








Original article

The Occurrence of Bovine Digital Dermatitis (BDD) on Service Period in Dairy Cows in Kosovo

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Abstract

The aim of the study was to estimate the frequency of bovine digital dermatitis (BDD) in dairy cows in region of north Kosovo in the period of time from calving to conception. A total of 200 dairy cows were examined clinically for the presence of bovine digital dermatitis (BDD) on service period in Dairy Cows in Kosovo. 25 out of 200 cows have been affected by BDD. The prevalence of this condition was evaluated, and the time of successful insemination was surveyed. The most affected numbers of animals were first parity heifers 11 or 44 %, CI 95% (26.67 to 62.93), second parity 06 or 24 %, CI 95% (11.5 to 43.43), third parity 04 or 16 %, CI 95% (6.40 to 34.65), fourth parity 03 or 12 %, CI 95% (4.16 to 29.95) as well as fifth parity with 03 or 12 %, CI 95% (4.16 to 29.95). Our study revealed that the hind legs were mostly affected than the front legs. 64 % of the pathologies were detected in the hind legs and 36 % in the front legs. The affected cows were successfully inseminated 127, 2 ± **14.42** days after parturition. This study shows on how important is the health management of the farms and farmers are often not cautious about the consequences.

Keywords: Animals, Bovine Digital Dermatitis, Dairy Cows, Foot Rot.

Received: 20 October 2019 * **Accepted:** 25 November 2019 * **DOI:** <https://doi.org/10.29329/ijjaar.2020.238.4>

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INTRODUCTION

Bovine digital dermatitis (BDD) was first described in Italy in 1974 (Cheli and Mortellaro, 1974) and is now widespread throughout Europe and North America. Bovine digital dermatitis is an emerging infectious disease that causes lameness, decreased milk production, and weight loss in livestock (Middelveen and Stricker, 2011). The incidence of BDD appears to be increasing worldwide (Brandt et al., 2008). There is some uncertainty about etiology of BDD and the contributing factors. Recent studies have associated it with various *Treponema* spp. phylogroups identified in the deeper epidermal layer of affected tissues (Nordhoff et al., 2008). Clinical signs include lameness and reluctance to move. Secondary weight loss, loss of fertility and decreased milk production can all be observed in affected herds (Radostits et al., 2009). BDD is considered a multifactorial disease, and moist, unhygienic conditions, such as the slurry to which the animals are frequently exposed, are considered predisposing factors (Palmer et al., 2013; Wells et al., 1999). The bacteria most often associated with BDD are spirochetes of the genus *Treponema*, which predominate in the deepest regions of DD lesions (Moter et al., 1998, Rasmussen et al., 2012). Lameness prevalence's were reported in a prevalence of 7% in Denmark (Alban, 1995), 11% in Kenya (Mohamadnia, 2005), 36.8% in England and Wales (Barker et al., 2010), and 28.5% in Canada (Ito et al., 2010). The first sign of foot rot is acute swelling of the tissue between the toes and swelling evenly distributed around the hairline of usually just one hoof. Often, the animal may have fever at this time. Acute foot rot appears to be exquisitely painful; cattle are often dead lame on one foot, with reluctance to move, and increased recumbence. The aim of the study was to estimate the frequency of bovine digital dermatitis (BDD) in dairy cows in region of north Kosovo in the period of time from calving to conception. This study shows on how important is the health management of the farms and farmers are often not cautious about the consequences.

Materials and Methods

The study was carried out during the years of 2017 and 2018 on dairy cattle in region of north Kosovo. A total of 200 dairy cows were examined clinically for the presence of bovine digital dermatitis on service period in Dairy Cows in Kosovo and examined weekly for BDD lesions using risk factors scores for subjective assessment of risk parameters. Visual inspection and digital palpation were applied to evaluate the lesions of DD according to Döpfer et al. (1997). A clinical control was performed to evaluate the health state of the hoof in all animals. The case determination of cows with foot rot was done through clinical examination using specific equipment. The cows were tied in a long-stall barn with adaily replaced chopped straw was used as bedding on the top of rubber mats. The feeding system was a total mixed ration (TMR) for all cows, and milking was twice/day.

Pathologies of hoof were registered and evidences on their occurrence in front and hind extremities were calculated in percentage. This study comprised the cows in the last month of pregnancy

and raised in the same management conditions. The period of time from calving to conception was evaluated.

