

Financial losses from foot diseases in cattle farms in Kars Province

Pınar DEMİR^{1*}, Sadık YAYLA², Özgür AKSOY³, İsa ÖZAYDIN³

¹Department of Livestock Economics, Faculty of Veterinary Medicine, Kafkas University, 36100 Kars, Turkey

²Atatürk Vocational Training School of Health Services, Kafkas University, 36100 Kars, Turkey

³Department of Surgery, Faculty of Veterinary Medicine, Kafkas University, 36100 Kars, Turkey

Received: 20.05.2011 • Accepted: 08.03.2012 • Published Online: 22.01.2013 • Printed: 22.02.2013

Abstract: This study was performed via a survey conducted of a total of 112 cattle operations in Kars and the vicinity and included a total of 2317 head, of which 280 were determined to have foot problems. The financial loss incurred per operation was calculated in accordance with the data obtained. As a result, the prevalence of foot disease encountered in cattle in the region in 2010 was determined to be 12.08%, and although it varied depending on the severity of the foot diseases, the animals were healed in an average of 46.5 days. Live weights declined by an average of 14.9% due to pain and lower feed consumption during the course of the disease and the rate of reoccurrence of the foot disease averaged 37.4%. Furthermore, it was determined that total loss per operation from foot diseases in this study was €357.85 and that operations spent an average of €76.36 per year on foot disease in the form of treatment and veterinarian expenses.

Key words: Cattle, foot diseases, financial losses, treatment and veterinarian expenses, Kars Province

1. Introduction

The problems that lead to financial losses in countries where modern cattle-raising is practiced include foot diseases, mastitis, and infertility (1,2). Kossaibati and Esslemont (3) reported that 38% of losses due to illness in cattle-raising are caused by mastitis and 27% by foot diseases. Enting et al. (1) reported that the incidence of foot diseases has increased in animals with improved meat and milk productivity as modern dairy cattle operations have become more widespread.

Factors such as breed, season, lactation, age, the way animals are raised, and hoof deformities all play a role in the incidence of foot diseases (4–6). Environmental and genetic factors, failure to regularly trim the hooves of cattle, and improper feeding all set the stage for foot diseases (7).

Foot diseases are one of the most substantial health problems in raising cattle and they are becoming more prevalent with the spread of intensive cattle-raising operations, resulting in significant economic losses. Economic losses related to foot diseases can include treatment expenses, the need for more labor, weight loss, milk that cannot be used during treatment, decline in milk production, premature removal from production, decreased fertility, extended intervals between calving, and additional insemination expenses (1,3).

The purpose of this study was to determine the prevalence of bovine foot disease in the province of Kars, which is one of the most important animal husbandry regions in Turkey, and to determine the economic losses resulting from foot diseases in cattle operations.

2. Materials and methods

The study consisted of a survey conducted at a total of 112 cattle operations chosen with the random sampling method in order to calculate economic losses and foot disease at cattle operations in Kars and the surrounding villages from October to December of 2010. The study examined 2317 head of cattle of various breeds, ages, and weights, of which 280 were determined to have foot diseases.

In the calculation of financial losses, there was no grouping of foot diseases according to cattle breeds. The average age of animals that had foot disease in the survey was 2.14 years; loss of cow and calf were not taken into consideration because disease was generally encountered in heifers and young bulls. Only the average economic losses caused by the disease for each operation were examined with the partial budgeting method (1). The average values obtained from the survey conducted with breeders and the financial losses resulting from disease were classified

* Correspondence: pinardemir80@hotmail.com

into 3 groups as “live weight loss”, “replacement cost”, and “treatment and veterinary expenses”, and the sum was calculated. Loss due to disease was calculated in the economic analysis performed according to the data obtained from the breeders, and the savings in feed that occurred due to the animal’s loss of appetite were taken into consideration.

The financial losses incurred per operation for foot diseases were calculated based on market conditions in January 2011. In addition, the continuous variables were expressed as mean \pm standard error, and categorical variables were compared by chi-square test. Statistical significance was set at $P < 0.05$.

Table 1 shows the methodology used to estimate financial losses caused by foot disease for each operation.

3. Results

In discussions with a total of 112 cattle operations, the incidence of foot diseases in the region was determined to be 12.08%. It was also determined that an average of 20.7 head of cattle were owned by each operation and that foot disease was observed in an average of 2.5 animals per year.

