

The Effects of Udder Dermatitis Due to Sarcoptic Mange on Milk Yield in Dairy Cows

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Summary

In the present study the aim was to elucidate the relationship between udder dermatitis due to naturally occurring sarcoptic mange infestation and milk yield in dairy cattle. Field observation was carried out in a private dairy farm in Bozdogan, Aydin comprising 18 out of 80 cattle were diagnosed with udder dermatitis in association with sarcoptic mange on the basis of clinical and parasitological examinations. For assessment of milk yield production, the data set included 5490 test day yields. The actual milk yield evaluated in second lactation changed between 2594-7742 kg (with a mean milk yield: 5394 ± 327.5 kg). The lactation periods of cows were detected between 181-306 day (the mean lactation period: 275 ± 9.5 days). The first occurrence of each lesions were included in the analysis and 6 cows had udder dermatitis in first 5 month and other cows at later lactation period. The mean daily milk loss was calculated 8.17 kg and daily milk yields loss for a cow was 0.44 kg. This pruritic disease involving udder led severe infection and dramatic drop of milk yield among dairy cattle enrolled in the present study. Results of the present study reported herein suggested that udder dermatitis in relation to scabies could be identified in cows in all stages of the lactating period, especially the prevalence was higher in later lactation period. The milk losses consequent to udder dermatitis may cause significant economic problems.

Keywords: Udder, Dermatitis, Sarcoptic mange, Milk yield, Cow

Sütçü İneklerde Sarkoptik Uyuza Bağlı Meme Dermatitisinin Süt Verimi Üzerine Etkileri

Özet

Bu çalışmada sütçü ineklerde doğal olarak oluşan sarkoptik uyuz enfestasyonuna bağlı meme dermatitisi ile süt verimi arasındaki ilişkinin incelenmesi amaçlanmıştır. Aydın ili Bozdoğan ilçesine bağlı özel bir süt sığırcılığı işletmesinde klinik ve parazitolojik muayeneler ile sarkoptik uyuzla ilişkili meme dermatitisi tanısı konulan 18/80 inekte saha gözlemi yapıldı. Süt veriminin değerlendirilmesi amacıyla 5490 kontrol günü verimi kullanıldı. İkinci laktasyondaki gerçek süt veriminin 2594-7742 kg arasında (ortalama süt verimi: 5394 ± 327.5 kg) değiştiği saptandı. Çalışmaya dahil edilen sütçü ineklerde laktasyon periyodunun 181-306 gün arasında (ortalama laktasyon periyodu: 275 ± 9.5 gün) olduğu belirlendi. Analizlerde her bir lezyonun ilk ortaya çıkışı dikkate alınarak 6 inekte meme dermatitisinin ilk 5 ayda diğerlerinde ise daha sonraki laktasyon periyodunda meydana geldiği belirlendi. Günlük ortalama süt kaybı 8.17 kg olarak hesaplanırken, bir inek başına günlük süt verim kaybı 0.44 kg'dı. Bu çalışma kapsamına alınan sütçü ineklerde meme derisinde kaşıntıyla seyreden bu hastalığın şiddetli enfeksiyona ve dramatik biçimde süt veriminin azalmasına neden olduğu belirlendi. Çalışmanın sonuçlarına bakıldığında, sarkoptik uyuzla ilişkili meme dermatitisinin laktasyon periyodunun tüm dönemlerindeki ineklerde tespit edilebileceği, özellikle de laktasyonun geç dönemlerinde prevalansın daha yüksek olabileceği tespit edildi. Meme dermatitisine ilişkin süt kayıplarının önemli ekonomik kayıplara neden olabileceği ortaya konuldu.

Anahtar sözcükler: Meme, Dermatitis, Sarkoptik uyuz, Süt verimi, İnek

INTRODUCTION

Profitability of disease control interactions at a herd level could be assessed by evaluation of relations among lossess

consequent to disease condition and expenditures for prevention or control measures¹⁻³. In a dairy cattle herd level



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losses may be defined as reduction of the output/input ratio relevant production process⁴. The probable effect of any disease condition on milk yield, may be expressed as the difference in milk yield of any ill cow, in comparison to that expected yield of that cow with no disease condition¹.

Up to date the relationship between udder diseases and milk yield has been elucidated in the veterinary literature, however little is known about the exact causes of udder dermatitis, also known as udder scald and intetrigio, or udder rot^{5,6}.

