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Assessment of Theileriosis Prevalence in Goat: A Study in the Central Areas of Khost Province, Afghanistan

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ABSTRACT

Background: Theileriosis, a tick-borne hemoprotozoan disease, poses a substantial economic threat to goat farming. Small ruminants, especially goats, play a significant role in the economy of poor farmers in Afghanistan. Parasites are known as an important risk factor for the health and production of small ruminants, which cause important economic losses in the developed and developing countries of the world. Parasitic diseases that are transmitted by insects affect the health of animals, causing low production due to malnutrition in animal. This study aims to assess the prevalence of theileriosis in goats and to reduce the mortality and morbidity rate within the central areas of Khost province.

Materials and Methods: All the data were analyzed using one-way analysis of variance (ANOVA-SPSS) which is described by Sen Decor and Cochran (1967). the sample size was calculated using Martine formula (n = 1.962pq/r2), where 1.96 is the 95% confidence interval (CI), p is the cumulative prevalence of theileriosis in goats of Baluchistan (9.70%) q is 1-p and r is the accepted error (5%).

Findings: This study demonstrated varying prevalence rates, with theileriosis prevalence recorded at 9.6% in male animals, 14.1% in females, 15.4% in non-mature animals, and 11.5% in matured. Statistical analyses substantiated the significance of gender-based prevalence ($P<0.05$) and age-based trends ($P<0.05$), emphasizing the heightened prevalence in females and young animals.

Conclusion: In conclusion, generally the prevalence of theileriosis exhibited gender-based disparities, with higher rates in females, and age-dependent variations, showcasing elevated prevalence in young animals. The study underscores the imperative for targeted management strategies, especially for female and young goat populations, to mitigate the economic impact of theileriosis in the central areas of Khost province, Afghanistan.

Keywords: Goats, Theileriosis, Prevalence, Khost.

INTRODUCTION

Theileriosis, a tick-borne hemoprotozoan disease, poses a substantial economic threat to goat farming. This study aims to assess the prevalence of theileriosis in goats within the central areas of Khost province. Small ruminants, especially goats, play a significant role in the economy of poor farmers in Afghanistan. Parasites are known as an important risk factor for the health and production of small ruminants, which cause important economic losses in the developed and developing countries of the world. Parasitic diseases that are transmitted by insects affect the health of animals, causing low production due to malnutrition in animal. Theileriosis is an important tick-borne, blood-parasitic disease that causes significant economic losses in goat farms (Rathod et al,

2021). The major economic losses of theileriosis are caused by high mortality in goats, reduced productivity, insect control and treatment of infected animals. They will have lost their life within 3-4 days.

Ticks and tick-borne parasitic diseases are currently a major threat to the animal production sector and tick-borne diseases are a major factor in animal mortality, resulting in reduced productivity. The acute stage of theileriosis in goats is characterized by high fever, enlarged of lymph nodes, anemia and high mortality (Manohar et al, 2021).

In small ruminants, the morbidity rate of theileriosis is 100% and the mortality rate is 40%. These parasites are transmitted biologically from one animal to another by Ixodida mites, which belong to the genera Hayalomma, Haemophysalis and Amblyoma. Also, these parasites are transmitted from one animal to another through flies, blood-sucking insects, and contaminated needles and syringes. In addition, this disease is also transmitted vertically from mother to child through the placenta. Theileriosis can be diagnosed in animals by clinical symptoms, laboratory tests, microscopic tests (smearing of blood and lymph material and examination under a microscope after color analysis), direct and indirect ELISA and PCR techniques (Hamid and Al-Obaidi, 2023). Although this article is written about the prevalence's of theileriosis in goats, there is very limited literature on this disease in small ruminants and especially in goats.

Theileriosis that infect small ruminants in tropical and subtropical regions of the world, including India, include T. Uilenberg, T. Lestoguardi and T. luwinshoni species, which are more common pathogenic in goats and sheep. This study was conducted with the aim of studying the prevalence of theileriosis in goats, clinical symptoms and pathological changes in goats (Rathod et al, 2021). Theileriosis is a very important and economic loses disease in goats, due to which there is a significant decrease in the milk production of goats and as a result it limits the life of the animal. Therefore, this disease is one of the It is a debatable topic, which should be investigated and the risks of this disease can be reduced in the future.