Foot disease was observed at 2.14 years of age on average and it was especially common in the months of June and July. Producers stated that foot and mouth disease accounted for 90% of the cases of foot disease and that 10% were due to the terrain and other factors.

It was determined that 16.19% of the foot disease was in the front right foot, 17.34% in the left front foot, 31.21% in the right back foot, and 35.26% in the left back foot.

Producers said that they obtained support from a veterinarian in the early stage of the disease 3.1% of the time and at an advanced stage 54.7% of the time, while 42.2% of the producers said that they waited for the disease to heal itself.

According to data obtained from the surveys, 48.2% of the foot disease occurred in males and 51.8% in females, while 58.3% of the foot disease in the region occurred in native cattle breeds, 10% in hybrid cattle, and 31.7% in culture cattle breeds. The study did not find any significant

statistical difference between the prevalence of breeds of cattle regarding foot diseases ($P > 0.05$).

The floor in 73.2% of the barns was concrete and 98.2% of the producers said that they used material like straw or dried horse manure for bedding. The floors of the barns were cleaned on average twice a day. During the winter months, 88.3% of the producers tied up their animals and 11.7% put them in pens. The study did not find any significant statistical difference between animals that were tied up or put into pens regarding foot diseases ($P > 0.05$). Producers also indicated that 90.8% of the animals did go outside in the winter, especially to drink water.

In order to prevent and control foot diseases, 28.6% of the producers said that they administered the foot and mouth vaccine, 18.6% used antiseptics such as foot baths and sprays, and 6.25% used lime. On the other hand, 21.4% of producers said they took no measures at all. In addition, 25% said that they performed hoof trimming and care themselves.

The technical and financial parameters used in the financial analysis and the related values obtained during the survey are provided in Table 2, while prices related to the financial analysis are given in Table 3.

Expenses for mechanical foot care (hoof trimming, foot bath), which is included in treatment and preventative veterinary expenses, was calculated as an average of €34.5, and annual average treatment and veterinarian expenses related to foot diseases were €76.36 for the cattle operations. Although it varied depending on the severity of the disease, it took an average of 46.5 days for the animals to heal.

It was determined that the animals that came down with disease had an average live weight of 205 kg, that live weight fell by an average of 14.9% during the illness due to pain and lower consumption of feed, and that the average rate of relapse in the same animal was 37.4%.

Producers said that 93.8% of the animals consumed less feed during the course of the illness, that the average decline in feed consumption was 12.24% while the foot disease continued, and that this situation continued for an average of 23.45 days.

Table 1. Methodology used in calculations.

Live weight loss = Average live weight (kg/head) \times decrease in the liveweight (%) \times price of meat (kg/€)

Cattle replacement costs = Price of replacement cattle (€) \times rate of removal from the herd (%)

Average treatment and veterinarian expenses (data obtained from breeders)

Total cost = Live weight loss + cattle replacement costs + average treatment and veterinarian expenses

Feed efficiency = Average decline in feed consumption (%) \times average decline in feed consumption (days) \times price of feed (kg/€)

Total financial losses = Total cost – feed efficiency

Table 2. Data used in estimating losses related to foot diseases (€).

Parameters	Min.	Max.	Mean	Std. error
Average days for healing	10	210	46.48	4.87
Treatment and veterinarian expenses (€)	6.90	230.10	76.36	7.14
Average live weight (kg)	100	500	205.00	14.43
Average body weight loss (%)	0.00	33.33	14.93	1.32
Rate of reoccurrence (%)	5	80	37.36	3.11
Average decline in feed consumption (%)	2	50	12.24	3.69
Average decline in feed consumption (days)	10	80	23.45	2.57

Table 3. Prices used in estimating losses related to foot diseases.

Factors	Prices (€)	References
Concentrate feed prices (€/kg)	0.31	TDSYMB (8)
Breeding heifer price (€)	2805.34	TOBB (9)
Price of meat (€/kg)	5.56	Etfiyat.com (10)
Cow replacement costs (60%) (€)	1682.93	Yalçın et al. (11)

In response to the questions in the survey regarding whether or not fertility of the animal decreased after the illness, 33.3% of the operations indicated that it did and total loss of fertility in heifers was determined to be 1.4%. The percentage of animals being disposed of due to loss of live weight or fertility was found to be 2.8%.

The annual financial loss of a cattle operation resulting from foot diseases is provided in Table 4 in light of the data obtained from the breeders.