Udder dermatitis has been recognized infrequently in the literature however may be an important problem for milkers, veterinary surgeons on large animal practice and herd managers⁵⁻⁷. Dermatitis detected between the udder and upper thigh may be observed in early lactation, as a sequele to skin damage by udder edema pressure into the upper thigh⁵. Lesions are frequently characterized within necrosis of the udder skin and a bad odour⁶. In the present study the aim was to elucidate the relationship between udder dermatitis due to naturally occurring sarcoptic mange infestation and milk yield in dairy cattle in Aydin, Turkey.

MATERIAL and METHODS

Study Area

The present study (field observation) was conducted retrospectively among 18 dairy cattle (out of 80) in Bozdogan province and at the Department of Internal Medicine, Faculty of Veterinary, Aydin city. The material was obtained from second lactation records of 18 Holstein Friesian cows raised between the years of November 2010 and October 2011 in a privately owned dairy farm in Bozdogan province in Aydin, Turkey. The data set included 5490 test day yields (TDYs). The milk samples were collected during the morning and evening milking. Data included the cow's identification number, herd code, the type of herd or production sector, the lactation number, the test-day milk yield, and the number of times the cow was milked per day.

In the final analysis only complete lactations within study period were used because of the potential that a cow might have become udder dermatitis before and after the data collection period within the same lactation (second lactation). Lesions causing clinical udder dermatitis were recorded and descriptions of the lesions were performed by the farmer to assist with lesions recognition for researchers.

Data Analysis

TDYs were the outcome variable; it followed a normal distribution. The data were hierarchically structured with TDY within cow within farm. The TDYs were obtained from the morning and evening milkings of each cow. Data from the first 306 days of lactation. The data were analysed using SPSS Statistics Release 17.0^a. The lactation curve modelled

using days in milk (DIM) and TDYs. The Gamma model was used for the estimation of the parameters of lactation curve⁸. The incomplete gamma function was used, as suggested previously⁸:

$$Y_t = a * t^b * e^{(-c*t)},$$

where Y_t is the milk yield in DIM t ,

a is a constant representing the level of initial yield of the cow,

b is a parameter representing the rate of increase to peak,

c is the rate of decline after peak,

t is the time period (daily),

e is the Neper number.

For fitting of the model the non-linear module of SPSS^a program was used. The lactation curves were drawn for the herd's mean benefit from the estimation of the parameters.

Parasitological Examination

In a convenience sample of Holstein cows with suspected lesions consistent with sarcoptic mange, skin scrapings were withdrawn from the tail, the area among the hind limbs dorsal to the udder and ventral to the vulva and especially whole udder. Skin scrapings were microscopically examined following KOH digestion. A complete history of each animal and date of examination were recorded and all the samples were processed within 12 h after collection. Briefly, 10% KOH solution was added to each sample container and boiled for 5-10 min⁹. Then samples were centrifuged at 1500 g for 5 min, supernatant and sediment were examined microscopically. Identification of mites was performed by morphological characteristics¹⁰.

RESULTS

Assessment of Milk Yield

In this study, the actual milk yield was evaluated in second lactation. The actual milk yields of cows at second lactation changes between 2594 kg and 7742 kg (the mean of milk yield: 5394±327.5 kg). The lactation periods of cows changes between 181-306 days (the means of lactation periods: 275±9.5 days).

The first occurrence of each lesions were included in the analysis and 6 cows could have had udder dermatitis in first 5 month and other cows have at the later lactation period. The mean daily milk loss was calculated 8.17 kg and daily milk yields loss for a cow was 0.44 kg.

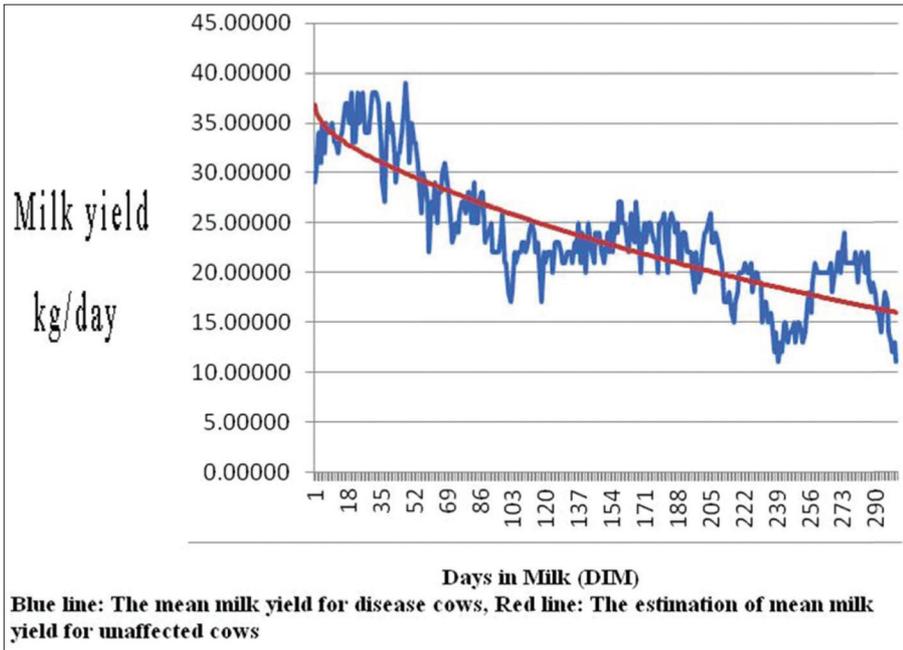
The lactation curve parameters estimated by Gamma model were given [Table 1](#).

