

## ULCERATIVE MAMMARY DERMATITIS AT DAIRY COWS – ETIOLOGY, PREVALENCE, GROSS PATHOLOGY AND STAGING

## ULCERATIVNI MAMARNI DERMATITIS MLEČNIH KRAVA – ETIOLOGIJA, PREVALENCA I PATOLOGIJA

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### ABSTRACT

Ulcerative mammary dermatitis (UMD) also known as udder cleft dermatitis first has been observed in England. Clinically it can be described as a mammary skin disease which causes moist udder sores with foul smelling, very similar to digital dermatitis (DD) lesions. Typical localization of UMD is a skin between the forequarter and abdominal wall, but it can also be found at the lower part of forequarter skin between papilas. Samples were collected from s Holstein Friesian dairy herd with recurrent cases of DD. The animals were kept in loose house systems with slatted and element floor. The clinical examination was performed during milking parlour using a lighted mirror device for easy access and view. Tissue samples were taken from different stages of UMD, and fixed in formalin, and stained HE and WS. We also employed a PCR analysis to determine a *Treponema* presence in tissue samples. The prevalence of UMD was 4,3%, and always at milking cows, and no case at dry cows. We found all stages of this disease. Pathohistological analysis reveals epidermal thickening, parakeratosis, neutrophil infiltration, WS staining reveals a presence of spiral microorganisms in deep skin layers at lesion. In conclusion UMD can be determined as multifactorial disease but with important role of *Treponemas*. Pathohistology is characteristic and WS staining can reveal presence of spiral bacteria (*Treponemas*) in deep layers. Milking cows are more prone to develop this disease than dry cows.

Key words: ulcerative mammary dermatitis, pathology, *Treponemas*.

### SAŽETAK

Ulcerozni mamarni dermatitis (UMD), također poznat kao dermatitis rascepa vimena, prvi put je primećen u Engleskoj. Klinički se može opisati kao bolest kože dojke koja uzrokuje vlažne rane na vimenu sa neprijatnim mirisom, veoma slične lezima digitalnog dermatitisa (DD). Tipična lokalizacija UMD je koža između prednje četvrtine i trbušnog zida, ali se može naći i na donjem delu kože prednje četvrtine između papila. Uzorci su prikupljeni iz holštajn frizijskog mlečnog stada sa rekurentnim slučajevima DD. Životinje su držane u rastresitim sistemima sa rešetkastim i elementarnim podom. Klinički pregled je obavljen u muzilištu korišćenjem osvetljenog ogledala za lakši pristup i pregled. Uzorci tkiva su uzeti iz različitih stadijuma UMD, fiksirani u formalinu i obojeni HE i VS. Takođe smo koristili PCR analizu da bismo utvrdili prisustvo *Treponema* u uzorcima tkiva. Prevalencija UMD je bila 4,3%, i to uvek kod muznih krava, a kod suvih krava nije bilo. Pronašli smo sve faze ove bolesti. Patohistološka analiza otkriva zadebljanje epiderme, parakeratoza, infiltraciju neutrofila, VS bojenje otkriva prisustvo spiralnih mikroorganizama u dubokim slojevima kože na leziji. U zaključku, UMD se može odrediti kao multifaktorska bolest, ali sa važnom ulogom *treponema*. Patohistologija je karakteristična i VS bojenje može otkriti prisustvo spiralnih bakterija (*treponema*) u dubokim slojevima. Krave muzare su sklonije razvoju ove bolesti od suvih krava.

Ključne reči: ulcerativni mamarni dermatitis, *Treponema*, patologija.

## ULCERATIVE MAMMARY DERMATITIS

Ulcerative mammary dermatitis (UMD) also known as udder cleft dermatitis first has been observed in England (Blowey and Edmondson, 1995). Clinically it can be described as a mammary skin disease which causes moist udder sores with foul smelling, very similar to digital dermatitis (DD) lesions (Evans et al., 2010). Typical localization of UMD is a skin between the forequarter and abdominal wall, but it can also be found at the lower part of forequarter skin between papillae. The lesions can also impair animal welfare, milk production, and milk quality, and can lead to premature culling (Riekerink, 2014). The etiology is oftenly described as multifactorial such as udder conformation, DIM and parity (Beattie and Taylor, 2000). Also, a link between UCD and digital dermatitis was suggested in some studies (Boyer and Singleton, 1998; Stamm et al., 2009), whereas other studies have shown a weak link (Beattie and Taylor, 2000), no link (Hansen and Nissen, 2010), or a lower risk for UCD (Warnick et al., 2002) in cows with digital dermatitis compared with cows without digital dermatitis. Reported prevalences were 18% in the United States (Warnick et al., 2002), 22% in 1 Scottish farm and 1.4% in an abattoir survey of 331 culled cows (Beattie and Taylor, 2000), and up to 39% within herd and 18.5% average in Sweden (Persson Waller et al., 2014). The aim of this investigation was to determine a gross pathology, histopathology, etiology and staging of Ulcerative mammary dermatitis. A UCM lesions can be with different localization, shape. First staging has been described by (Reikernik et al., 2014). He described UCM in stages following mostly a clinically presentation of these lesions, but not a histopathological and

