Ankara İli Süt Sığırcılığı İşletmelerinde Klinik Mastitis Kaynaklı Ekonomik Kayıplar

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Özet

Amaç:
Bu araştırmada, süt sığırcılık işletmelerinde en önemli hastalık problemlerinden birisi olan klinik mastitis kaynaklı verim ve finansal kayıplar tahmin edilerek, finansal kayıpların seviyesi ile işletmelerin sosyo-ekonomik yapısı ve yetiştiricilerin mastitis kontrol uygulamaları arasındaki ilişkinin araştırılması amaçlanmıştır.
Materyal ve Metod:
Ankara ili Damızlık Sığır Yetiştiricileri Birliği'ne bağlı Soy Kütüğüne üye 618 süt sığırcılık işletmesinden seçilen 45 adet işletmede ileriye dönük bir araştırma gerçekleştirilmiştir. Kasım 2005-Mart 2007 tarihleri arasında 17 aylık saha araştırmasının ilk 5 ayı deneme periyodu, 12 ayı ise proje dönemi olarak değerlendirilmiş olup, her işletme ayda bir defa ziyaret edilmiştir. Proje sonunda yetiştiricilerle kapsamlı anket çalışması yapılmıştır.
Sonuç:
Araştırmada ortalama klinik mastitis insidensi %42,1 ve hedef mastitis insidensinin ise %12,7 olduğu tespit edilmiştir. Her klinik mastitis vakası sonucu oluşan ekonomik kayıpların (nüks dâhil) hastalığın hafif, orta ve şiddetli formlarında sırasıyla 79 TL (158 lt çiğ süt eşdeğeri), 218 TL (436 lt çiğ süt eşdeğeri), 569 TL (1204 lt çiğ süt eşdeğeri) olarak hesaplanmıştır. Hastalığın seyrine göre hesaplanan ağırlıklı ortalama kaybın ise 244 TL (460 lt çiğ süt eşdeğeri) olduğu hesaplanmıştır. Toplam finansal kayıplar içinde kayıp kalemlerin payı incelendiğinde, hafif ve orta şiddette seyreden vakalarda en yüksek kayıp kaleminin tedavi masrafları (sırasıyla %80 ve %60), şiddetli seyreden vakalarda ise süt verim kaybının (%51) olduğu tespit edilmiştir.

Anahtar Sözcükler: Süt sığırcılığı, endemik hastalıklar, klinik mastitis, finansal kayıp

Economic losses due to clinical mastitis in dairy herds in Ankara

Abstract

Aim:
This study aimed at estimating clinical mastitis related avoidable and unavoidable financial losses at dairy herds, and investigating the association between the avoidable losses and socio-economic characteristics of producers, and their hygiene and mastitis control applications.
Materials and Methods:
A prospective longitudinal observation study was carried out in randomly selected 45 dairy herds from 618 Turkish Dairy Breeding Association (TDBA) herds in Ankara province, Turkey. The survey was conducted between November 2005 and March 2007, and each herd was visited at least once a month. The first five months were regarded as a trial period, and subsequent 12 months was as a study period. At the end of the study, a detailed survey related to their business, hygiene and mastitis control applications.
Results: In the study, the average incidence rate of clinical mastitis in the herds surveyed was 42,1%, and target incidence rate was calculated as 12,7% (as the average incidence rates of the best 25 herds). Financial losses from each cases of clinical mastitis (including the repeat of the case) were estimated as 79 TL/case (158 lt liquid milk equivalent) for mild cases, 218 TL/case (436 lt liquid milk equivalent) for intermediate cases, 569TL/case (1204 lt liquid milk equivalent) for the severe cases. The weighted mean financial loss according to the probability of occurrence of each case was calculated to be 244 TL/case (460lt liquid milk equivalent) The proportion of the treatment cost in the total financial cost was the highest in the mild and intermediate cases (80 % and 60% respectively), whereas, it milk yield loss was the highest (%51) in the severe cases.

Key words: dairy herd, endemic diseases, clinical mastitis, financial loss

INTRODUCTION

Dairy herds are low profit margin businesses and in this sector, the distinction between successful and unsuccessful businesses can be seen with the ability to control cost (1) or taking the disease costs under the control, financial management of endemic diseases such as mastitis which is seen in every dairy herd in various level is quite important (1, 5, 7, 13, 20). Losses due to mastitis may vary according to the socio-economic structure of breeders but on the other hand the losses can be quite serious in the case of lack of udder hygiene (16).