MATERIALS AND METHODS

Study Area

This study was conducted to investigate the prevalence of theileriosis in goats in the central areas of Khost province. Blood samples were taken from goats of different areas and diagnosed in the laboratory of Sheikh Zayed University, Faculty of Veterinary Sciences and also in the laboratory of the Department of Agriculture of Khost province for the prevalence of theileriosis.

Samples Collection

Considering all the parameters, the blood samples were taken from the jugular vein in aseptic conditions and after blood collection, the blood samples were placed in Ethylene Diamine Tetra Acetic Acid (EDTA) tubes. Then they are transferred to the laboratory. Also, blood was taken from the ear vein to make a thin smear, and a 20-gauge needle was used to collect the sample. The blood sample size in all samples did not exceed 2cc. Age and sex of goats was recorded during sampling. The age of the goats was determined by asking the owner or examining the teeth.

Sample size

The sample size was calculated using Martine formula (n = 1.962pq/r2), where 1.96 is the 95% confidence interval (CI), p is the cumulative prevalence of theileriosis in goats of Baluchistan (9.70%) (Khan et al, 2017). q

is 1-p and r is the accepted error (5%). Based on the mentioned specifications, the approximate size of the sample was calculated to be 130 in order to determine the prevalence of theileriosis in goats in the central areas of Khost province. 130 goats were selected simple random sampling (SRS) from all the available goats in the above-mentioned area without regard to age and sex.

Examination of the blood sample

The Giemsa stain method has been used to examine the blood samples in such a way that the blood smears are first dried by air and then fixed by methanol and then Staining was done with a dark color and after a few minutes (5-15min) it was washed with distilled water and after drying in open air, it was observed in the presence of immersion oil by a light microscope with 100x power. In positive cases, the periplasm was seen in round, rod-shaped and comma-shaped inside the red blood cells.

Statistical Analysis

All the data were analyzed using one-way analysis of variance (ANOVA-SPSS) as described by Sen decor and Cochran (1967). Which has ($P<0.05$) significant level and ($P<99.095$) confident interval.

RESULTS

Prevalence based on gender

As a result of this study, it was found that the prevalence of theileriosis in goats in the central areas of Khost province was 9.6% in male animals and 14.1% in female animals.

Table 1. Shows deference's based on gender, the prevalence of theileriosis in goats of the central areas of Khost province:

Sex	No. of samples	No. of positive cases	Prevalence (%)	P-value
Male	52	5	9.6	P< 0.05
Female	78	11	14.1	P< 0.05
Total	130	16	12.3	

Prevalence based on age

As a result of this study it was found that the prevalence of theileriosis in goats in the central areas of Khost province was 15.4% in young animals and 11.5% in adult animals.

Table 2. Shows deference's based on age, the prevalence of theileriosis in goats of the central areas of Khost province:

Sex	No. of samples	No. of positive cases	Prevalence (%)	P-value
Young	26	4	15.4	P< 0.05
Adult	104	12	11.5	P< 0.05
Total	130	16	12.3	

Prevalence based on Matured and non-Matured

As a result of this study it was found that the prevalence of theileriosis in the central areas of Khost province was 14.3% in young male goats and 15.8% in young female goats. Also, the prevalence of theileriosis was 8.9% in adult male goats and 13.6% in adult female goats.

Table 3. Shows differences based on Matured and non- Matured goats, the prevalence of theileriosis in the central areas of Khost province.

Sex	Age	No. of samples	No. of positive cases	Prevalence (%)	P-value
Male	Mature	7	1	14.3	P< 0.05
Female	Non- Matured	19	3	15.8	P< 0.05
Male	Matured	45	4	8.9	P< 0.05
Female	Non- Matured	59	8	13.6	P< 0.05
Total		130	16	12.3	

DISCUSSION

Theileriosis is a very important parasitic disease of goats, which causes high mortality and reduced productivity in goats. This study was conducted to determine the prevalence of theileriosis in goat in the central areas of Khost province. A total of 130 goats were investigated in this study, 52 male and 78 female goats according to gender. According to age, 26 young and 104 adult goats were investigated. As a result, the disease incidence was 9.6% in male, 14.1% in female goats, 15.4% in young and 11.5% in adult goats. It was also 14.3% in young male goats, 15.8% in young female goats, 8.9% in mature male goats and 13.6% in mature female goats.

