Original Article

Evaluation of the Costs of Clinical Mastitis Treatment in Dairy Farming

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ABSTRACT

Clinical mastitis is a disease that causes to significant economic losses in dairy farming. Milk yield losses and treatment costs, are some of them. This study aimed at to determining clinical mastitis treatment cost. Questionnaire forms were conducted on veterinarian clinicians. In accordance to the results of the descriptive statistics from the questionnaire form, average local treatment cost of clinical mastitis in per dairy cows was calculated as 22 TL. The incidence of clinical mastitis in only one lobe was found 61.38%. Average minimum cost of parenteral medicine use in per dairy cow was calculated as 54 TL where maximum cost is 116 TL.

Keywords: Dairy Cattle, Mastitis, Treatment.

INTRODUCTION

Clinical mastitis leads to significantly economic losses (Wolfova *et al.,* 2006). Values of these losses are closely related with incidence of the disease and milk yields of diseased animals and treatment cost. The rates of clinical mastitis were found as between 5%- 36.5% in some studies in 90's and 2000's (Emre *et al.,* 2011; Fırat, 1993; Seegers *et al.,* 2003). Daily milk yield change varies as between in 3.5kg per day in local breed (Alpan and Arpacık, 1998) and 23-24kg per day in culture breed (Gürses and Bayraktar, 2012; Erdem *et al.,* 2007) in Turkey.

Clinical mastitis leads to important economic losses; such as, milk losses, discarded milk and transient reductions milk yield, premature culling, treatment costs, death of the cow, reduced milk quality and price of the milk are some of them (Durr *et al.,* 2008, Fetrow, 2000). Annual loss per cow is calculated between as 69-228 £ in England and Scottish Dairy herds (Kossaibati and Esslemont, 1997; Yalçın, 2000). In a study conducted on the cost of clinical mastitis treatment costs were found $94 ± 51(Shim *et al.,* 2004).

Depending on the years, supply conditions, seasons, pathogen types, etc cattle's milk yield and the rate of clinical mastitis varies significantly in the field conditions. Therefore clinical mastitis treatment costs were investigated in this study. The costs of clinical mastitis under field conditions due to the sheer numbers of variables need to be calculated at the enterprise level. That's why this study is conducted in order to determining treatment cost per animal

MATERIAL and METHODS

Pre-assessment

Neither study area people nor veterinarians send the material with mastitis in the laboratory for factor isolation in the study area. Due to this, mastitis treatment cannot be performed depending on the isolation of bacteria in the field conditions. For this reason, in present study, that was carried in order to determine treatment cost of clinical mastitis, questionnaire technique was used by considering observation of veterinary clinicians on clinical applications may direct clinicians not to use their routine clinical applications and this may result in miscalculation of treatment costs. For this purpose, a questionnaire study was made with private veterinary clinicians who carry their licensed business in Samsun province in 2012. In 2012, there were 104 clinics in Samsun province. 13 of these were excluded from the study since they serve as pet clinics and sampling size was determined for remaining 91 clinics.

Sample size; $n = N. t^2.p .q / d^2 (N-1) + t^2.p.q$

n: Sample size to be included in the study

N: Individual number in target population

t: Theoretical value in t table at a defined significance level

p: Estimated survey of population with mastitis (probability of occurrence)

q: Estimated survey of population with lack of mastitis (probability of nonoccurrence)

d: Accepted ± sampling error

Required sampling size for studied population within 90% confidence interval, with ± % 10 sampling error was calculated as n=40.

Accordingly, randomly selected clinicians and who could have time for the questionnaire answered our questionnaire (Salant and Dillman, 1994). One of 40 clinicians who answered the questionnaire was only one woman and 39 was man. In this study; clinicians answered the questions about mammary lobe number that have mastitis, how many of mastitis notices were made within 24 hours, minimum and maximum cost of medicine that is applied to one mammary lobe for dry off period therapy, minimum and maximum cost of parenteral medicine applications, administration duration and interval of intramammary medicines and mean transportation cost that is demanded from the customer.

Statistical Analysis of Data

Data collected in this study was analyzed by SPSS software package (SPSS, 2002). Evaluation of the data descriptive statistical methods were used (number, percentage, mean, median, mode, and standard deviation).

Technical Acceptances

Examination fee for treatment cost calculation was determined by using 2012 price list of Samsun-Sinop Chamber of Veterinarians (RCV, 2012).

Local treatment cost of the disease is calculated by using the formula;

Local treatment cost of the disease = Cost of application of one dose (TL, Turkish money) X Total application number

Cost of total local treatment for one mammary lobe is calculated by using the formula;

Cost of total local treatment for one mammary lobe= local treatment cost X localization of the disease to mammary lobes%. Mean local treatment cost per case is calculated by using cost of total local treatment for one mammary lobe.