The average economic loss per operation related to foot diseases was calculated as €357.85. This study identified

losses resulting from foot diseases in operations in the Kars area as loss of live weight (46.40%), cow replacement costs (32.78%), and expenses for treatment and veterinarians (20.82%).

From discussions conducted with producers, it was determined that the average age of cattle who contracted the illness was 2.14 years, and so expenses related to loss of dairy production, milk that could not be used during treatment, extended calving time, and additional insemination at the operations were not included.

Table 4. Financial losses due to foot diseases (€).

Financial losses	Prices (€)	%
Weight loss	170.17	46.40
Treatment and veterinarian expenses	76.36	20.82
Cattle replacement costs	120.21	32.78
Total costs	366.74	100.00
Feed efficiency	8.89	-
Total financial losses	357.85	-

4. Discussion

Foot diseases are known to result in substantial economic losses in dairy cattle-raising and constitute serious health problems (12). In fact, they are the third most serious problem after infertility and mastitis (13).

It has been determined that foot diseases identified in cattle vary depending on the way the cattle are raised, how they are fed, shelter conditions, climate, and geographical regions (5). The annual incidence of foot diseases in this study was 12.08%, and this rate is equivalent to rates reported for Turkey as numerous researchers have reported rates varying from 10% to 27% (7,14–17).

It was determined that 48.2% of the foot diseases occurred in males and 51.8% in females, while 58.3% of the foot disease occurred in native breeds. This might be attributed to the fact that the survey was conducted with the random sampling method and in a region where the population of native cattle breeds in animal husbandry operations is quite high (63.9%) according to data from the Turkish Statistical Agency (18).

Canpolat and Bulut (7), Atasoy (15), and İstek and Durgun (16) reported that 80%–88% of foot diseases occurred in the back feet. This study, however, resembles other studies in finding that 66.47% of complaints about foot diseases occurred in the back feet.

This study determined that the average weight of the animals that contracted foot diseases was 205 kg. However, some researchers have reported that foot diseases are encountered more frequently in cattle weighing over 250 kg (19,20). It is thought that the reason foot diseases are especially prevalent in animals that weigh more is that the disease results from the pressure that is formed by the load borne by the foot (16). The reason for the difference here is thought to be that 90% of the foot disease in the region is caused by foot and mouth disease and because young animals are more sensitive to this disease.

On the other hand, a number of researchers (14,16,21–23) have reported that several predisposing factors, such as climate and environmental conditions, improper nutrition, unclean or irregular shelter, failure to perform regular foot and hoof care, pregnancy and lactation, age, breed, and sex, play a role in foot diseases. It has been emphasized that factors such as keeping animals in a shelter continually, the common use of manure for bedding, lack of a 3%–4% slope on the barn floor for urine and other wastes, lack of manure trenches, and failure to wash the animals' feet upon returning from pasture all play a role when it comes to the occurrence of foot diseases (5). In this study, the barn floors were cleaned on average twice a day. However, the usable area in barns where animal husbandry was conducted by families on a small scale was insufficient. The barns did not meet hygienic standards and the floors in these operations were generally wet, dirty, and muddy.

In the studies that have been conducted, hoof deformities were generally observed in the winter and spring months. It has been reported that this occurs because the animals are kept in the barns due to the weather conditions and are not taken out enough, coupled with failure to provide hoof care (4,5,7,24,25). In this study, on the other hand, it was determined that foot diseases in the region were observed in the months of June and July (78.8%), and this situation is related to the fact that foot and mouth disease is especially prevalent in the region during the months of June and July.

The survey determined that the average age of the animals that contracted foot disease was 2.14. A number of researchers have reported that foot diseases are more frequently observed in cattle between the ages of 3 and 7 (7,17,26). This difference in the average age was attributed to the fact that the study was conducted among a population consisting of mostly younger animals and the fact that young animals are more susceptible to foot and mouth disease.

This study did not find any statistically significant difference regarding foot diseases between animals that were tied up or put into pens ($P > 0.05$). The reason for this is thought to be the fact that 90.8% of the producers took their animals outside to drink water during the winter months.

An examination of dairy barns in the province of Kars showed that most of them were not well planned and had floors of dirt or concrete. Generally, straw and dried horse manure were used as bedding. Dirt floors were preferred over concrete by 26.8% of the producers because they are soft and warm.