In the countries where the dairy farming is developed, health records are kept regularly and the analyzes are conducted in order to identify the incidence of losses due to endemic diseases, compare them with the target values and calculate the economic value of deviation from the target (24). However, in Turkey, though the importance of the economic losses due to cattle diseases has been underlined for many years (17) mostly health records are not kept even by modern considered farms, moreover the records are not used in the case of the disease control decisions in the farms where the records are kept (25).

In this study, it is aimed at studying the interaction between the level of financial losses and socio-economic structure of dairy herd and the breeders mastitis control applications estimating the production and financial losses due to the clinical mastitis which is one of the most important disease problems in dairy herds.

MATERIALS AND METHODS

The materials of this study are consisted of present cows in 45 dairy herd which are selected from the 618 dairy herds related to Turkish Dairy Breeders Central Association (TDBCA), in Ankara. The dairy herds used in the study, consist the %7,4 of the total number of dairy herds and the %9,2 of the number of cows in the province. The survey is conducted in the center of Ankara and its districts where the dairy herds are mostly established. It has taken 17 months for field research and the first 5-month period of data collection is identified as the trial period.

The incidence has been calculated with a method of monthly incidence (21); target values are determined with the similar literature values and / or taking the first slice of 25% , of the best average in all dairy herds (10). The dairy herds are separated into 3 groups which are small (n <10), moderate (n ≥ 10-n <20) and large (n ≥ 20) in terms of their scales, and the shelter types are identified as closed, semi-open and open. Calculating diseases loss sorts , largely the analytical roof that Yalçın and et al.(23) ' has used is facilitated.

Financial losses resulting from clinical mastitis disease are calculated separately for 3 different course, "mild", "moderate" and "severe". Mild cases are describes with a slight redness on the udder while the moderate cases are described that disease is limited with an inflammatory / purulent local infection but there is no systemic symptoms, and the severe infection refers that there is systemic infection beside local symptoms and this sort of disease may be fatal. When the losses resulting from clinical mastitis are calculated, the incidence rate and layoffs, immediate cut, unresponsive treatment, infection on the multiple udder lobe, udder atrophy, relapse probabilities are taken into account for the 3 different courses of disease mentioned above. Technical and economic parameters which are commonly used in the analysis of these diseases and technical and financial values that are dedicated to all diseases are given in Tables 1 and 2.

Unavoidable losses represents the minimum level that the total losses due to endemic diseases can be reduced to. The losses over this level are expressed "avoidable losses".

SPSS 11.0 package program was preferred in statistical analysis. The non-parametric tests were preferred because the data did not show normal distribution (Kolmogorov-Smirnov Test "Sample KS") and / or it is not homogenous ("Homogeneity of variance test" option of Oneway Anova test). In multiple groups, Kruskal-Wallis were used from the other non-parametric tests. Significance between groups was determined with the Mann-Whitney U test in evaluation of binary groups.

Table1. Technical and financial data used in the calculation of economic losses due to endemic diseases

Technical information related to production	Value	Source	Explanation
Lactation milk yield (*lt*)	5456	Research data	305-day milk yield were taken into account.
Average daily milk yield (*lt*)	17,31	Research data	
Daily consumption of concentrate feed (kg/cow)	14,5	Research data	Concentrate and forage quality were taken into account
1 *l* of milk consumed forage quality	0,84	Calculation	
Patient animal care (hour)	0,25	Assumption	The farmer spends additional time to treat sick animals (hour)
Farmer's sick animal treatment period (hour)	0,5	Assumption	The farmer spends additional time to cure sick animals (hour)
Financial information used in the calculations *			
Milk prices (TL/*lt*)	0,53	Research data	2007 Dairy premium support included
Concentrate feed price (TL)	0,45	Research data	Year 2007
Breeding heifers price (TL/cow)	2473	Research data	Year 2007
Culling cow price (TL/cow)			
When removed from the herd due to old age and low yield (TL/cow)	1715	Research data	
Due to illness in the emergency slaughter (TL/cow)	650	Research data	In case of emergency slaughter
calving interval of 1 day of delay costs The cost of culling decisions (TL/cow)			
Culling due to old age and low yield (TL/cow)	738	Calculation	
Due to illness in the emergency slaughter (TL/cow)	1823	Calculation	In case of emergency slaughter
Farmer labor costs (TL/day)	13,4		minimum wage (403TL)
Farmer labor costs (TL/hour)	1,5		
artificial insemination fee	25		Research data
The cost of one day delay in calving interval	5,6	Yalçın (2000) (22)	

* March 2007 prices is calculated considering.