A dairy cattle's mastitis case it is assumed that once a year there.

Cost of local application cost is calculated to be 6.04%. Since the data about localization of the disease in mammary lobes do not show normal distribution, this calculation is higher. However the difference is not considered in present study.

RESULTS

In this study, in order to determine the cost of medication that is used in local treatment of the disease, clinicians were questioned about localization of the disease on mammary lobes and data related with these questions are presented in Table 1.

Firstly, localization of the disease comes on only one lobe with 61.38%. Localization data related with presence of the disease are found, two, three and four lobes 27.25%, 9.52% and 7.89% respectively. Mean values related with lower and upper price limits of parenteral and local treatment that are used in treatment of clinical mastitis and maximum and minimum prices are given in Table 2. Mean value of lowest cost of parenteral treatment that is used in treatment of clinical mastitis by veterinary application is 54 TL; highest price of parenteral treatment is 116 TL on average. Mean lower limit of cost of one dose local treatment is 5.64 TL where highest limit is 10 TL.

In this study, clinician's local treatment applications interval and administration numbers are questioned and the related data are presented in Table 3. Accordingly, clinicians' choice a local treatment administration interval is determined to be 12 hours on average and mean application number is determined to be 2.18 times.

By using data that are presented on Tables 1, 2 and 3; local treatment cost of clinical mastitis is calculated and given in Table 4.

Table 1. Localization of clinical mastitis in mammary lobes in Samsun province, Turkey.

Localization of the disease	N	Mean	Median	Mode	Standard deviation
Only one lobe	40	61.38	60.00	80	19.611
Two lobes	40	27.25	22.50	30	16.944
Three lobes	31	9.52	10.00	10	5.378
Four lobes	19	7.89	10.00	10	2.536

Table 2. Medication cost of clinical mastitis in Samsun province, Turkey.

Costs	N	Mean(TL)	Standard Deviation
Parenteral treatment cost, lowest	40	54.12	26.162
Parenteral treatment cost, highest	38	116.32	52.604
Cost of one dose local treatment, lowest	33	5.64	1.868
Cost of one dose local treatment, highest	33	10.36	3.229

Table 3. Local medication applications intervals and numbers in Samsun province, Turkey.

Treatment applications	N	Mean	Standard Deviation
Administration interval (hours)	29	12	2.619
Administration number	31	2.18	0.842

Table 4. Local treatment cost of clinical mastitis per animal in Samsun provinc, Turkey.

Localization of the disease	Cost of one dose local medication (TL)	Total cost of local medication (TL)	Localization of the disease on mammary lobes (%)	Cost of local treatment of the disease for each mammary lobe (TL)
Only one lobe	5.83	12.70	61.38	7.78
Two lobes	11.66	25.41	27.25	6.92
Three lobes	17.49	38.12	9.52	3.62
Four lobes	23.32	50.83	7.89	4.01

Mean local treatment cost is calculated as 22 TL by using the cost of local treatment of the disease for each mammary lobe data that is given in Table 4.

In present study, some of cost items were not used in the calculation of clinical mastitis. The cost of clinical mastitis after exclusion of parenteral treatment costs is calculated and shown on Table 5. The cost of clinical mastitis after exclusion of parenteral treatment costs is calculated 120.46 TL. Calculations related with total treatment cost per animal are presented in Table 6.

Due to the difference between minimum and maximum mean costs of parenteral treatment applications, lower and upper limits of treatment costs are determined. When we studied the data presented on the Table, it is seen that cost of treatment of clinical mastitis cases per animal is calculated to be minimum 175 TL, maximum 237 TL for 2012 year.

Table 5. The cost of clinical mastitis after exclusion of parenteral treatment costs in Samsun Province, Turkey.

Cost items	Cost (TL)
Mean local treatment cost per case (calculated by using questionnaire data)	22
Veterinary surgeon examination fee (RCV,2012)	73
Transporting fee (questionnaire data)	25
Total	120

Table 6. Total treatment cost per animal in Samsun province, Turkey.

Cost items	Minimum	Maximum
Mean cost of parenteral treatment applications (TL)	54.12	116
Total cost of clinical mastitis treatment except parenteral treatment cost (TL)	120.46	120
Total treatment cost per animal (TL)	174.58	237

DISCUSSION

Clinical mastitis is one of endemic diseases seen in dairy farming enterprises, which has important financial results (Wolfova *et al.,* 2006). In this study treatment cost of clinical mastitis per animal is estimated to be between 174.58 TL- 237 TL in 2012. Studies that define mastitis losses report that annual loss per cow is \$118 – 182 in 80s (Jasper, 1982; Seykora and Mc Daniel, 1985). In the studies that were carried in next ten years, losses per cow were reported as 69-228£ in 90s (Kossaibati and Esslemont, 1997; Yalçın, 2000). Comparison of reported data with the results of present study showed that our results were within the range of these studies (Jasper, 1982; Seykora and Mc Daniel, 1985).