A study conducted on 670 goats in Baluchistan, the Giemsa stain method of microscopic examination was used to examine the blood samples. The prevalence of theileriosis in male animals was 18.92%, and in the female animals were 17.92%. 7.99% in animals that has less than one-year-old and 15.85% in (1-2) year olds, and also the prevalence of the theileriosis in more than two years old was 22.17%. this study is consistent with our study in terms of the method, but in this study, the prevalence of the theileriosis was higher in male animals than in female animals, and the reason may be that female animals are mostly used for milk production, they are kept in houses and not sent to pasture, so that their contact with insects is less than that of male animals. but in our research area, female animals are grazed together with male animals in the pasture. And also, in this study, there were more cases of the disease in older goats compared to younger goats. The reason may be that, in our research area, younger goats are grazing together with older ones (Khan et al, 2017).

Another study that conducted in Jeddah, Saudi Arabia on 299 samples, including sheep and goats, used Giemsa Stain and PCR technique to examine the blood samples, the prevalence of theileriosis was 49.3% in young goats, 63.6% in mature goats, 46.7% in male goats and 61.3% in female goats. in this study, the prevalence of theileriosis was more than from our study, which was due to the precise PCR tests and the increment in the ambient temperature in the area, where theileriosis can spread and develop well in a hot environment. In this study the prevalence is similar to our study based on gender, but it is different on age. It may be due to grazing of mature animals and increased exposure to insects in the pasture (Metwally et al, 2021).

Another similar study, which was conducted in Multan region of Pakistan, blood samples were taken from 463 goats and the Giemsa stain method was used to test the blood samples. Prevalence of the disease was 22.8% in male animals, 14% in female animals, 12.6% in young animals and 17% in older animals. This study is consistent with our study according to the method, but the prevalence of theileriosis is different from our study according to gender. In our study, the prevalence of the disease was more in the female sex, but in this study, the incidence is higher in males, which is due to the transfer of male animals to pasture and the increment in the number of mites in the area. Also, based on age, our study is similar to the study (Riaz et al, 2019) in which the prevalence of the disease is more in young goats and the reason may be the delicate skin of young goats.

During this study, some farmers did not permit us to take blood samples from their goats for the diagnosis of this disease, no electricity for 24 hours in the laboratory of the Faculty of Veterinary Sciences, non-availability of PCR test equipment, transportation difficulties and not bringing the samples to the laboratory in a proper way are all things that hindered our research to some extent. availability of some necessary equipment for conducting microscopic tests in the laboratory, good behavior and cooperation of farmers in the field, timely delivery of the samples to the laboratory and their examination at the corresponding time, samples after the inspection, giving information about the result to the owner and giving assurance about the health of the animal is something that has helped in the development of our research. Our study revealed the presence of theileriosis in goats in the Khost province.

Similar research is needed in all district of the Khost province to determine the prevalence of theileriosis, and for diagnosis PCR test should be apply on the samples, so that the data of theileriosis prevalence can be better accurate.

CONCLUSION

This study was conducted to find out the prevalence rate of theileriosis in 130 goats in the central areas of Khost province. The investigation has showed that the theileriosis is available in the goats in the central areas of Khost province Afghanistan. In this assessment the age and sex of the animals were taken as variables for the mentioned study, therefore the prevalence of theileriosis was higher in female animals than in males based on gender ($P<0.05$) and the prevalence of the theileriosis was higher based on age. The prevalence was higher in young animals than in adult animals ($P<0.05$). Also, the prevalence's of theileriosis in young female animals was higher than that of young male animals ($P> 0.05$) and the prevalence of theileriosis in adult female animals was higher than that of adult male animals ($P< 0.05$).

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Authors Contributions: I.M. designed the research project and collected the data from the field. B.K. worked in the laboratory, analyzed the data with K.S.I. and K.A.R. L.H. has checked the manuscript finally for the grammar.

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