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「Short communication」

Prevalence of brucellosis and its association with reproductive problems in goats in Bangladesh

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Brucellosis is one of the world's major zoonoses, alongside bovine tuberculosis and rabies[1]. *Brucella* species infection is endemic in human beings and livestock in Mediterranean countries, and it is also present in Asia, sub-Saharan Africa and Latin America[2]. The importance of brucellosis is not known precisely, but it can have a considerable impact on both human and animal health, as well as having socioeconomic effects, especially in areas where rural income relies largely on livestock breeding and dairy products. Brucellosis in human beings is caused by exposure to livestock and livestock products. Infection can result from direct contact with infected animals and can also be transmitted to consumers through raw milk and milk products. In human beings, the symptoms of disease are weakness, joint and muscle pain, headache, undulant fever, hepatomegaly, splenomegaly and night sweats[2]. Recently, it has been reported that brucellosis can affect the central and peripheral nervous system[3]. In animals, brucellosis mainly affects reproduction and fertility, reduces the survival of newborns and reduces milk yield. The disease does not cause significant mortality in adult animals[2].

In Bangladesh, approximately 80 percent of people live in villages, and rural income is largely dependent on livestock; the people are in close contact with livestock on a daily basis. There are about 33.55 million goats

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in Bangladesh[4] and it is considered as poor man's cow. These goats can significantly play an important role in the economic development of the poor farmer.

The goats' enterprise is becoming more popular in Bangladesh due to socio-economic condition and their ability to survive on poor quality pastures and forage that is unsuitable for other species of domestic animals. Besides, goats require relatively small investment and can therefore, be a source of cash income for small-scale farmers in Bangladesh. The goats are not only important for meat and milk but also important for good quality leathers and source of income to farmers and a scant information is available about the prevalence of brucellosis in human beings and animals in the country by the Rahman et al[5] and Mustafa[6]. This short communication describes a study to investigate the prevalence of brucellosis in goats in Dhaka and Mymensingh districts of Bangladesh, and its association with abortions, retention of placentas and abnormal uterine discharge.

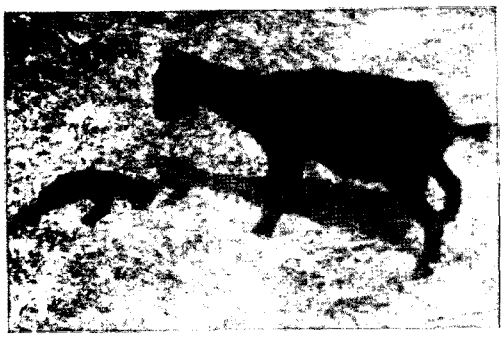

Fig 1. The indigenous goat of Bangladesh having abortion (courtesy Samad MA)

Sexually mature indigenous goats (Fig 1) housed in rural areas of Dhaka and Mymensingh districts were included in the study.

A total of 300 goats of variable age were investigated between March 2005 and February 2006. In this study, approximately 3 to 5 ml of blood was collected from the jugular vein of each goat using a sterile disposable syringe and needle. Serum samples were prepared by centrifugation and stored in vials at -20°C. Samples were initially screened for *Brucella* species by using the rose bengal test (RBT) and plate agglutination test (PAT); positive samples were then subjected to the tube agglutination test (TAT) and mercaptoethanol test (MET) for further confirmation[7]. For all tests, the *B abortus* strain 1119-3 (DaeSung Microbiological Laboratories, Korea) was used as the antigen.

The seroprevalence was determined by considering the total number of animals tested and positive reactors using the formula given by Thrusfield[8]. The results were statistically analyzed for interpretation by using Chi-square tests (χ^2). Probabilities associated with the observed values of Chi-square, determined from relevant tables. Significance determined at 5% and 1% level.

