseases in buffaloes may undergo sustained due to farmers' ignorance and practical difficulties in association with the regular examinations and treatment of affected animals (Bagate et al., 2012). Failure in treatment of these foot affections to the patients leaves no choice other than culling. In the fiscal year 2020/21 AD, the population status buffaloes were 5,159,931, whereas in Rupandehi district, the population status of buffaloes was 151,128 (MoALD, 2022). In Siddharthanagar municipality, the population status of buffaloes is 2987. Foot problems causing lameness, generally arises due to management and environment factors, poor hygiene, and nutritional practices. (Sadiq et al., 2017).

The total milk produced by buffalo in the year 2020/21 was 1,419,412 Mt. Lt. and the net meat production of buff was 188,172 Mt. Kg (MoALD, 2020/21). Milk yield reduction, reduced feed intake, decreased conception rate, weight loss, mortality, etc. are some of the effects caused by lameness in animal (Konwar et al., 2015). The farmers are still unaware about various foot affections and their management techniques. The level of ignorance by farmers can worsen the condition of the animal already affected. Foot affections lead to production and economical losses. Due to very few researches about foot affections in cattle and buffalo, this research can help for better understanding in preventing foot diseases.

Methodology

Study area and period

A descriptive type of study was conducted at Siddharthanagar municipality, Rupandehi, Nepal. There are 13 wards in the municipality as shown in Figure 1. The study period was of three-month time period i.e., October 2022 to January 2023 A.D.

Collection of data

Data was purposively collected from different free rearing systems and stall-feeding systems. The farmers were asked for the cooperation with the data collection after explaining about the study. The farmers were interviewed first and questionnaire was asked. After the questionnaire, the clinical examination was done by visual inspections of the foot, gait of animals, the posture of the animals, and palpation of the affected area.