The lactation curve of estimated by Gamma model was shown in [Fig. 1](#). The fitted values of milk yield were plotted for udder dermatitis

Table 1. The lactation curve parameters estimated by Gamma model ($R^2: 0.55$)**Tablo 1.** Gama modeli kullanılarak tahmin edilen laktasyon eğrisi parametreleri

Variable	N	Min	Max	Mean	S.E.
a	18	14.93	40.79	27.5	1.78
b	18	-0.20	0.16	0.007	0.0225
c	18	-0.001	0.007	0.002	0.0047

The 22.5% prevalence rate, noticed in this multidisciplinary study (Agricultural Department of Zootechnics and Veterinary Internal Medicine), may be attributed to a combination of factors such as poor nutrition, hygiene level, herdsman poor knowledge of udder health and overcrowding conditions where the cattle were kept. Prolonged anorexia due to intense pruritus prone the cattle to debility and

**Fig 1.** The lactation curve of estimated using by Gamma model of 18 Holstein Friesian cows**Şekil 1.** Gama modeli kullanılarak tahmin edilen 18 baş Siyah Alaca ineğin laktasyon eğrisi

Parasitological Findings

Of the 80 cows examined 18 (22.5%) were found to have udder dermatitis consistent with sarcoptic mange. Anorexia was evident in most of the animals involved. Lesions were located on whole area of the udder in all 4 quarters. Lesions had hyperpigmentation, crusting, mild erythema and intense pruritus was evident during physical examination. All 18 cows had skin scrapings from lesional sites, were positive for live *Sarcoptes scabiei* mites.

DISCUSSION

Mange in cattle may be caused by different species of mite infestation with *Sarcoptes scabiei* var. *bovis* (syn. *Sarcoptes bovis*)¹¹⁻¹³, *Chorioptes bovis* or *Psoroptes ovis*¹². Although mites may infest cattle of all classes and ages, chorioptic mange is frequently prevalent in dairy cows whereas sarcoptic mange is often associated with growing cattle. Under appropriate conditions, the latter types of mange may spread all over the body of cattle and consequently cause considerable economic losses^{12,14,15}, involving decreased milk and meat production^{9,10}. Especially udder dermatitis may be associated with sarcoptic mange^{5,6}. *Sarcoptes* spp. may lead to itch, dermatitis and intense pruritus due to which animals loose much of the rumination time and hence loose general body condition^{5,6,9,16}.

emaciation, or predisposed cattle to other secondary diseases, all finally leading to significant economic losses of the affected animals. Bacterial complications may also be involved as the cause of death in scabietic cattle¹⁶.

Apart from the diseased animal, the farmer was worried about the dramatic drop of milk yield also reported in similarly affected sheep⁹ and cattle^{5,6} and may be attributed to the significant reduction of food intake secondary to intense pruritus¹⁶.

In a university practice study with unpublished results, the veterinarians detected 1600 cow herd case that udder dermatitis were mostly prevalent in later lactation aged cows, probably could have been associated to suspected sarcoptic mange, however this was not proved⁵. A recent University study has shown that udder dermatitis in early lactation caused high milk losses. Milk production losses averaged 681 pounds for each cow having this disease, which was approximately equal to digestive disorders⁵.