Table 2. Technical and financial data used in the calculation of economic losses due to clinical mastitis

	mild*	moderate*	severe*	source
Incidence (%)	0,37	0,41	0,22	Research data
Culling rate due to mastitis (%)	0,00	0,00	0,04	Research data
Emergency slaughter rate due to mastitis (%)*	0,00	0,00	0,00	Research data
Veterinarians treatment rate (%)	0,08	0,38	0,76	Research data
Farmer treatment rate (%)	0,92	0,62	0,24	Calculation
The average treatment time (day)	2,3	4,5	6,4	Research data
recurrence rate (within 1 month)	0,05	0,01	0,3	Veterinary survey
Incidence in 1 lobe (%)	0,91	0,55	0,25	Research data
Incidence in 2 lobe (%)	0,07	0,34	0,56	Research data
Incidence in 3 lobe (%)	0,00	0,03	0,06	Research data
Incidence in 4 lobe (%)	0,02	0,08	0,13	Research data
Average number of infected lobes	1,05	1,64	2,07	Calculation
Decrease in lactation milk yield (%)	0,024	0,085	0,25	Bennett, 2003 (2) [#]
a) The rate of breast-blind (%)	0,00	0,03	0,07	Calculation
b) Additional reduction in milk yield due to breast blind (%) [&]	0,2	0,2	0,2	Assumption
Decrease in concentrate feed in infected animals (%)	0,2	0,2	0,3	McInerney et al. (1992) (11)
Treatment expenditures				
Average veterinarian fees (TL/case)[&&]	45	55	70	Research data
Average drug costs (TL/case)	20	50	80	Research data

*mild cases: Only slight redness in the breast; moderate cases: Inflamed breast / purulent infection is local, but the absence of systemic symptoms; severe cases: Finding systemic infections and even diseases can be fatal [#] The average of the low and high values were used. [&]25% of breast blind, but this is compensated by 5% of other breast was assumed. &&= The first application veterinarians operate. Other applications breeders operate.

RESULTS

Economic losses associated with clinical mastitis is presented in Table 3.

Economic losses (recurrent fees), as a result of each clinical mastitis cases, are calculated as respectively 79 TL (158lt raw milk equivalence), 218 TL (436 lt raw milk equivalence), 569 TL (1204 lt raw milk equivalence) in the mild, moderate and severe forms of disease. The weighted average loss calculated according to the course of disease is calculated 244 TL (460 lt raw milk equivalence).When the share of loss sorts in total financial losses is analyzed, treatment costs of the highest loss sort in trivial and moderate cases are respectively %80 and %60 while it is sees that the milk production loss is %51 in severe cases. In the dairy herds included in the survey, total loss due to mastitis is calculated as 47.645 TL and it is found that % 68 of the loss can be avoidable. Avoidable losses vary between 51 TL and 2242 TL in the dairy herds. Weighted average total loss because of mastitis calculated as 99,4 TL / cow and it is found that 79,5 TL of this amount can be avoidable.

Table3. Economic losses due to clinical mastitis

Lost items	Financial losses (TL/case)			The ratio of total losses (%)		
	mild	moderate	severe	mild	moderate	severe
Net loss in milk yield (TL/case)	15,6	86,4	294,3	19,6	39,7	51,7
financial value of milk loss	18,2	100,8	374,1	22,9	46,3	65,7
Feed saving (due to a fall in milk yield)	2,6	14,3	79,8	3,3	6,6	14,0
Net culling loss (TL/case)	0,0	0,0	44,0	0,0	0,0	7,7
Culling loss (TL/case)	0,0	0,0	44,0	0,0	0,0	7,7
emergency slaughter (TL/case)	0,0	0,0	0,0	0,0	0,0	0,0
Treatment costs	64,1	131,4	230,8	80,4	60,3	40,6
Waste milk cost *	39,4	59,6	77,1	49,5	27,4	13,5
Additional treatment costs were taken into account only in the case of recurrence. Drug cost	20,0	50,0	100,0	25,1	23,0	17,6
veterinary costs	3,6	20,9	53,2	4,5	9,6	9,4
Extra labor costs	1,1	0,8	0,6	1,3	0,4	0,1
total loss of mastitis (TL/case)	79,7	217,8	569,1	100,0	100,0	100,0
total loss of mastitis - recurrence included (TL/case)**	83,6	231,0	638,4			
Weighted average losses	244,0					

* Treatment duration was assumed +2 days.
** Additional treatment costs were taken into account only in the case of recurrence.

It is confirmed that avoidable losses in small, medium and large dairy herds are respectively 101 TL / cow, 89 TL/cow and 43 TL/cow and in the closed and open types of shelters the losses are also respectively 49TL/cow and 129 TL/cow. The differences between the groups are found to be statistically significant (p <0.05).