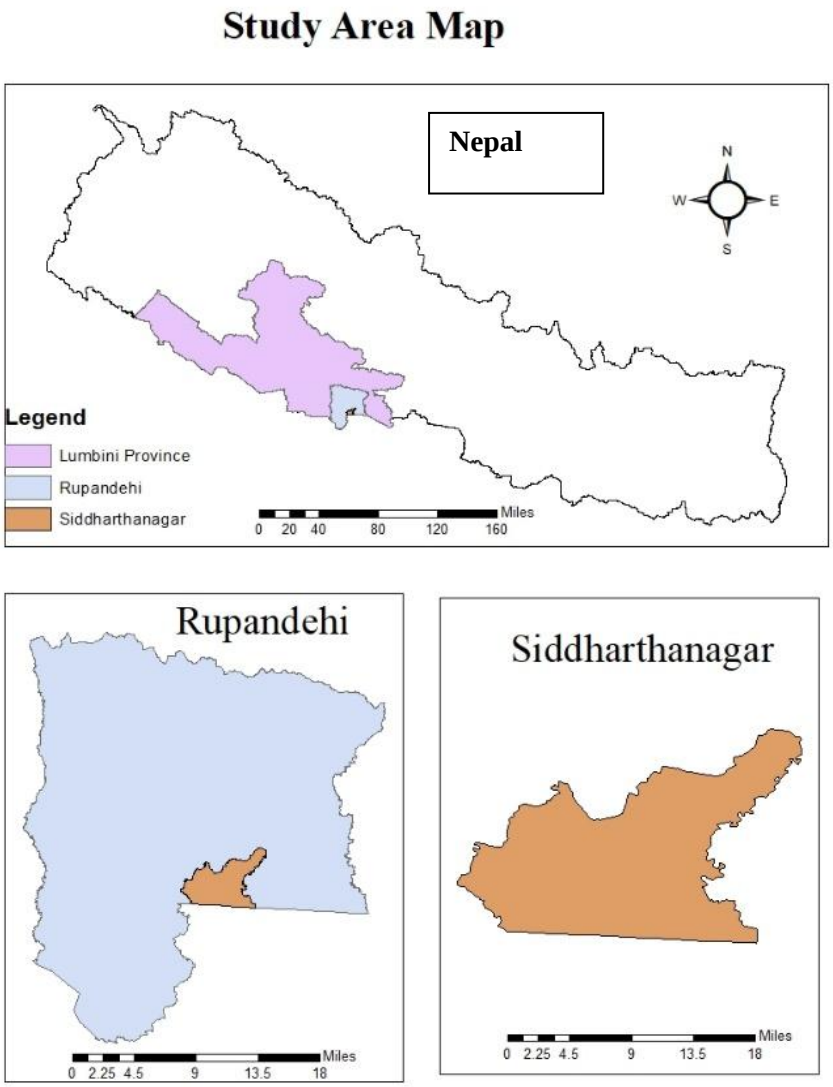

Figure 1. Map of Siddharthanagar municipality, Nepal

Population Size

The population status of buffaloes in Siddharthanagar municipality is 2987, according to Siddharthanagar municipality reports, 2079 B.S. (2022 A.D.). A total 343 buffaloes were recruited for the study. The sample size was calculated by using the following formula:

$$n = \frac{z^2 * p(1-p)] / e^2}{1 + [z^2 * p(1-p)] / e^2 * N}$$

Source: Ausvet Epitools (https://epitools.ausvet.com.au/casecontrolss)

Where,

n = Sample size
z = z-score for level of confidence 95%
p = population proportion
e = margin of error

The z score for 95% confidence level is 1.96, the population proportion is kept 50%, and 5% margin of error. However, 811 buffaloes were observed.

Case Classification

The cases were classified on the basis of:

Age: - Less than 2 years
- 2 years
- Above 2 years
Sex: **-** Male
- Female
Floor: - Concrete
- Mud
Housing System:
- Free rearing system
- Stall feeding system
Limbs: - Forelimb
- Hindlimb

Questionnaire survey

A questionnaire survey was done with each farmer to access the management aspects, and its possible risks related to the foot affections in the buffaloes at Siddharthanagar municipality. The questionnaire consists of the details about personal information (optional), total number of buffaloes, ages, sex, breed, parity, floor, housing and grazing system, foot affections, affected limbs and claws.

Data analysis

The obtained data was collected and coded in Program Microsoft Office Excel 2019 with P value 0.05.

Result

Overall prevalence of Foot affection in buffaloes in Siddharthanagar Municipality, Rupandehi

Out of 811 buffaloes examined, 52 animals were found to have affections on their foot resulting in overall prevalence of 6.41% in Siddharthanagar municipality, Rupandehi, mentioned in Table 1. The foot affections found in buffaloes were Overgrowth of hoof, Corkscrew, Digital dermatitis, and Scissor claw. The prevalence of Overgrowth of hoof was 4.90 %, Corkscrew was 0.99%, Digital dermatitis was 0.25%, and Scissor claw was 0.25% presented in Table 2.

Table 1. Overall prevalence of Foot affections

Number of animals observed	Foot affections seen	Prevalence
Buffalo = 811	52	6.41%

Table 2. Types of foot affections observed

Foot Affections	Total	Prevalence
Overgrowth of Hoof	40	4.90%
Corkscrew	8	0.99%
Digital Dermatitis	2	0.25%
Scissor Claw	2	0.25%
Total	52	6.41%

FOOT AFFECTIONS FOUND DURING THE SURVEY

Figure 2. Scissor Claw (FRM) **Figure 3.** Digital Dermatitis
Figure 4. Corkscrew claw (HLM) **Figure 5.** Overgrowth of Hoof (FRM)

Prevalence of Foot affections in relation to age

The highest prevalence of foot affections in relation to age was recorded in the age group of greater than two years (61.53%) followed by less than two years age (34.61%) and group of two years age (3.84%) shown in Figure 6. In the group of less than two years of age, the occurrence of Overgrowth of Hoof was 25.00%, Corkscrew was 75.00%, Digital Dermatitis was 100.00%, and Scissor claw was 0.00%, among overall prevalence. Similarly, in the age group of two years, the occurrence of Overgrowth of Hoof was recorded to be 5.00%, whereas no other foot affections were found.

In the age group of greater than two years, the occurrence of Overgrowth of Hoof was 70.00% followed by Corkscrew (25.00%), Digital Dermatitis was 0.00%, and Scissor claw was 100.00%, among the overall prevalence.

