

DİĞİTAL DERMATİTİS IN THE COWS

*Taner DURGUN, *Özmen İSTEK

*Fırat Üniversitesi Veteriner Fakültesi Cerrahi Anabilim Dalı-ELAZIĞ

** Fırat Üniversitesi Muş Meslek Yüksek Okulu-MUŞ

ABSTRACT

Bovine digital dermatitis a disease of unknown aetiology, is characterised by the presence of annular erythematous lesion on the volar aspect of the limb the just proximal to the heel horn. It is associated with variable degrees of the lameness. Economically, the result of digital dermatitis (reduced milk yields, lower reproductive performance, increased involuntary cull rates, discarded milk, and the additional labor cost) are much greater than the treatments costs.

Key Word : Digital Dermatitis, Cow.

ÖZET

SIĞIRLARDA DİĞİTAL DERMATİTİS

Siğır digital dermatitisi etiyolojisi bilinmeyen bir hastalık olup, yumuşak ökçede ayağın proksimal ucuna yakın volar yüzünde yuvarlak görünümlü eritematöz lezyonlarla karakterizedir. Değişik derecede topallık ile ilişkilidir. Ekonomik olarak digital dermatitisin sonucu (süt veriminde azalma , üreme performansında düşüş, üretimden çıkarılan hayvan oranında artış, süt kalitesinde bozulma ve ilave edilen işçilik maaliyeti) sağaltım masraflarına göre daha fazladır.

Anahtar Kelimeler: Digital Dermatitis, Siğır.

1. INTRODUCTION

Digital dermatitis is an epidermitis characteristically affecting the skin at the plantar/palmar aspect of the bovine foot, near the heel bulbs (4). The disease was first described in Italy by Cheli and Mortellaro in 1974. Since then, digital dermatitis and a similar condition named papillomatous digital dermatitis have been reported worldwide (21,24,26). Lately, both designations appear to represent the same disease complex, which in the USA is also know as a footwarts, hairy footwarts, heel warts and strawberry foot disease (22).

Outbreaks of the Bovine digital dermatitis have mainly been reported in housed cattle (1,2,22,24) suggesting that enviromental or biological factors associated with those systems of management may be important risk factor (23,24).

Although prevalence of disease appeared to be higher whenever enviromental conditions were poor, with large volumes of slurry accumulated in the passageways of the free stalls digital dermatitis has also been observed in cattle housed under high standarts of hygiene (1) or in grazing systems (10,14).

Cows with digital dermatitis induced lameness may cut back severely on feed intake. That can cause milk production to fall, result in poor reproductive performance or even lead to culling of valuable animals (28).

CLINICAL FEATURES

Digital dermatitis is an acut or chronic inflammatory disease of the bovine foot. The primary clinical sign is lameness. The affected animals walked on their toes. In one cow with a badly affected foot; the toes of the hoof had became so badly worn that the sensitive laminae were exposed. Lesions which were located on the volar aspect of both hindlimbs at the junction of skin and the horn of heel, were usually caked with a mixture of dirt and dried exudate (3,5,7).

Digital dermatitis occurred in the skin at its junction with the soft perioplic horn of the heel and midway between the two claws. They were mostly circumscribed, circular or oval, erosive to proliferative with raised presenting filiform papillae on their eroded surfaces. Its surface was dark red-brown. The hairs in the lesion were erect and matted with exudate. Wiping the exudate and debris from

the surface revealed a red, raw proliferative area, usually circular and 1 to 2 cm in diameter. This was extremely painful to the touch and had a characteristic and very strong pungent smell (1,7).

Lesions of digital dermatitis were characterised by their erosive-proliferative nature and common anatomical location on the plantar/palmar interdigital skin bordering. The interdigital space, which was rarely involved. These lesions were differentiated from a milder form of epidermis, restricted to the hairless skin of interdigital space, and characterised by erosion of the dermis without the formation of filiform papillae and responsible for slight clinical signs. This type interdigital lesion was consistent with the condition described as interdigital dermatitis (3,14).

More advanced lesions led to progressive separation horn from the sensitive laminae, to give a typical underrun sole, which sometimes extended forward from the heel to reach half-way to the toe (4).

BACTERIOLOGICAL AND HISTOLOGIC FINDINGS

A potentially infectious aetiology for digital dermatitis in dairy cattle was investigated and centred on the possible involvement of spirochaetes. Spirochaetes have been described by microbiological analysis of lesion (11,15), detected by serology and by rRNA chain reaction (PCR) (8). First successful cultivation of these organisms was made by Walker and others 1995 in California, USA (9).

Authors have reported unculturable spirochaetes associated with digital dermatitis in the UK to be genetically and antigenically related to *Treponema vincentii*, *Treponema phagedenis* and *Treponema denticola* (8,9,25).

Histologically, the lesion was hyperkeratotic with multiple foci of bacterial infection of the keratinised outer layer of the epidermis, accompanied by focal neutrophil infiltration. There is no evidence of neoplasia. The aerobic culture was overgrown with contaminants and no non-sporing anaerobes were isolated. However, organisms with the morphology of spirochaetes were detected in the lesions in Warthin-Starry stained sections. The lesions considered consistent with the disease entity described as digital papillomatosis/ digital dermatitis (27).