In dairy herds where the dairy farming is not professed as a father occupation, and professional training and consulting services are available, avoidable loss is calculated respectively 49 TL, 58 TL and 65TL and lower values per each cow. However, in the dairy herds where in the case of mastistis the treatment is administered by a veterinarian, dry period antibiotics are only applied to milkers, milking is done before feeding and milking is not done in right order, avoidable losses are respectively found 90TL, 93TL, 184TL, 83TL per each cow. It is calculated that identified loss is high in the dairy herds where the udder is washed with normal water, no drying after washing operation and the immersion vessel is not used.

DISCUSSION

In this study, comparing the losses that are obtained with economic analysis and the other study findings in literature is difficult.

The most significant difficulty is the incidence which is one of the important factors that identify the economic losses as a result of the clinical mastitis, and it significantly varies with the production system, operating scale, the date of survey, country and region (5, 24). Moreover, as it is clear in this study and in literature, there are different methods to calculate the incidence. Differences in loss sorts and calculating methods are effective for the differences in the findings of the literature (5, 15, 18). Milk production loss, medical costs, veterinarian services, waste milk, labor cost , taking out of livestock and other diseases are taken into consideration in some studies while many studies include a few loss sorts (5, 8, 13, 15). Yalçın and et al.(23)' report in their survey on literatures that the losses due to mastitis change from 271 lt to 1277 lt milk equivalence per case and in some literatures, the costs of treatment are considered as missing sort.

In this study, the target incidence, the average of deviation from the target, lost per case, the average of annual loss per cow, avoidable annual lost per cow are respectively calculated as %12,7; %39,9; 244TL; 110TL and 99,4TL.

The same values are calculated in Yalçın and et al. (23)' survey that has similarities as the method is similar, and the results are respectively %5,4; %31,3; 315TL; 113TL and 98,6TL. Essslemont ve Spincer (3) i is calculated the values respectively %9,5; %27,6; 485TL; 180TL and 133,8TL.

There are great similarities between this and Yalçın and et al. (23)' study , and this is because incidence of diseases, the course of some cases(mild, moderate and severe forms), veterinarian treatment ratio, veterinarian fees, costs of drugs and sale prices are different(in this study, field findings are used instead of TDBCA statistics). While Yalçın and et al. (23) take the lowest %10 values as the target value, because the operation number is less than the this study, Esslemont ve Spincer(3)' ¼ quartile value is taken into the consideration. For these reasons, the total and avoidable losses because of the disease per cow caused different calculation.

Kossaibati ve Esslemont (10), are conducted a survey on 80 dairy herds in the UK and they state that the loss per cow is 63 £ annually because of the health problems such as mastitis, foot disorders, retentio secundinarum, hypocalcaemia, twin births, calf deaths and unobservable estrous cases. It is calculated in a study conducted in Sweden that cost of clinical mastitis is 428 € per case , avoidable loss is € 97(4). Miller and Dorn (12), in a survey conducted in the U.S.A, report that total cost average is $ 172 as a result of the diseases mentioned above and the most important disease is clinical mastitis in terms of the its share in the total cost (26%).

In some studies, taking into consideration of mastitis and with scholastic bio-economic modeling, average cost per case is calculated as 194€, 189€, 180€, 168€ for respectively S. aureus, E. coli, S. uberis, S. dysgalactiae (6).
In the Czech Republic, it is reported that the direct losses due to clinical mastitis (waste milk, drug costs, veterinarian services, breeder spends time milking system's extra-costs, the dry period antibiotic administration) are changed between 43,6€ and 84,4€ per case and annual average loss is 62,6€ per cow. These

values are changed between 17-198€ in the Netherlands, and the average is 78€ (8).

In England, economic losses caused by the clinical mastitis in dairy herds are grouped and analyzed according to the disease forms (mild, severe and fatal cases) and the type of the costs (direct and indirect costs) (9). In this study, the average annual direct costs and total costs per cow are calculated respectively £28,9 and £113,2 in the mild mastitis cases; the costs are £122 and £332,7 in severe mastitis; and the total cost is £435,8 in fatal cases (9).

Apart from the significant differences between the studies reported in the literature and this study, it is seen that most of the losses due to mastitis are avoidable.

As this research and literature findings they support this study show, dairy herds in Turkey direct to the other agricultural and non-agricultural activities because they are so small that generally the breeders cannot maintain their family (14, 19, 25). For this reason it is thought that the production is not in desired level and therefore economic losses due to mastitis are increased.

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