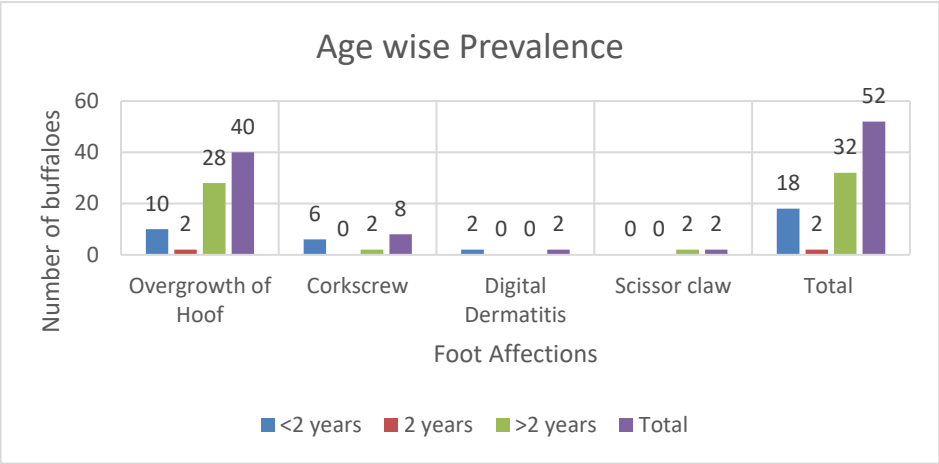

Figure 6. Age-wise graph distribution of various foot affections

Prevalence of Foot affection in relation to sex

The highest prevalence of Foot affections in relation to sex was found in Females (100%) whereas there was no prevalence of Foot affections in Males i.e., 0% shown in Figure 7. The occurrence of Overgrowth of Hoof was 100%, Corkscrew was 100%, Digital Dermatitis was 100%, and Scissor claw was 100% in Females, among the overall prevalence.

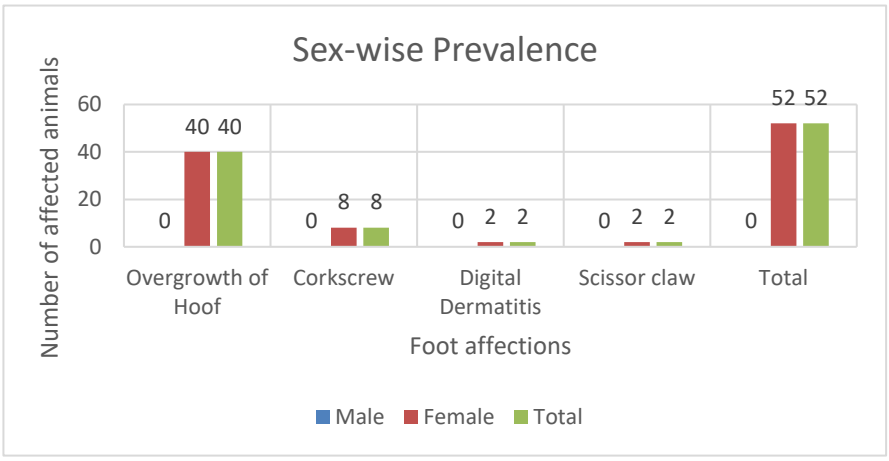

Figure 7. Sex-wise graph distribution of various foot affections

Prevalence of Foot affection in relation to grazing system

The highest prevalence of Foot affections in relation to Grazing system was found in Stall feeding grazing system (50.00%) followed by Free range grazing system (34.61%) and Both type of grazing system (15.38%) mentioned in Figure 8. In the Stall-feeding grazing system, the occurrence of Overgrowth of Hoof was 50.00%, Corkscrew was 50.00%, Digital Dermatitis was 100.00%, and 0.00% Scissor claw, among the overall prevalence. In Free range grazing system, the occurrence of Overgrowth of hoof was 30.00%, 50.00% Corkscrew, 0.00% Digital Dermatitis, and 100.00% Scissor claw among the overall prevalence. In addition, only 8.00% occurrence of Overgrowth of Hoof was seen in both type of grazing system with 0.00% occurrence of other foot affections.