Normal skin taken from the plantar aspect of the bulbs of the heel has an epithelium of the 50 to 70 cells in thickness, covered by a layer of keratin. Early changes of digital dermatitis were seen as a loss of superficial keratin, with a concurrent

thickening of the epithelium to 100 plus cells/mm by both hyperplasia and hypertrophy of epithelial cells (5).

TREATMENT AND CONTROL

In the initial stage of disease, because of the pain, allowing animals to walk normally is critical. This means treatment of the infected area by removing debris from the specific lesion plus using a topical application of caustic chemicals and antibiotics (6).

In control of nail lesions, prophylaxis is more effective than creative treatment. For this reason, deformations in nails of cattle must be removed by cutting off nail in 6 month period and enough space for walking practice must be provided. The construction of the basins (in 20-30 cm depth), filled with either 5-10 % copper sulphate, 3-5% formalin or 8-10 % zinc sulphate solutions, in the entrance of stables for foot-baths may be used for both prophylactic and treatment purposes (12).

In the field, digital dermatitis can be successfully controlled by a single passage through a footbath containing 5 to 6 g/litre oxytetracycline or 150 g of a mixture of lincomycin and spectinomycin in 200 litres of water. Although the precise cause of digital dermatitis has yet to be identified, other species of spirochaetes have been shown to be sensitive to these antibiotics. For example, *Borrelia burgdorferi* is highly sensitive to oxytetracycline and lincomycin is licenced for use in the treatment of swine dysentery, a condition caused by the *Spirochaeta serpulina* hyodysenteriae (18,20). For optimal effect, the heels of the cows should be washed thoroughly before entering the footbath (6). Repeat treatments may be needed after four to six weeks, depending on the extent of the environmental challenge (12).

Footbath is the most commonly used method for treating digital dermatitis in cattle. The footbath is filled with water to a depth of 130 mm and estimated to contain 280 litres by volume. Erythromycin soluble is added at a rate of 690 mg erythromycin/litre of water (16). When digital dermatitis was seen, footbathing was reintroduced, using approximately per 5 cent formalin solution, once a week. Further, a footbath containing a nine to ten percent solution of copper sulfate can help control digital dermatitis (4).

In the initial a variety of treatments was used, particularly parenteral injection of penicillin, streptomycin, tetracyclines, cephalosporins and sulphonamides. None proved effective and most cases recovered slowly on their own, over the course

of seven to 10 days. Most effective treatment proved to be a deep scraping of the lesion, using the hook end of knife, followed by topical oxytetracycline (4,13,17,19).

Topical sprays are the least expensive treatment; can be applied directly ; have less chance for contamination; and have less chance for residue but may be less effective than other treatments. It is helpful to clean the area before topical spray are applied as the antibiotic is less effective if manure and other debris are not removed (16).

2. CONCLUSION

Economically, the result of digital dermatitis are much greater than the treatments costs. Financial

losses occur as the result of reduced milk production, loss of body condition, reduced fertility, culling, veterinary costs and medication, as well as time devoted nursing an animal the dairyman.

Treatment can consist of hoof trimming, foot bath and/or topical applications. Depending on the problem, a veterinarian and hoof trimmer should be consulted as to the best method of treatment. A combination of several treatment protocols may be necessary to correct individual and herd problems.

To control the digital dermatitis keep the herd as closed as possible. Footbaths somewhat effective but incidence of the digital dermatitis is much more common in new cattle than in existing cows.