Although some of diseases related cost items such as amount of milk discarded in short term, increased labor costs and exclusion of animals from the herd are not included in the scope of this study, calculated costs were within the range that was defined by previous studies (Jasper, 1982; Seykora and Mc Daniel, 1985; Yalçın, 2000). This is thought to be related with low milk yield and high treatment costs.

CONCLUSION

Animal husbandry is a dynamic process. Factors that affect milk yields in dairy cow are breed, lactation period, number of daily milking, milking interval and weight, nutrition, environmental temperature, calving season, of dry period, diseases and exercise. In studies of mastitis milk yield for economic losses related to all of these factors into consideration in determining the area and almost impossible to do the field work is far from being rational. Therefore, at the farm level in mastitis incidence and yield losses at the level of farm knowledge is needed.

A treatment plan for the clinical mastitis needs early detection, diagnosis of the pathogen and effective treatment. In present study, vet clinicians did not reported that were made a somatic cell numbers control applications and pathogen diagnosis in the field conditions. The other important finding was the treatment cost does not vary in regard with the strain of the animal. For this reason it is recommended to build up a record system for endemic diseases in national scale. By this way awareness of breeder on the disease would be increased about public health and more gain to be obtained from milk in healthy, furthermore cost and results of application of disease control strategies would be explained to the breeder easily.

REFERANCES

Alpan, O. and Arpacık R (1998). Sığır Yetiştiriciliği, ISBN 975-95817-3-6 Şahin Matbaası, Ankara

Durr JW, Cue RI, Monardes HG, Moro-Mendez J and Wade KM (2008). Milk losses associated with somatic cell counts per breed, parity and stage of lactation in Canadian Dairy Cattle. Livestock Science, 117: 225–232.

Emre B, Cengiz M and Alaçam E (2011). Evaluation of effects of milking hygiene and management factor on Clinical Mastitis Incidence in Dairy Cows, Kafkas Universitesi Veteriner Fakültesi Dergisi, 17(1): 31-35.

Erdem H, Atasever S, and Kul E (2007). Gökhöyük Tarım İşletmesinde yetiştirilen Siyah Alaca sığırların süt ve döl verim özellikleri 1. süt verim özellikleri. OMÜ Ziraat Fakültesi Dergisi, 22(1): 41-46.

Fetrow J (2000). Mastitis: an economic consideration. Proceedings of the 29th annual meeting of Natl. Mast. Madison, Coun., Atlanta, GA, Natl Mast Coun. WI. Pp: 3-47

Gürses M, and Bayraktar M (2012). Türkiye'de farklı bölgelerde yetiştirilen Holştayn sığırlarda bazı süt ve döl verimi özellikleri, Kafkas Universitesi Veteriner Fakültesi Dergisi, 18 (2): 273-280

Jasper DE (1982). Environmental mastitis. Veterinary Record, 111 (11): 226-236.

Kossaibati MA, and Esslemont RJ (1997). The costs of production diseases in dairy herds in England. The Veterinary Journal, 154: 41-51.

Regional Chamber of Veterinarians (2012). 2012 Price Schedule. Samsun-Sinop Bölge Veteriner Hekimler Odası.

Salant P, and Dillman DA (1994). How to conduct your own survey, John Wiley and Sons, Inc. Newyork., s. 55.

Seegers H, Fourichon C, and Beaudeau F (2003). Production effects related to mastitis and mastitis economics in dairy cattle herds, Veterinary Record, 34: 475-491.

Seykora AJ and McDaniel BT (1985). Udder and teat morphology related to mastitis resistance: A review. Journal of Dairy Science, 68: 2087-2093.

Shim EH, Shanks RD, and Morin DE (2004). Milk loss and treatment costs Associated with Two Treatment Protocols for Clinical Mastitis in Dairy Cows, Journal of Dairy Science, 87 (8): 2702–2708

SPSS Inc. (2002). SPSS for Windows 11.00 Chicago, USA.

Wolfova M, Stipkova M, and Wolf J (2006). Incidence and Economics of Clinical Mastitis in Five Holstein Herds in the Czech Republic, Preventive Veterinary Medicine, 77: 48-64.

Yalçın C (2000). Cost of mastitis in Scottish dairy herds with low and high subclinical mastitis problems. Turkish Journal of Veterinary Animal Science, 24 (5): 465-472.