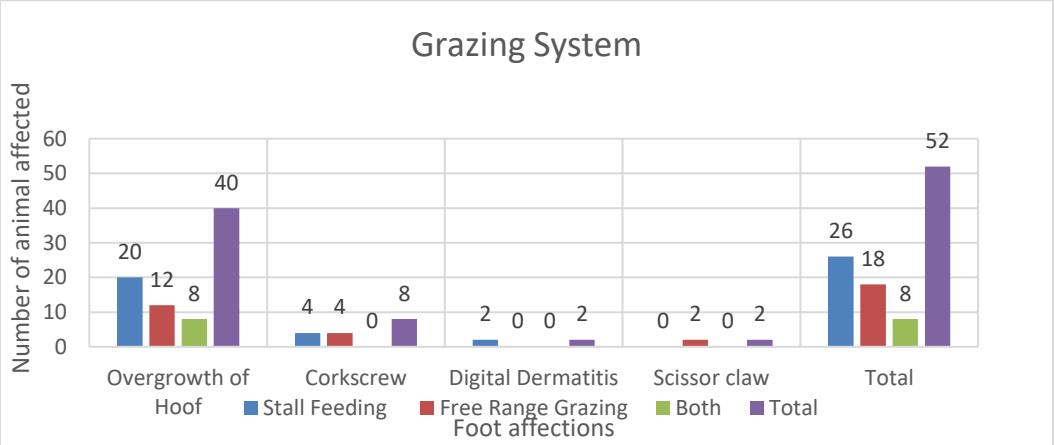

Figure 8. Graph showing types of foot affections in relation to grazing system

Prevalence of Foot affections in relation to the different types of floors

In relation to different types of floors where the animals are kept, the highest prevalence of foot affections was seen in Concrete type of floor with 86.53% prevalence, followed by Mud type of floor with prevalence of 13.46% shown in Figure 9. In the Concrete type of floor, the occurrence of Overgrowth of Hoof was 90.00%, Corkscrew 87.50%, 0.00% Digital Dermatitis, and 100.00% Scissor claw among overall prevalence. In the Mud type of floor, 10.00% Overgrowth of Hoof, 12.50% Corkscrew, 100.00% Digital Dermatitis, and 0.00% Scissor claw was observed among the overall prevalence.

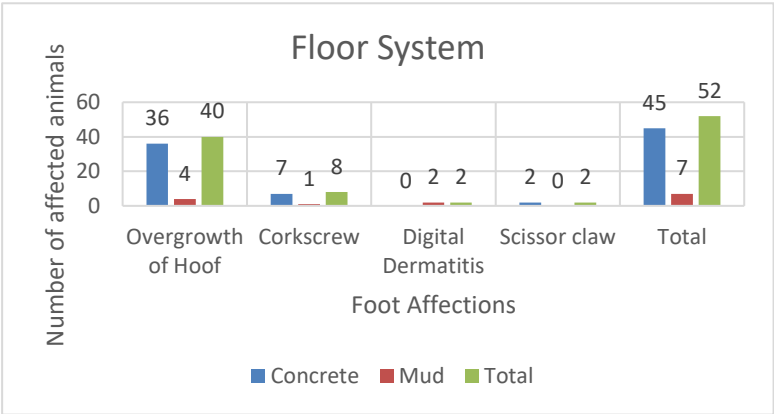

Figure 9. Graph showing types of foot affections in relation to types of floor system

Prevalence of Foot affections on the basis of limbs and claws

In relation to the limbs of animal, the hindlimbs have more foot affections than forelimbs with the prevalence of 51.92% in hindlimbs, 42.30% in forelimbs, and 5.76% in both limbs shown in Figure 10. In forelimbs, 47.50% Overgrowth of Hoof, 25.00% Corkscrew, 50.00% Digital Dermatitis, and 0.00% Scissor claw, among the overall prevalence was observed. In hindlimbs, 45.00% Overgrowth of Hoof, 75.00% Corkscrew, 50.00% Digital Dermatitis, and 100.00% Scissor claw among overall prevalence was seen. 7.50% Overgrowth of Hoof was seen in both limbs among the overall prevalence.