Descriptive statistics like Mean and Standard deviation are used to describe the distribution of the estimated parameters. Asymmetric Wilson score confidence intervals (CI 95%) taking into account the sample size and the total population (sampling fraction) were calculated for prevalence estimates using the online statistical toolbox at *OpenEpi.com* (http://openepi.com/Menu/OE_Menu.htm). This method provides exact, non-symmetrical confidence intervals for estimates based on simple random samples that are robust even when sample size is small and/or the prevalence is close to 0% or 100% (Wilson, 1927; Rothman and Boice, 1979; Wallis, 2013).

Results and Discussion

A total of 200 dairy cows were examined for the presence of bovine digital dermatitis. The prevalence of BDD in dairy cows was 25 out of 200 cows or 12.5 %, 95% CI (8.61 to 17.8). Our study revealed that the hind legs were resulted to be more affected than the front legs, respectively 64 %, CI 95% (44.52 to 79.75) of the pathologies were detected in the hind legs unlike the front legs with 36 %, CI 95% (20.25 to 55.48). It was determined that 16 %, CI 95% (6.40 to 34.65) of the foot disease (BDD) was in the front right foot, 20 %, CI 95% (8.86 to 39.13) in the left front foot, 28 %, CI 95% (14.28 to 47.58) in the right back foot, and 36 %, CI 95% (20.25 to 55.48) in the left back foot (Table 1).

Table 1. Animal with BDD problems. Our study detected that the hind legs were more affected than the front legs. 64 %, CI 95% (44.52 to 79.75) of the pathologies was detected in the hind legs and 36 %, CI 95% (44.52 to 79.75) in the front legs

Animal with BDD problems	The number of affected animals (n=25)	% of affected animals, with 95% CI*
The front limbs	09	36 %, CI 95% (20.25 to 55.48)
The hind limbs	16	64 %, CI 95% (44.52 to 79.75)
The front right foot	04	16 %, CI 95% (6.40 to 34.65)
The front left foot	05	20 %, CI 95% (8.86 to 39.13)
The right back foot	07	28 %, CI 95% (14.28 to 47.58)
The left back foot	09	36 %, CI 95% (20.25 to 55.48)

* the 95% CI are Wilson score 95% CI as for a simple number of samples based on animal affected with BDD.

The lesions are commonly seen at the plantar side of the claw, near or in the interdigital space. Hind legs are more often affected than front legs (Guard, 2008).

The most affected numbers of animals were first parity heifers 11 out of 25 or 44 %, CI 95% (26.67 to 62.93), followed by the second parity was 06 out of 25 or 24 %, CI 95% (11.5 to 43.43), third parity was 04 out of 25 or 16 %, CI 95% (6.40 to 34.65), fourth parity was 03 out of 25 or 12 %, CI 95% (4.16 to 29.95) and fifth parity was 03 out of 25 or CI 95% (4.16 to 29.95), shown in Table 2.

Table 2. Bovine Digital Dermatitis in Dairy cows according to parity

Number of parities	Number of affected animals (n=25)	% of affected animals, with 95% CI*
Parity 1	11	44 %, CI 95% (26.67 to 62.93)
Parity 2	06	24 %, CI 95% (11.5 to 43.43)
Parity 3	04	16 %, CI 95% (6.40 to 34.65)
Parity 4	03	12 %, CI 95% (4.16 to 29.95)
Parity 5	01	04 %, CI 95% (0.70 to 19.54)

* the 95% CI are Wilson score 95% CI as for a simple number of samples based on affected cows with BDD classified by parities.

Foot diseases are known to result in substantial economic losses in dairy cattle-raising and constitute serious health problems (Logue et al., 1993). In fact, they are the third most serious problem after infertility and mastitis (Weaver, 1987). Heifers seem to be the most affected age group (Mc Gavin and Zachary, 2006) and it is especially seen in early lactation (Shearer, 2009). Our study revealed that the hind legs were mostly affected than the front legs. Young animals kept in non-hygienic conditions and new incoming animals into the farm and those already infected should be considered under risk to develop lesions and end up with lameness and consequently with high economic lost (Flower and Weary, 2006). There are many causes that can cause lameness in cattle. The high incidence of digital dermatitis in young cows is considered as a consequence of farmer's manner of supplying the heifers from the market. The animals were exposed to different stable conditions and management, as well as stress factors like delivery, first lactation and different feed. The main objective of the study was to determine the impact of BDD on reproduction performance. The emphasis was put on their influence on calving to conception interval as well as on number of services per conception. **Data were reported as mean \pm standard deviation (SD) or range as appropriate.** All investigated animals have been registered previously in the system of the Identification and Registration (I&R) unit at Kosovo Food and Veterinary Agency. The affected cows were successfully inseminated 127, 2 \pm 14.42 days after parturition, as shown in Table

