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DETERMINATION OF THE SEASONALITY OF BOVINE TUBERCULOSIS DISEASE FROM THE RISK BASED DISEASE MANAGEMENT

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ABSTRACT

This study is among major epidemics in the world and Turkey is conducted to evaluate the seasonality of the risk factors of the disease bovine tuberculosis. The seasonal distribution of Turkey's outbreak of bovine tuberculosis in the 2005-2014 year was investigated in this study. Office International des Epizooties outbreak data was used to determine Turkey's monthly bovine tuberculosis outbreak data at the provincial level for this evaluation. Turkey's 81 provinces, seven geographic regions, and 12-month outbreak data are evaluated. The distribution of the four seasons of the outbreak to the coast and inland are analyzed for the determined seasonality of the disease. In the study, it was found that Turkey reached the highest number of outbreaks of the disease throughout the summer at a rate of 29.44%. In the study, the risk of bovine tuberculosis disease, diseases of the seasonality of the summer months when the investigation come to the fore, has been carefully assessed in terms of planning for disease control measures. As a result, reveals how it should be used in the identification of disease-specific risk that results obtained in the fight against the disease in this study and the importance of the fight against the disease. Taking control of the disease and timely measures for the disease will contribute to the reduction of costs related to the disease.

Contribution/ Originality:

This study reveals that the bovine tuberculosis disease fighting plans should be prepared with an understanding of disease-season relationship by a country level.

1. INTRODUCTION

In an economic perspective, bovine tuberculosis is come front of the animal health problems on a global scale. The disease continues to be a problem in developing countries as well as in some developed countries. In Great Britain, it is reported that the incidence in cattle declined to 0.01% in the end of the 1970s, but the incidence in the year 2010 reached 5%, and in the UK the disease will lead to over 1 million pounds over the next 10 years [1].

This shows that the successes in epidemic management are fragile and that the risk of disease needs to be studied in detail. The importance of risk-based methods in combating epidemic disease on a global scale and in Turkey has been demonstrated some scientific research in recent years [2-5]. In the fight against disease, the

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accurate identification of disease-specific risks means more rational management of the resources used and saves resources. The work to be done in this direction is very intensive, requiring studies that investigate different variables.

There are some variables that can be evaluated at the macro level in determining the risk of disease in bovine tuberculosis disease. These variables are the recurrence of bovine tuberculosis disease in the same settlement areas [6] animal movements [4] and seasonality [1, 7, 8]. From these variables, seasonality is defined as the periodic occurrence of events at a certain time [8]. Determining the seasonality of the disease contributes to the determination of the risk factors that will cause it to occur in the seasons when the disease reaches the highest level and to provide solutions for these risks. It will be contribute to disease management significantly.

Determination of seasonality in bovine tuberculosis disease will allow accurate determination of possible risk sources of the disease and possible interventions in this area. The studies investigating the epidemiological risk of bovine tuberculosis disease are studies in which the risks to the wildlife and the risk of the disease in general are evaluated [4, 9-11].

There is a limited number of studies investigating the risk of bovine tuberculosis in Turkey [12]. Some studies on a global scale are investigating to risk on general and wildlife risks [11, 13].

Studies on the seasonality of the disease have shown that bovine tuberculosis cases are related to the feeding areas of animals and highland areas where intensive animal movements are considered as high risk [13, 14]. Bovine tuberculosis shows seasonally significant fluctuations in different geographic and demographic characteristics in countries where different breeding systems exist [7].

By examining these differences, it is necessary to determine the seasons in which the disease reaches the highest levels. This determination will ensure that the protection and control plans for the disease are more intelligent.

In countries where protection and control expenditures are made using public resources, the resources will be shifted to other problematic areas, and the positive developments in the disease will indirectly lead to an increase in animal and animal products. This will create positive results for producers and consumers. Geographically, the determination of the seasonality of the disease will contribute to the understanding of risk based disease management. For this reason, it is necessary to show that firstly determining the season in which the disease reaches the highest level in Turkey and secondly whether these seasons changed according to the regions. By contributing to the planning of studies on the risk variables of the disease, it will be possible to use more economically viable resources.

2. MATERIAL AND METOD

The Turkish bovine tuberculosis outbreak data from the International Agency for Epidemiology (OIE) for 2005-2014 were used in the study [15]. The outbreak of outbreaks in Turkey using illiterate and outbreak data for a period of ten years has been combined in the Microsoft Excel (ME) program. The numbers of outbreaks belonging to each of the seven geographical regions were determined by processing the data base belonging to the region in which they were located.

Disease outbreaks in study,

I. Ninety one provinces in Turkey

II. Seven geographic regions

1. Marmara, 11 provinces.
2. Black Sea Region, 18 provinces.
3. Mediterranean, 8 provinces.
4. Aegean, 8 provinces.
5. Eastern Anatolia region, 15 provinces.