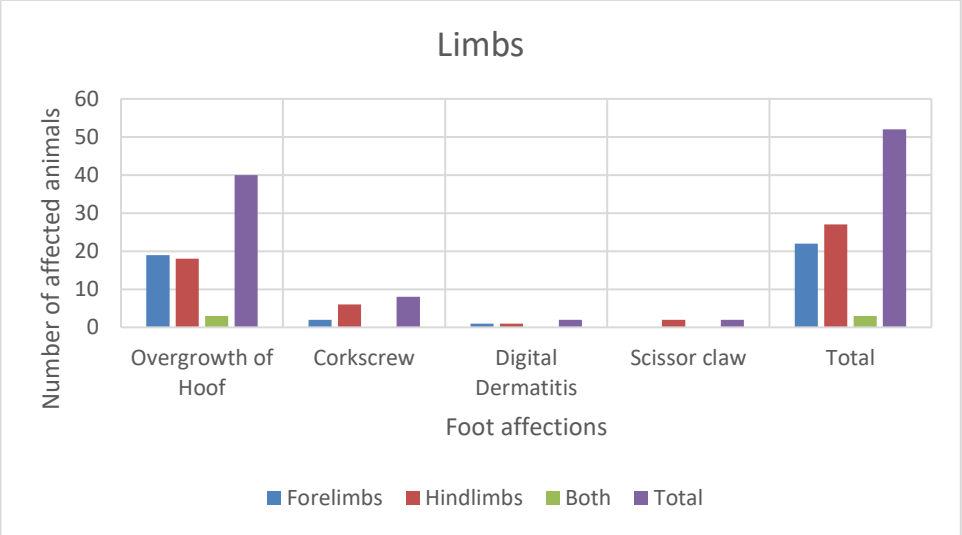

Figure 10. Graphs showing types of foot affections on the basis of limbs

Higher prevalence of foot affections was seen in medial claw (72%) than lateral claw (28%) mentioned in Figure 11. 80% of the Overgrowth of Hoof was seen medial claw and 20% was seen in lateral claw, with respect to the overall prevalence. 25% Corkscrew was seen in medial claw and 75% cases was seen in lateral claw, with respect to overall prevalence. 50% cases of Scissor claw were seen in both medial and lateral claws, with respect to the overall prevalence.

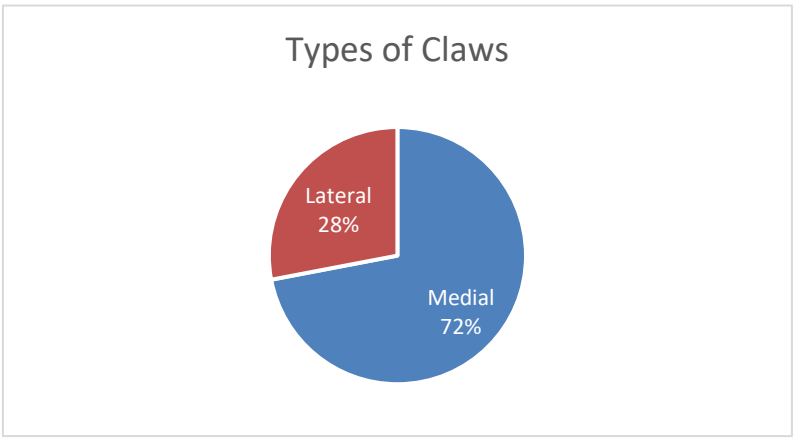

Figure 11. Pie-chart showing claw-wise prevalence of foot affections

Discussion

This study showed 52 buffaloes had foot affections among 811 buffaloes in Siddharthanagar municipality, which were non-infective in nature. Such non-infective foot affections are mostly prone to non-clinical or sub-clinical laminitis. There could be multiple factors involved to cause such foot affections such as age, sex, grazing system, floor, etc. These sub-clinical foot affections may not show significant problems but serve as a major contributor to progressive clinical foot and claw lesions as they tend to be persistent and generally ignored by the farmers. The foot affections found during the study and overgrowth of hoof was observed, followed by Corkscrew, Digital dermatitis, and Scissor claw.