Table 3. The calculation between the dates from the calving period up to conception period, expressed by days

Nr.	Ear tag	Date of calving	Date of successful service	Calving to conception period (days)
1	106663XX	07.03.2018	08.08.2018	154
2	102432XX	21.06.2018	16.10.2018	113
3	102432XX	10.03.2018	01.08.2018	138
4	102432XX	11.07.2018	12.10.2018	109
5	102432XX	17.06.2018	17.10.2018	122
6	102432XX	01.04.2018	11.09.2018	138
7	106663XX	13.03.2018	22.07.2018	131
8	106663XX	03.01.2018	23.05.2018	140
9	106663XX	27.01.2018	27.06.2018	151
10	106663XX	15.02.2018	20.06.2018	125
11	106663XX	23.06.2018	25.10.2018	125
12	106663XX	03.02.2018	23.06.2018	140
13	108724XX	27.01.2018	27.05.2018	120
14	108724XX	15.02.2018	20.06.2018	125
15	105535XX	23.06.2018	18.10.2018	117
16	105680XX	15.03.2018	18.07.2018	121
17	105680XX	11.04.2018	11.09.2018	148
18	105680XX	14.07.2018	13.10.2018	113
19	106780XX	27.06.2018	17.10.2018	112
20	107025XX	15.07.2018	20.12.2018	126
21	107354XX	23.06.2018	12.10.2018	112
22	108721XX	24.05.2018	15.09.2018	134
23	109396XX	15.06.2018	02.12.2018	146
24	109561XX	05.08.2018	25.11.2018	123
25	109865XX	11.06.2018	20.09.2018	98
The average:				127.24*

*Mean \pm (SD) = 127.24 \pm 14.42

Conclusions

The results of this study provide an idea about the prevalence and risk factors of digital dermatitis in dairy cows in Kosovo. For treatment to be effective it must be started early in the course of the disease. It is necessary to have a break in skin integrity for foot rot to occur.

We concluded that the prevalence of digital dermatitis is high in our farm. The absence of control program allows and predisposes the high prevalence. The BDD have a big impact on duration of calving to conception period. A control program for the foot rot infection in the farm should be established as a routine procedure, as animals with lesions act as reservoirs of infection for other animals. The important

attention should be pointed to environmental factors and disinfection which should be carried out regularly. Furthermore, the small sample size of this investigation must be considered as a limitation. The absence of control program allows and predisposes the high prevalence. The BDD have a big impact on duration of calving to conception period. Control and treatment of hoofs, especially in dairy cows and intensive farms every 6 months make is very useful to reduce the occurrence of these pathologies (Flower and Weary, 2006).

Acknowledgments

The authors thank the Dairy Farmers Association “Graufi”, Kosovo for the provision of the needed financial assistance to conduct the investigation.

