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Prevalence of brucellosis in goat in Assam, India

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Abstract

Brucellosis is an infectious, economically ravaging reproductive disease of animal have zoonotic importance. The present work was conducted to investigate the prevalence of brucellosis in goat on the basis of serological test viz., RBPT, STAT, I-ELISA. The prevalence of brucellosis was recorded, 1.45% in goat by RBPT, STAT and I-ELISA. Prevalence was recorded only in female goat (2.15%), Age-wise highest prevalence recorded in the age group of 9-18 months (4.76%). Prevalence rate on the basis of previous history or clinical symptoms recorded in case of aborted doe (16.67%).

Keywords: Brucellosis, serological, aborted, prevalence, zoonotic

1. Introduction

Brucellosis is the most economically devastating contagious reproductive disease of different sexually matured animals with worldwide distribution. It is caused by a different species of *Brucella* are responsible for the reproductive disease of domestic animal. In case of goat brucellosis is mainly caused by *Brucella melitensis* characterized by abortion, retained placenta, orchitis, epididymitis, rarely arthritis, hygroma, with excretion of organism in uterine discharge and in milk [1]. Cases of cross transmission of *Brucella* organism can occur between cattle, swine, sheep, goat and other species including dog, horses, bison, deer and camel [2][3]. Brucellosis is the most common zoonoses in the world, accounting for annual occurrence of more than 500,000 cases [4] basically endemic in low socio-economic countries like India and the prevalent species causing human infection are *Brucella melitensis* and *Brucella abortus* [5]. Most infection in human is contracted from sheep and goat possesses a serious public health threat [6][7]. The effect of the disease on ram's fertility and reproductive complications in ewe provide significant influence in wool and meat industry [8]. It is also a major impediment for international trade of milk, meat and their products [9].

Occurrence of brucellosis had been reported from the North-eastern part of India Among the North-eastern states Assam possesses goat population of 61,69,193 according to the all India 19th livestock census report in the year 2012. Assam with a prevalence rate varying from moderate to high in cattle [10][11]. There is a dearth of reports regarding the prevalence of brucellosis in small ruminants like goat from Assam.

The diagnosis of brucellosis presents difficulties in spite of the fact that there is no other disease for which such a large numbers of tests are available as for brucellosis [12]. Though, diagnosis of brucellosis by bacteriological technique is the most reliable approach [13] and it provides incontrovertible diagnosis of *Brucella* infection, is a time consuming, tedious and always put the laboratory workers under great risk of infection. Apart from this, it has often been reported that recovery of *Brucella* from blood and milk culture is quite insensitive [14]. As the infection results in varied immune response in the host which necessitates the detection of antibodies to *Brucella*, The conventional assays such as Rose Bengal Plate Test (RBPT), Milk Ring Test (MRT), Serum Tube Agglutination Test (STAT), Indirect Enzyme Linked Immunosorbent Assay (I-ELISA) etc. widely used in various combinations for the diagnosis of brucellosis.

With consideration of the above facts the present study was carried out to investigate the prevalence of brucellosis in goat on the basis of serological test viz. RBPT, STAT, I-ELISA has been conducted.

2. Materials and methods

2.1 Sources and places of samples/materials

The present investigation was carried out during the period from February, 2015 to May, 2016. The samples were collected randomly from unvaccinated (*Brucella*) animals having history of abortion, repeat breeding, retention of placenta, mastitis, hygroma, as well as from apparently healthy animals of different age groups. The milk and serum samples has been collected from Lakhimpur, Dhemaji, Sonitpur, Darang, Marigaon, Golaghat, Kamrup Metro, Dhubri, Kokrajhar districts of Assam. The study protocol was approved by IAEC (Approval No. 770/ac/CPCSEA/FVSc/AAU/IAEC/15-16/351 Dated. 10.04.2015).

2.2 Prevalence based on different serological tests

The serum samples were screened for the presence of *Brucella* specific antibody by Rose Bengal Plate Test using *Brucella* Coloured Antigen. The RBPT antigen for the test was procured from the Institute of Animal Husbandry and Veterinary Biologicals, Hebbal, Bangalore (IAHVB). RBPT was performed as described by Alton *et al.* (1975) [15]. In the present research work, protein-G based indirect ELISA kit (ICAR NIVEDI, Yelahanka, Bengaluru, Karnataka) was used to detect the antibody against the *Brucella* infection in the serum samples collected from goat according to their protocol. Similarly, STAT was performed using the procedure as described by Stemshorm *et al.* (1985) [16]. Prevalence was also described in relation to the host factors like age, sex and previous history of clinical symptoms. The collected data were subjected to preparation of master sheet in MS Excel. The empirical percentage of disease were estimated with 95% CI, using calculator for computing sample summery information available in JMP 10 of SAS 4.3 version.