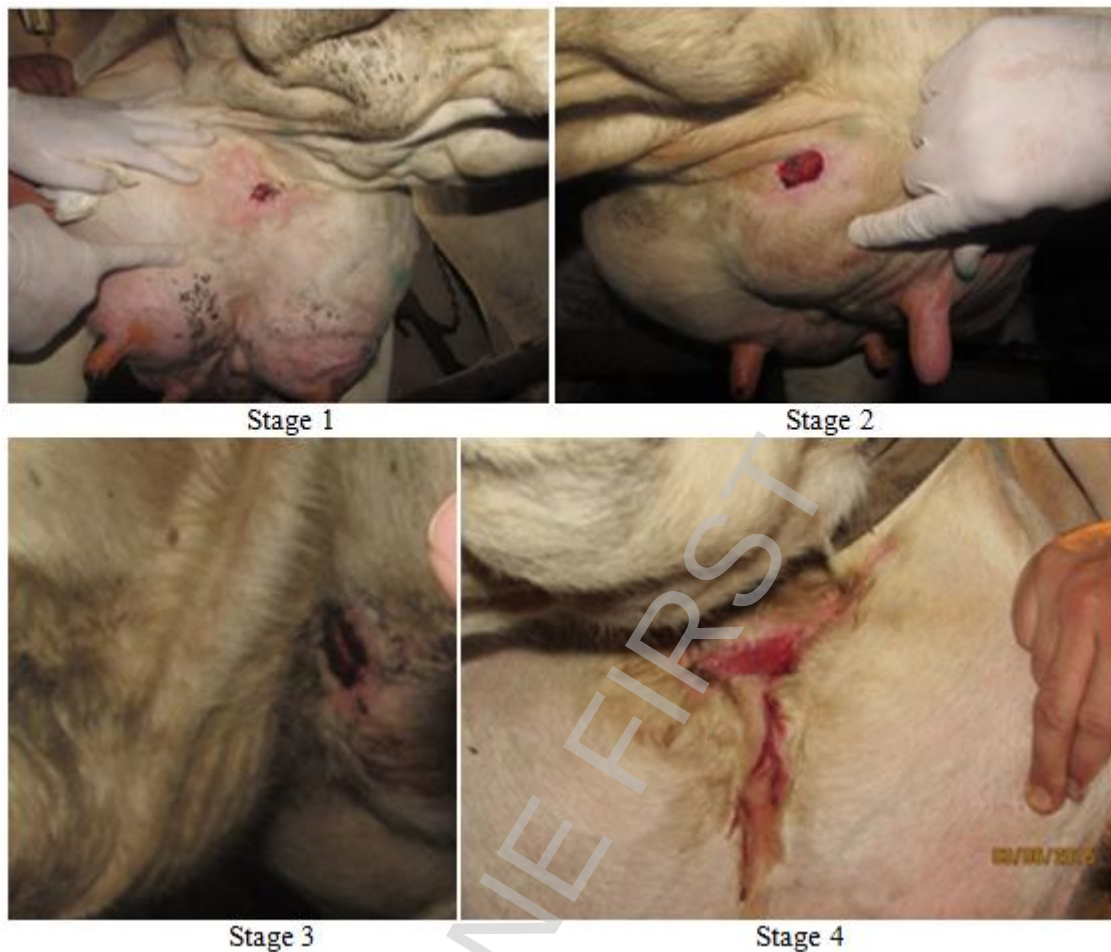
transition between stages criteria. In our investigation we put focus not only on clinically (macroscopic shape) but also to the a transition process between stages (figure 1) an histopathological evidence and pain. We also took in mind that a UCM and DD are caused by similar microorganisms, and assumed a similarity in pathogenesis.

## MATERIAL AND METHODS, RESULTS AND CONCLUSIONS

Samples were collected from s Holstein Friesian dairy herd with recurrent cases of DD. The animals were kept in loose house systems with slatted and element floor. The clinical examination was performed during milking parlour using a lighted mirror device for easy access and view. Tissue samples were taken from different stages of UMD, and fixed in formalin, and stained HE and WS. We also employed a PCR analysis to determine a *Treponema* presence in tissue samples (QIAamp DNA mini kit, Qiagen).

The prevalence of UMD was 4.3%, and always at milking cows, and no case at dry cows. We found all stages of this disease. Histopathological analysis reveal epidermal thickening, parakeratosis, neutrophil infiltration, WS staining reveals a presence of spiral microorganisms in deep skin layers at lesion. PCR analysis identified a *T. medium/T. vincentii* group *T. phagedenis* group and *T. denticola/T. putidum*.

In conclusion UMD can be determined as multifactorial disease but with important role of *Treponemas*. Histopathology is characteristic and WS staining can reveal presence of spiral bacteria (*Treponemas*) in deep layers. Milking cows are more prone to develop this disease than dry cows.



**Figure 1.** Stages of ulcerative mammary dermatitis

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