The foot affections were more observed in older buffaloes of age group greater than two years which is not similar to the findings of Alam et al. (2022), which showed higher prevalence in between 1-2 years of age group. The results obtained in the research might be due to the physical changes occurring during gestation and after calving. The animal's body size increases which may affect the horn in the foot and corium, which may alter the integrity of the hoof. During the study, it was also observed that no hoof-trimming or foot-dipping practices were seen.

Female buffaloes were seen with higher prevalence of foot affections in the study. This finding is also supported by Alam et al. (2022) which might be due to the frequent handling of female animals for milking purposes. The stress in female with heavy milk production during the first 3 to 4 months post-calving also further contribute the laminitis processes (Rowlands et al., 1985). This finding resulted due to a smaller number of male population of buffaloes in comparison to the females. Male buffaloes with any problems are generally not kept by farmers and are sent to the meat industry.

Based on the grazing system, Stall fed grazing system had the higher prevalence of foot affections, which might be due to stress, longer standing position in uncomfortable and unhygienic condition of the stall. The concrete floor had shown higher prevalence (86.53%) than the mud floor, which is also supported by Gupta et al. (2022), Rahman et al. (2013), and Parmar et al. (2014). This might be due to higher chances of injuries and continuous effects on sensitive tissues of claws. There might be other effects on foot depending upon the floor type and materials used in making floor.

The hindlimbs have more foot affections in comparison to the forelimb, which is also supported by Gupta et al. (2022) but Chakrabarti and Kumar (2016) reported otherwise. This might be due to carrying of more weight in the hindlimbs and lack of proper sanitation near the hindlimbs. Higher prevalence of foot affections was seen in medial claw (72%) than lateral claw (28%). The lateral claws are more exposed to the ground and external environment which may be a reason to rub and wither claws and more chance for occurrence of medial claws affections.

Conclusion and Recommendation

The prevalence rate of foot affections in buffaloes at Siddharthanagar municipality during the study was found to be 6.28%. The foot affections found were Overgrowth of Hoof, Corkscrew, Digital Dermatitis, and Scissor claw. In relation to age, higher prevalence was seen in age group of more than two years. Females had more foot affections while no affections were seen in male. Stall feeding grazing system had shown more foot affections in comparison to free range grazing system. More foot affections were seen in concrete floor than in mud floor. While comparing the limbs, hindlimbs had shown more foot affections and medial claws had shown to have more foot affections.

Conflict of interest

The authors have declared no conflict of interest.

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References

1. Bagate M S, Mahla J K, Parikh P V and D B Patil, 2012. Incidence of foot disorders in dairy animals-A retrospective study. Intas Polivet, 13(2): 192-194.
2. Bhatia M S, Patil D B, Parikh P V, Parmar J J, Mehta T A, Rajput P K and S Parnerkar, 2016. Occurrence of bovine hoof affections in Anand district of Gujarat. Indian Journal Veterinary Surgery, 37(1): 54-56.
3. Chakrabarti A S I T and Kumar P A N K A J, 2016. Incidences of foot diseases of cattle in Bihar, India. International Journal Agricultural Science Research, 6*:* 267-272.
4. Enting H D, Kooij A A, Dijkhiuzen R B M, Huirne R B M, AND Noordhuizen-Stassen E N, 1997. Economic losses due to clinical lameness in dairy cattle. Livestock Production Science, 49: 259-267.
5. Frank B and Bergsten C, 1996. Sole haemorrhages I tied primipirous cow as an indicator of laminitis: Effect of diet, flooring and season. Acta Veterinaria Scandinavica, 37: 383-394.
6. Garbarino EJ, Hernandez JA, Shearer JK, Risco CA and WW Thatcher, 2004. Effects of lameness on ovarian activity in postpartum Holstein cows. Journal of Dairy Science, 87: 4123-4131.
7. Gonzalez- Sagues A, 2005. Clinical attention to lameness. Albeiter, 91: 12-15.
8. Hepworth K, Neary Mand S Kenyon, 2004. Hoof anatomy, care and management in livestock. Purdue Agriculture, 10(04): 9.
9. Hernandez JA, Garbarino EJ, Shearer JK, Risco CA and WW Thatcher, 2005. Comparison of the calving-to-conception interval in dairy cows with different degrees of lameness during the prebreeding postpartum period. Journal of. American Veterinary Medical Association, 227: 1284-1291.
10. Hussain R, Mahmood F, Aslam B, Siddique AB, Rafique A, Khaliq SA, Khan I, Imran S, Mubeen M, Jahanzaib and Nasir AA, 2020. Investigation of different serotypes of FMDV in vaccinated Buffaloes (*Bubalus bubalis*) in Southern Areas of Punjab Province, Pakistan. Pakistan Veterinary Journal, 40(1): 118-122.
11. Islam M D, R A Runa, M M Alam, 2020. Prevalence and risk factors analysis of bovine foot diseases in certain milk pocket areas of Sirajganj District, Bangladesh. Veterinary Sciences: Research and Reviews, 6(2): 73-79.
12. Kalsi J S, Randhawa S S and S R Swaran, 2002. Surveillance of foot disorders in dairy cattle of Punjab. Indian Journal of Veterinary Medicine, 22: 70-74.
13. Konwar B, Saikia B and H Bayan, 2015. Survey of Foot Affections in Mizoram Dairy Animals. Indian Veterinary Journal, 92(7): 82-83.