A general decline, especially in breeding bulls, and weight loss due to the pain experienced by the animal were observed. The disease generally occurred in the back feet and resulted in unwillingness to copulate and failure to inseminate (27). As a result, there is an economic loss because animals are removed from the breeding program early and sent to slaughter. In this study, economic loss due to the early removal of animals from production was determined to be €120.21.

Foot diseases can cause decline in body condition (1). In this study, the amount of feed consumed by animals declined by 12.24% (2%–50%) and this lasted on average 23.45 days, even though it varied depending on the severity of the disease. The economic analysis took this into account. In keeping with the results of this study, Enting et al. (1) reported that in the study they conducted, feed consumption fell 4% and this lasted for 35 days.

In the study conducted by Kudi et al. (27), a significant relationship was identified between foot diseases and live weight ($P < 0.05$). In this study, live weight declined by an average of 14.49% and this situation continued for an

average of 46.5 days. In light of these data, it can be said that live weight fell by 0.66 kg per day. Similarly, Ettema and Østergaard (28) and VanArendonk et al. (29) reported in their studies that daily body weight decreased by 0.5 kg and that this situation continued on average for 35 days.

In this study, the average age of those that contracted foot diseases was 2.14. Economic analysis regarding declining milk production was not performed because data on changes to milk production were unavailable. However, Rajala-Schultz et al. (30) determined that the daily loss in milk production per cow varied between 1.5 and 2.8 kg. Warnick et al. (31) reported that average daily milk production per head in 2 different herds fell by 0.5 and 1.5 kg respectively after cows developed lameness.

In this study, average loss per operation in cattle-raising operations was calculated as €357.85. In similar studies, average loss per operation in dairy cattle operations was €398.07 (11), while Kossaibati and Esslemont (3) reported that the total cost per case was £246.22, Cha et al. (32) reported an average cost of US\$177.62 per case in different types of lameness (single ulcer, digital dermatitis, foot rot), Ettema and Østergaard (28) reported a loss of €192 per case in the herds, and Enting et al. (1) reported economic loss of €104 per cow. Therefore, it could be said that there was no significant economic difference between this study and other studies even though there were numerous differences in terms of the area where the studies were conducted, operation management approaches, and the breeds of animals.

References

- Enting, H., Kooij, D., Dijkhuizen, A.A., Huirne, R.B.M., Noordhuizen-Stassen, E.N.: Economic losses due to clinical lameness in dairy cattle. *Livest. Prod. Sci.*, 1997; 49: 259–267.
- Clarkson, M.J., Downham, D.Y., Faul, W.B., Hughes, J.W., Manson, F.J., Merritt, J.B., Murray, R.D., Russell, W.B., Sutherst, J.E., Ward, W.R.: Incidence and prevalence of lameness in dairy cattle. *Vet. Rec.*, 1996; 138: 563–567.
- Kossaibati, M.A., Esslemont, R.J.: The costs of production diseases in dairy herds in England. *Vet. J.*, 1997; 154: 41–51.
- Hassall, S.A., Ward, W.R., Murray, R.D.: Effects of lameness on the behaviour of cows during the summer. *Vet. Rec.*, 1993; 132: 578–580.
- Rowlands, G.J., Russell, A.M., Williams, L.A.: Effects of season, herd size, management system and veterinary practice on the lameness incidence in dairy cattle. *Vet. Rec.*, 1983; 113: 441–445.
- Vermunt, J., Greenough, P.R.: Predisposing factors of laminitis in cattle. *Br. Vet. J.*, 1994; 150: 151–164.
- Canpolat, İ., Bulut, S.: Incidence of foot diseases in cattle in and around Elazığ. *F.Ü. Sağlık Bil. Derg.*, 2003; 17: 155–160 (in Turkish with English abstract).
- TDSYMB (Cattle Breeders' Association of Turkey): Concentrate feed prices 2011; www.dsymb.org.tr.
- TOBB (Union of Chambers and Commodity Exchanges of Turkey): Breeding heifer price 2011; www.tobb.org.tr.
- Etfiyat.com: Current meat prices 2011; www.etfiyat.com.
- Yalçın, C., Sarıözkan, S., Yıldız, A.Ş., Günlü, A.: Financial losses due to lameness in dairy herds in Burdur, Kırklareli and Konya provinces of Turkey. *Ankara Üniv. Vet. Fak. Derg.*, 2010; 57: 99–104 (in Turkish with English abstract).
- Logue, D.N., Offer, J.E., Kenpson, S.A.: Lameness in dairy cattle. *Irish Vet. J.*, 1993; 46: 47–58.
- Weaver, A.D.: Cattle foot problems. 3. Surgical techniques. *Agri-Practice*, 1987; 9: 14–16.
- Sağlıyan, A., Ünsaldı, E.: Observation on the incidence of foot diseases of cattle in Tunceli Region. *F.Ü. Sağlık Bil. Derg.*, 2002; 16: 47–56 (in Turkish with English abstract).
- Atasoy, N.: The incidence and treatment of foot diseases seen in the dairy cows in the region of Erzurum. *Y.Y.Ü. Vet. Fak. Derg.*, 2003; 14: 1–5 (in Turkish with English abstract).