6. Central Anatolia region, 13 provinces.

7. Southeastern Anatolia region, 8 provinces.

III. Coast and Inner

1. Coast, 29 provinces.

2. Inner, 52 provinces.

And monthly outbreak data were analyzed by triple geographic classification.

The prevalence of climate differences in the study was assessed by considering the seasons. In order to determine the seasonal distribution of outbreak data, geographic classifications of provinces are brought together by seasons in the ME program.

When the seasonality is investigated in the disease, it is preferred to use outbreak data instead of incidence.

2.1. Statistical Analysis

Descriptive statistics of outbreaks number data by Turkey general, geographical regions, coastal and inner sector were given using SPSS package program [16].

3. RESULTS

The descriptive (number, percentage) statistical data related to the seasonal distribution of bovine tuberculosis cases are given in Table-1.

Table-1. According to seasonal outbreaks of bovine tuberculosis and the number of shares%

	Winter	%	Spring	%	Summer	%	Autumn	%	Total	%
Turkey	1.367	21.98	1.428	22.96	1.831	29.44	1.512	24.32	6.138	100.00
1*	293	22.23	278	21.09	452	34.30	316	23.97	1.339	21.81
2*	258	21.48	273	22.72	336	27.98	299	24.90	1.166	18.99
3*	112	23.43	122	25.52	131	27.40	99	20.71	464	7.55
4*	272	22.28	284	23.26	344	28.17	295	24.16	1.195	19.46
5*	264	23.32	273	24.12	280	24.73	300	26.49	1.117	18.19
6 *	164	20.35	192	23,82	282	34.99	159	19.73	797	12.98
7*	4	6.45	6	9.67	6	9.68	44	70.97	60	0.97
Coast	519	21.50	533	22.08	781	32.36	566	23.44	2.399	39.08
Inner	848	22.30	895	23.53	1.050	27.60	946	24.87	3.739	60.91

*Regions

When the table data are analyzed, it is estimated that a total of 6,138 outbreaks were detected in 10 years in Turkey, 1.339 outbreaks (21.81%) were detected in Region 1 and 0.97% of 60 outbreaks were detected in Region 7. The descriptive statistics of the study's general, regional, coastal and internal data are given in Table-2.

Table-2. Descriptive statistics of bovine tuberculosis outbreaks in Turkey's, regions, coastal and inland areas

Area	N	Range	Minimum	Maximum	Average	Standart Deviation
Turkey	6138	464	1367	1831	1555.32	186.57
1*	6138	174	278	452	342.61	72.55
2*	6138	78	258	344	301.94	28.53
3*	6138	32	199	131	116.79	12.23
4*	6138	72	272	344	301.94	28.54
5*	6138	36	264	300	279.73	12.92
6*	6138	123	159	282	204.48	51.99
7*	6138	40	4	44	14.92	16.65
Coast	6138	262	519	781	611,99	111.45
Inner	6138	202	848	1050	943,33	77.23

*Regions

4. DISCUSSION AND RESULT

In the study, it was determined that the disease was detected in 29.44% of the whole Turkey in the summer months, and the other 5 regions outside the 5th and 7th regions and coastal and internal data of Turkey reflected the general data of Turkey.

In Turkey, bovine tuberculosis disease is macroscopically detected in animals cut in slaughterhouses. Since reliable data on the number of bovine animals cut monthly at 81 provinces of the study period could not be obtained, it was not possible to determine how much the seasonality of the disease affected the cut counts.

Studies that reported that the disease increased due to close contact in intensive cattle breeding establishments [17] indicate that the incidence of infections in the summer months is higher in the case of animals receiving infections predominantly in winter months and having a longer incubation period. For this reason, the risks of common pasture and water use should be carefully evaluated in investigating disease risks in Turkey.

In a study investigating the seasonality of bovine tuberculosis in Nigeria, the disease reached its highest level in March and June [7]. In a study of the seasonality of the disease in Tanzania, it was reported that the disease increased during the rainy periods between March and May [18]. The different seasonality of the disease in different geographical conditions emphasized the importance of determining the seasonality of the disease by considering the geographical regions.

Scientific studies [19, 20] suggesting the risk-based formulation of epidemic fighting strategies [19, 20] demonstrate the importance of these steps in disease control. As a result, in this study, the seasonality of bovine tuberculosis in Turkey was investigated and the relation of the disease with the seasons was determined.

The highest level of outbreak in working period in Turkey in summer was determined. This necessitates planning of risk assessments and fighting programs in the winter months, taking into consideration firstly, the long incubation period of the disease.

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