In the present study the actual milk yield was assessed in second lactation and changed between 2594-7742 kg. with (the mean of milk yield: 5394±327.5 kg). Mean lactation periods of cows was 275±9.5 days. Regarding the stage of lactation and its interactions with milk yield and udder dermatitis were evaluated, the present findings indicate that

udder dermatitis was more common in later lactation period (12/18, 66.6%) in this herd, however could be identified in all stages of the lactating period, as detected in the first 5 month of lactation in 6/18 cows. The mean daily milk loss was calculated 8.17 kg and daily milk yields loss for a cow was 0.44 kg. This value was similar to that reported previously⁵. This pruritic disease involving udder led severe infection and dramatic drop of milk yield among dairy cattle enrolled in the present study.

Despite its economic and zoonotic importance, sarcoptic mange has not been received fully attention and its real impact on milk yield is still unknown in many areas of Turkey. Keeping in view the importance of sarcoptic mange, the present study was planned to determine the existence of sarcoptic mange on udder and to investigate the probable milk yield disturbance associated with mange in dairy cattle.

Although little has been documented about udder dermatitis in association with sarcoptic mange and its correlation with milk yield, particular attention should be paid to potential confounding when the risk of sarcoptic mange varies according to production level. Results of the present study reported herein suggested that udder dermatitis in relation to Scabies could be identified in cows in all stages of the lactating period, especially the prevalence was higher in later lactation period. The milk losses consequent to udder dermatitis may cause significant economic problems. Furthermore it was considered that sarcoptic mange adversely affects the production of the infested cattle.

REFERENCES

1. **Fourichon C, Seegers H, Bareille N, Beaudreau F:** Effects of disease on milk production in the dairy cow: A review. *Prev Vet Med*, 41 (1): 1-35, 1999.
2. **McInerney JP, Howe KS, Scheffers JA:** A framework for the economic analysis of disease in farm livestock. *Prev Vet Med*, 13 (2): 137-154, 1992.
3. **Seegers H, Fourichon C, Malher X, L'Hastis M:** A framework for animal health. *Vet Res*, 25 (2-3): 165-173, 1994.
4. **Dijkhuizen AA:** Economic aspects of diseases and disease control. *PhD Thesis*. University of Utrecht, 155 p, 1983.
5. **Reneau JK:** Udder scald may be more costly than you think. *University of Minnesota Quality Counts Programs*, pp. 1-2, 2008.
6. **Warnick LD, Nydam D, Maciel A, Guard CL, Wade SE:** Udder cleft dermatitis and sarcoptic mange in a dairy herd. *JAVMA*, 221(2): 273-276, 2002.
7. **Roy C, Roque JL, François PM, Ferrieres A, Raboisson D:** Investigation of the aetiology of udder-thigh dermatitis in French dairy cattle. *Vet J*, [In press], 2011.
8. **Wood PDP:** Algebraic model of the lactation curve in cattle. *Nature*, 216 (511): 164-165, 1967.
9. **Fthenakis GC, Papadopoulos E, Himonas C, Leontides L, Kritas S, Papatsas J:** Efficacy of moxidectin against sarcoptic mange and effects on milk yield of ewes and growth of lambs. *Vet Parasitol*, 87 (2-3): 207-216, 2000.
10. **Soulsby EJL:** Helminths, Artropods and Protozoa of Domesticated Animals. 7th ed., pp. 765-777, Baillier Tindall, London, 1982.
11. **Barth D, Preston JM:** Efficacy of topically administered ivermectin against chorioptic and sarcoptic mange of cattle. *Vet Rec*, 123 (4): 101-104, 1988.
12. **Rehbein S, Visser M, Winter R, Maciel AE:** Efficacy of a new long-acting formulation of ivermectin and other injectable avermectins against induced *Psoroptes ovis* infestations in cattle. *Parasitol Res*, 88 (12): 1061-1065, 2002.
13. **Soll MD, d'Assonville JA, Smith CJZ:** Efficacy of topically applied ivermectin against sarcoptic mange (*Sarcoptes scabiei* var. *bovis*) of cattle. *Parasitol Res*, 78 (2): 120-122, 1992.
14. **Elbers AR, Rambags PG, van der Heijden HM, Hunneman WA:** Production performance and pruritic behaviour of pigs naturally infected by *Sarcoptes scabiei* var *suis* in a contact transmission experiment. *Vet Q*, 22 (3): 145-149, 2000.
15. **Rehbein S, Visser M, Winter R, Trommer B, Matthes HF, Maciel A, Marley SE:** Productivity effects of bovine mange and control with ivermectin. *Vet Parasitol*, 114 (4): 267-284, 2003.
16. **Rebhun WC:** Skin Diseases. In, Rebhun WC (Ed): Diseases of Dairy Cattle. p. 256, Lippincott Williams & Wilkins Philadelphia, 1995.