16. İstek, Ö., Durgun, T.: Muş ve yöresindeki sığırlarda görülen ayak hastalıklarının prevalansı üzerine araştırmalar. Doğu Anadolu Bölgesi Araştırmaları, 2004; 39–47 (in Turkish).
17. Alkan, İ., Boynukara, B., Genççelep, M.: Van ve yöresinde sığır ayak hastalıklarının yayılışı, nedenleri ve sağaltımı üzerine bir araştırma. Y.Y.Ü. Vet. Fak. Derg., 1993; 4: 87–95 (in Turkish).
18. TÜİK (Turkish Statistical Institute): Regional statistics 2009; www.tuik.com.
19. Peterse, D.J., Korver, S., Oldenbroek, J.K., Talmon, F.P.: Relationship between levels of concentrate feeding and incidence of sole ulcers in dairy cattle. Vet. Rec., 1984; 115: 629–630.
20. Weaver, A.D.: Lameness in cattle-investigational and diagnostic check lists. Br. Vet. J., 1985; 141: 27–33.
21. Greenough, P. R.: Observations on bovine laminitis. In Practice, 1990; 12: 169–173.
22. Livesey, C.T., Fleming, F.L.: Nutritional influences on laminitis, sole ulcer and bruised sole in Friesian cows. Vet. Rec., 1984; 114: 510–512.
23. Vermunt, J., Greenough, P.R.: Predisposing factors of laminitis in cattle. Br. Vet. J., 1994; 150: 151–164.
24. Bargai, U., Shamir, A., Lubin, A., Bogin, E.: Winter outbreaks of laminitis in calves; aetiology and laboratory, radiological and pathological finding. Vet. Rec., 1992; 31: 411–414.
25. Rowlands, G.J., Russell, A.M., Williams, L.A.: Effect of stage of lactation, month, age, origin and heart girth on lameness in dairy cattle. Vet. Rec., 1985; 117: 576–580.
26. Wells, S.J., Trent, A.M., Marsh, W.E., Williamson, N.B., Robinson, R.A.: Some risk factors associated with clinical lameness in dairy herds in Minnesota and Wisconsin. Vet. Rec., 1995; 136: 537–540.
27. Kudi, A.C., Kalla, D.J.U., Niba, A.T., Danbirni, S.: Effect of lameness on body condition score, live weight and milk yield of Holstein Friesian dairy cattle. Internet J. Vet. Med., 2009; 6: 1.
28. Ettema, J.F., Østergaard, S.: Economic decision making on prevention and control of clinical lameness in Danish dairy herds. Livest. Sci., 2006; 102: 92–106.
29. VanArendonk, J.A.M., Stockvisch, P.E., Korver, S., Oldenbroek, J.K.: Factors determining the carcass value of culled dairy cows. Livest. Prod. Sci., 1984; 11: 391–400.
30. Rajala-Schultz, P.J., Gröhn, Y.T., McCulloch, C.E.: Effects of milk fever, ketosis, and lameness on milk yield in dairy cows. J. Dairy Sci., 1999; 82: 288–294.
31. Warnick, L.D., Janssen, D., Guard, C.L., Gröhn, Y.T.: The effect of lameness on milk production in dairy cows. J. Dairy Sci., 2001; 84: 1988–1997.
32. Cha, E., Hertl, J.A., Bar, D., Gröhn, Y.T.: The cost of different types of lameness in dairy cows calculated by dynamic programming. Prev. Vet. Med., 2010; 97: 1–8.
33. Zeddies, J., Munz, J., Fuchs, C.: Ökonomische Aspekte des Einsatzes von Tierarzneimitteln und tierärztlichen Behandlungen. Prakt. Tierarzt., 1997; 78: 44–51 (in German).