REFERENCES

- Alban, L. (1995). Lameness in Danish dairy cows: frequency and possible risk factors. *Prev. Vet. Med.*, 22, 213-225.
- Barker, Z. E., K. A. Leach, H. R. Whay, N. J. Bell and D.C.J. Main (2010). Assessment of lameness prevalence and associated risk factors in dairy herds in England and Wales. *J. Dairy Sci.*, 93, 932-941.
- Brandt, S., V. Apprich, V. Hackl, R. Tober, M. Danzer, C. Kainzbauer, C. Gabriel, C. Stanek, and J. Kofler (2008). Prevalence of bovine papillomavirus and *Treponema* DNA in bovine digital dermatitis lesions. *Vet. Microbiol.*, 148, 161-167.
- Cheli, R., and C. Mortellaro (1974). La dermatite digitale del bovino. *Proc. 8th International Conference on Diseases of Cattle*, 208-213.
- Dopfer, D., A. Koopmans, F.A. Meijer, I. Szakall, Y.H. Schukken, W. Klee, R.B. Bosma, J.L. Cornelisse, A.J. van Asten, and A. A. ter Huurne (1997). Histopathological and bacteriological evaluation of digital dermatitis in cattle, with special reference to spirochaetes and *Campylobacter faecalis*. *Vet Rec.*, 140, 620-3.
- Flower, F. C., and D. M. Weary (2006). Effect of hoof pathologies on subjective assessments of dairy cow gait. *J. Dairy Sci*, 153, 197- 202.
- Guard, C. (2008). Musculoskeletal Disorders. In: Thomas J. Divers A2DVM A2Dipl ACVIM A2ACVECC, Simon F. Peek, BVSc, MRCVS, PhD, Dipl ACVIM, editors. *Rebhun's Diseases of Dairy Cattle (Second Edition)* Saint Louis: W.B. Saunders; p. 467-503.
- http://openepi.com/Menu/OE_Menu.htm”. Open Source Epidemiological Statistics for Public Health. Accessed on (22.11.2019).
- Ito, K., M.A.G. von Keyserlingk, S.J. LeBlanc and D.M. Weary (2010). Lying behavior as an indicator of lameness in dairy cows. *J. Dairy Sci.*, 93, 3553-3560.
- Logue, D.N., J. E. Offer, and S. A. Kenpson, (1993). Lameness in dairy cattle. *Irish Vet. J.*, 46, 47-58.
- McGavin, M.D., and J.F. Zachary (2006). Digital Infections of Ruminants (Bacterial Pododermatitis). *Pathologic Basis of Veterinary Disease*. 4th ed.: Elsevier; p. 1189-1190, 1191, 1192.
- Middelveen, M.J., and R.B. Stricker (2011). Filament formation associated with spirochetal infection: a comparative approach to Morgellons disease. *Clin. Cosmet. Investig. Dermatol.*, 4, 167-177.

- Mohamadnia, A. R., (2005). Lameness an increased risk in dairy farms. Proc. 14 Iranian National Veterinary Congress, Tehran, Iran, 138-150.
- Moter, A., G. Leist, R. Rudolph, K. Schrank, B.K. Choi, M. Wagner, and U.B. Göbel, (1998). Fluorescence *in situ* hybridization shows spatial distribution of as yet uncultured treponemes in biopsies from digital dermatitis lesions. Microbiology. 144, 2459–2467.
- Nordhoff, M., A. Moter, K. Schrank, and L.H. Wieler (2008). High prevalence of treponemes in bovine digital dermatitis – a molecular epidemiology. Vet. Microbiol., 131, 293-300.
- Palmer, M.A., R.F. Donnelly, M. J. Garland, R. Majithiya, and N.E. O’Connell (2013). The effect of slurry on skin permeability to methylene blue dye in dairy cows with and without a history of digital dermatitis. Animal, 7, 1731–1737.
- Radostits, O. M., C.C. Gay, D.C. Blood, and K.W. Hinchcliff (2009). Veterinary medicine: A textbook of the diseases of cattle, sheep, pigs, goats and horses, 9th edition, 950-952, WB Saunders, Kent, UK.
- Rasmussen, N., N. Capion, K. Klitgaard, T. Rogdo, T. Fjeldaas, M. Boye, and T.K. Jensen (2012). Bovine digital dermatitis: possible pathogenic consortium consisting of *Dichelobacter nodosus* and multiple *Treponema* species. Vet. Microbiol., 160, 151–161.
- Rothman, K.J., and J.D. Boice (1979). Epidemiologic analysis with a programmable calculator. NIH Pub No.79-1649. Bethesda, MD: National Institute of Health, pp. 31-32.
- Shearer, J.K., (2009). Infectious Disorders of the Foot Skin. In: Anderson DE, Rings DM, editors. Food Animal Practice (Fifth Edition) Saint Louis: W.B. Saunders; p. 234-242.
- Wallis, S.A., (2013). Binomial confidence intervals and contingency tests: Mathematical fundamentals and the evaluation of alternative methods. Journal of Quantitative Linguistics., 20 3: 178-208. DOI: 10.1080/09296174.2013.799918
- Weaver, A. D., (1987). Cattle foot problems. Surgical techniques. Agri-Practice., 9:14-16.
- Wells, S.J., L.P. Garber, and B.A. Wagner (1999). Papillomatous digital dermatitis and associated risk factors in US dairy herds. Prev. Vet. Med., 38, 11–24.
- Wilson, E.B., (1927). Probable inference, the law of succession, and statistical inference. Journal of the American Statistical Association, 22, 209-212.