3. Results and Discussion

3.1 Prevalence of brucellosis based on different tests

In the present study prevalence was found to be 1.45% (CI: 0.00%, 3.44%) which ranges from 0.0 - 8.70% in case of goat based on RBPT. The present findings corroborated with the findings of Priya *et al.* (2010) [17] who have recorded a higher prevalence of 5.70% in goat at Wayanad district of Kerala by RBPT. Whereas present study has a close association with the findings of Singh *et al.* (1998) [18] where an overall prevalence of 4.00% was recorded in organized state government goat farms from seven districts of Uttar Pradesh and Punjab as well as 0.80% prevalence in farmers' goat flocks from the mentioned states. Lone *et al.* (2013) [19] recorded prevalence of 6.50% in sheep of organized and unorganized sectors of Kashmir Valley. Suryawanshi *et al.* (2014) [20] found a higher prevalence of 7.32% in goats from four different districts of Maharashtra. These variations in prevalence might be due to variation in environment, sex, age, breed and other factors (breeding system).

In the present study a prevalence rate of 1.45% which ranges from 0.00% to 8.70% was recorded in case of goat by STAT. The present findings are in consistent with observation made by the former workers Priya *et al.* (2010) [17], Singh *et al.* (2010) [21], Kumar *et al.* (1997) [22] and Suryawanshi *et al.* (2014) [20] who have recorded a prevalence rate of 4.3% to 30% in various regions of India in case of goat. As observed in the study area the higher population of goats was mainly

reared in domestic courtyard with close proximity to the other animals or expose during community grazing and this might be the reason for increase prevalence in the goats of the study area.

In the present study the overall prevalence of brucellosis recorded was 1.45% (ranged from 0 to 8.70%) in case of goat by I-ELISA (Table.1). Among the other districts prevalence of brucellosis in goat is recorded only in Dhubri district of Assam. It probably due to the unrestricted migration and trespassing, uninspected trading of animals by the porous borders with nearby country Bangladesh where higher prevalence of brucellosis cases were reported by Islam *et al.* (2013) [23].

3.2 Evaluation of host factors associated with prevalence of brucellosis in goat

A high association between age and prevalence of brucellosis was recorded in the present study. Highest percentage of *Brucella* positive reactors among goat recorded only in the age group of 9-18 months (4.76%) (CI:0.00%, 11.20%) by RBPT, STAT, I-ELISA test, in other age groups found no positive reactor. The present findings are in consistent with observation made by the former workers [23, 17]. According to Blood *et al.* (1979) [24], low percentage of brucella reactors in heifers might be due to less numbers of samples as well as insufficient exposor of their immune system to the organism. Young animals remain sero-negative until its first parturition. Chettri *et al.* (2015) [25] opined that older animals had more chances of exposor to bacteria and contacting the diseases and there was concurrent decrease in immunity and increase in stress in older age group.

Lower prevalence of brucellosis in young ones could be due to resistance of young animals to infection [26]. With the passage of time animals are more likely to be exposed to the bacteria and contract the disease [27]. However, Kazi *et al.* (2005) [28] reported that high prevalence of brucellosis among older animals might be related to maturity with advancing age, thereby the organism may have propagated to remain as latent infection or it may cause disease. Susceptibility to brucellosis increases with age; it seems to be commonly associated with sexual maturity than age [8].

Sex-wise prevalence was found to be 2.15% (CI: 0.00%, 5.10%) in case of female goat by all the three serological tests. Similar results were recorded by Priya *et al.* (2010) [17] who have recorded a higher prevalence in female goat (4.7%) than in males (3.9%). It may be due to the preferential localization of *Brucella* organisms in the uterus and high erythritol content of placenta, which stimulates growth of these organism [29]. The serological response of male to brucella infection is limited [30].

The highest percentage of brucella positive reactors found among the animals having previous history of abortion (16.67%) (CI:0.00%, 37.75%). Roberts (1971) [31] stated that, multiplication of the brucella organism is enhanced with the increased concentration of erythritol in gravid uterus leads to increase percentage of abortion. Radostits *et al.* (2000) [8] opined that the higher incidence of abortion in third trimester may be due to the fact that uterine environment becomes conducive for growth of brucella due to production of erythritol, which in turn causes damage to placenta and results abortion. Retention of placenta is a common sequel to abortion in brucellosis.

Table 1: District-wise prevalence of brucellosis in goat by indirect-enzyme linked immunosorbent assay (i-elisa)

District	No. of samples collected from different animals	Positive in I-ELISA			
		Goat			
		No +ve	Prev. (%)	95% CI Lower	95% CI Upper
Lakhimpur	35	0	0	0.00%	0.00%
Dhemaji	22	0	0	0.00%	0.00%
Kokrajhar	12	0	0	0.00%	0.00%
Dhubri	23	2	8.70	0.00%	20.21%
Golaghat	10	0	0	0.00%	0.00%
Marigaon	15	0	0	0.00%	0.00%
Kamrup (M)	13	0	0	0.00%	0.00%
Sonitpur	0	0	0	0.00%	0.00%
Darang	8	0	0	0.00%	0.00%
Total	138	2	1.45	0.00%	3.44%

4. Conclusion

In the present study, on the basis of serological test prevalence of brucellosis was recorded as 1.45% in goat by RBPT, STAT and I-ELISA. As prevalence found in goat, as goat stay in a close association with human community, the prevalence of the disease indicate a higher risk of zoonotic importance.

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