14. Kossaibati M A and Esslemont R J, 1997. The cost of production diseases in dairy herds in England. Veterinary Journal, 154: 41-51.
15. Melendez P, Bartolome J, Archbald LF and A Donovan, 2003. The association between lameness, ovarian cysts and fertility in lactating dairy cows. Theriogenology, 59: 927-937.
16. Mishra P P, Sonu J, Gupta R K, Bhoopendra S, Singh V K and Harnam S, 2020. Prevalence of hoof disorders in cattle in Ayodhya district of Uttar Pradesh, India. Journal of Experimental Zoology, India, 23(2): 1341-1350.
17. Ministry of Agriculture and Livestock Development, 2022. Retrieved from Ministry of Agriculture and Livestock Development, Government of Nepal website: https://moald.gov.np/ministry-introduction.
18. Nguhiu-Mwangi J, Mbithi P M F, Wabacha J K and Mbuthia P G, 2012. Risk (Predisposing) factors for non-infectious claw disorders in dairy cows under varying zero-grazing systems. *A Bird's-Eye View of Veterinary Medicine. Rijeka, Croatia: InTech*, 393-422.
19. Parajuli P, Pandit S and K Kaphle, 2020. Foot and Mouth Disease (FMD) among Animals in Nepal. International Journal of Applied Sciences and Biotechnology, 8(1): 7-13.
20. Parmar J J, Patel P B and Kag B G, 2014. Incidence of hoof affections in cattle of North Gujarat. Indian Journal of Veterinary Surgery, 35(1): 61-63.
21. Rahman M A, Imtiaz M A, Ahaduzzaman M, Ghosh K K, Masud A A, Chowdhury S and Sikder S, 2014. Effects of flooring and rearing system on hoof health of dairy cows in some selected areas of Bangladesh. Bangladesh Journal of Animal Science, 43(2): 132-137.
22. Rowlands G J, Russell A M and Williams L A, 1985. Effects of stage of lactation, month, age, origin and heart girth on lameness in dairy cattle. The Veterinary Record, 117(22): 576-580.
23. Russell A M, Rowlands G J, Shaw S R and A D Weaver, 1982. Survey of lameness in British dairy cattle. The Veterinary Record, 111(8): 155-160.
24. Sadiq M B, Ramanoon S Z, Mansor R, Syed-Hussain S S and Shaik Mossadeq W M, 2017. Prevalence of lameness, claw lesions, and associated risk factors in dairy farms in Selangor, Malaysia. Tropical Animal Health and Production, 49(8): 1741-1748.
25. Sogstad A M, Østeras O and T Fjeldaas, 2006. Bovine claw and limb disorders related to reproductive performance and production diseases. Journal of Dairy Science, 89: 2519-2528.
26. Vermunt JJ and Greenough PR, 1995. Structural characteristics of the bovine claws: horn and wear, horn hardness and claw conformation. British Veterinary Journal, 151: 157-180.