3. REFERENCES

1. Bassett, H.F., Monaghan, M.L., Leinhan, P., Doherty, M.L. and Carter, M.H. 1990. Bovine Digital Dermatitis. *Vet. Rec.* 126, 164-165
2. Bergsten, C., Hancock, D.D., Gay, C.C. and Fox, L.K. 1998. Claw Disease: The Most Common Cause of Dairy Lameness Diagnose, Frequencies and Risk Groups in A University Herd. *Bovine Proceeding.* 31, 188-194
3. Berry, S.L. 2001. Diseases of The Digital Soft Tissues. *Vet. Clin. North. Am. Food Anim. Pract.* 17(1), 129-142
4. Blowey, R.W. and Sharp, M.W. 1988. Digital Dermatitis in Dairy Cattle. *Vet. Rec.* 131, 39
5. Blowey, R.W., Done, S.H., Cooley, W. 1994. Observation on The Patogenesis Digital Dermatitis in Cattle. *Vet. Rec.* 135, 115-117
6. Blowey, R.W. 2000. Control of Digital Dermatitis. *Vet. Rec.* 146(10), 295
7. Cruz, C., Dreimeier, D., Cerva, C. and Corbellini, L.G. 2001. Bovine Digital Dermatitis in Southern Brasil. *Vet. Rec.* 148, 576-577
8. Demirkan, I., Blowey, R.W., Murray, W.D., Carter, S.D. and Woodward, M.J. 1998.
9. Frequent Detection of A Treponema in Bovine Digital Dermatitis by Polymerase Chain Reaction and Immunocytochemistry. *Veterinary Microbiology.* 60, 285-292
10. Demirkan, I., Carter, S.D., Hart, C.A., Woodward, M.J. 1999. Isolation and Cultivation of A Spirochaete from Bovine Digital Dermatitis. *Vet. Rec.* 145(17), 497-498
11. Desrochers, A., Anderson, D.E., St-Jean, G. 2001. Lameness Examination in Cattle. *The Veterinary Clinics of North America. Food Animal Practice.* 17, 39-51
12. Döpfer, D., Koopmans, A., Meijer, F.A., Szakal, I., Schukken, Y.H., Klee, W., Bosma, R.B., Cornelisse, J.L., Van Asten, A.J.A.M. and Ter Huurne, A.A.H.M. 1997.
13. Histological and Bacteriological Evaluation of Digital Dermatitis in Cattle, With Special Reference to Spirochaetes and Camphylobacter Faecalis. *Vet. Rec.* 140, 620-623
14. Durgun, T. 1998. Ulcus Solea in Cattle. *F.Ü. Sağlık Bil. Dergisi.* 12(2), 215-218
15. El-Ghoul, W., Shaheed, B.I. 2001. Ulcerative and Papillomatous Digital Dermatitis of The Pastern Region in Dairy Cattle: Clinical and Histopathological Studies. *Dtsch. Tierarztl. Wochenschr.* 108(5), 216-22
16. Gourreau, J.M., Scott, D.W. and Rousseau, J.F. 1992. La Dermatite Digitee des Bovins. *Point Veterinaire.* 24, 49-57
17. Grund, S., Nattermann, H., Horsch, F. 1995. Electron-microscopic Examination of Spirochaetes in Dermatitis Digitalis Lesion in Cows. *Zentralblatt für Vetrinärmedizin B.* 42, 533-542
18. Laven, R.A. and Hunt, H. 2001. Comparison of Valnemulin and Lincomycin in The Treatment of Digital Dermatitis by Individually Applied Topical Spray. *Vet. Rec.* 149(10), 302-303
19. Hernandez, J. and Shearer, J.K. 2000. Efficacy of Oxytetracycline for Treatment of Papillomatous Digital Dermatitis Lesion on

- Various Anatomic Locations in Dair Cows. J Am Vet Med Assoc. 15;216(8), 1288-1290
20. Luft, B.J., Volkman, D.J., Halperin, J.J. and Dattwyler, R.J. 1988. New Chemotherapeutic Approaches in The Treatment of LymeBorreliosis. Annals of the New York Acedemy of Sciences. 539, 352-361
21. Manske, T., Hultgren, J., Bergsten, C. 2002. Topical Treatment of Digital Dermatitis Associated With Severe Heel-horn Erosion in A Swedish Dairy Herd. Prev Vet Med. 14;53(3), 215-231
22. Matton, P. and Van Melckebeke, H. 1990. Bovine Borreliosis of Simple Methods for Detection of The Spirocheate in The Blood. Tropical Animal Health and Production. 22, 147-152
23. Read, D.N., Walker, R.L. and Castro, A.E. 1992. An Invasive Spirocheate Associated With Interdigital Papillomatosis of Dair Cattle. Vet. Rec. 130, 59-60
24. Read, D.N. and Walker, R.L. 1998. Papillomatous Digital Dermatitis (footwarts) in California Dairy Cattle: Clinical and Gross Pathologic Findings. Journal of Veterinary Diagnostic Investigation. 10, 67-76
25. Rodriguez –Lanz, A., David, W.H., Carpenter. T.E. and Read, D.H. 1996. Case-control Study of Digital Dermatitis in Southern California Dairy Farms. Preventive Veterinary Medicine. 28, 117-121
26. Rodriguez –Lanz, A., Melendez –Retamal, P., Hird, D.W., Read, D.H., and Walker, R.L. 1999. Farm- and- host Level Risk Factor for Papillomatous Digital Dermatitis in Chelian Dair Cattle. Preventive Veterinary Medicine. 42, 87-97
27. Schrank, K., Choi, B.K., Grund, S., Moter, A., Heuner, K., Nattermann, H., Gobel, U.B. 1999. Treponema Brennaborensis sp. nov., A Novel Spirochaete Isolated from A Dairy Cow Suffering from Digital Dermatitis. Int J Syst Bacteriol. 49 Pt 1, 43-50
28. Van Amstel, S.R., Van Vuuren, S. and Tutt, C.L. 1991. Digital Dermatitis: Out Break. Journal of The South African Veterinary Association. 66, 177-181
29. Weaver, A.D. 1994. Vet. Ann. 34, 20
30. Yeruham, I., Friedman, S., Elad, D. and Perl, S. 2000. Association Between Milk Production, Somatic Cell Count and Bacterial Dermatoses in Three Dairy Cattle Herds. Aust. Vet. J.78(4), 250-253