Table 1. Overall prevalence of brucellosis in goats

Species	Sera collected and tested	Positive cases (%)
Goat	300	7 (2.33)

The overall prevalence of brucellosis in goat shown in Table 1, was 2.33% (7 goats) in among 300 goats. Prevalence of brucellosis in regards of abortion in animals was presented in Table 2. Fifteen cases of abor-

tion were found in 300 goats with prevalence of brucellosis 20% in RBT and MET, and 13.33% in PAT and TAT. While the 285 non-aborted goats showed the prevalence of brucellosis were 0.70% in RBT, 1.05% in PAT and 1.40% in both TAT and MET. Among 7 positive reactors, 3 goats were aborted and 4 goats were non-aborted. In this study, there existed a significant ($P<0.01$) association among abor-tion and the prevalence of brucellosis when the sera samples tested by RBT, PAT and MET.

Table 2. Prevalence of brucellosis in aborted and non-aborted goats (results based on RBT, PAT, TAT and MET)

Species	Condition	sera collected and tested	Number of sera positive (%) by				Level of significance
			RBT	PAT	TAT	MET	
Goat	Abortion	15	3 (20.00)	2 (13.33)	2 (13.33)	3 (20.00)	*
	Non-abortion	285	2 (0.70)	3 (1.05)	4 (1.40)	4 (1.40)	

* Significant at 1% level of probability ($P<0.01$)

Prevalence of brucellosis in respects of retention of placenta was presented in Table 3. Among 300 goats, 15 goats having the history of retention of placenta showed the prevalence of brucellosis 13.33% in RBT, PAT and MET, and 6.67% in TAT. On the contrary, 285 goats having history of no retention of placenta, the prevalence of brucellosis were 1.05% in RBT and PAT, and 1.75% in TAT and MET. There existed a significant ($P<0.01$) association among retention of placenta and the prevalence of brucellosis when the sera samples tested by RBT, PAT and MET.

Table 3. Prevalence of brucellosis in goats associated with retention of placenta

Species	Retention of placenta	Sera collected and tested	Number of sera positive (%) by				Level of significance
			RBT	PAT	TAT	MET	
Goat	Yes	15	2 (13.33)	2 (13.33)	1 (6.67)	2 (13.33)	*
	No	285	3 (1.05)	3 (1.05)	5 (1.75)	5 (1.75)	

* Significant at 1% level of probability ($P<0.01$)
Results based on RBT, PAT, TAT and MET.

The prevalence of brucellosis on the manifestation of any abnormal uterine discharge presented in Table 4. Of 300 goats, 10 goats found to be manifested the abnormal uterine discharge and one positive reactor was found with 10% prevalence of brucellosis in all four serological tests.

Among the rest of 290 goats, no abnormal uterine discharge was found and the prevalence of brucellosis was 1.38% in RBT and PAT, 1.72% in TAT and 2.07% in MET. In this study, there existed a significant ($P<0.05$) association among abnormal uterine discharge and the prevalence of brucellosis when the sera samples tested by RBT, PAT, TAT and MET.

The diagnosis of brucellosis is confirmed by isolation of *Brucella* species by bacteriological culture or by detection of an immune response to its antigens by serological tests[9]. Diagnosis based exclusively on the isolation of *Brucella* species presents several drawbacks: the slow growth of *Brucella* may delay diagnosis by more than seven days, and sensitivity is often low, from 50 to 90 % depending on the disease stage, the *Brucella* species, the quantity of bacteria, and the type of culture medium and technique employed[10]. Serological testing is therefore important in the diagnosis of brucellosis. The RBT is the main serological test used to diagnose *Brucella* species infection; sometimes it is more sensitive than the complement fixation test, especially in sheep[11]. In some countries, the TAT has become the standard screening test; it is recommended for the collection of quantitative information on immune responses, and is the most frequently used test to confirm serological results[12] and in some countries *Brucella* positive serum samples are subjected to MET as confirmatory test[13]. The PAT was originally developed to provide a rapid test, and it approximates the results of the TAT. However, in many countries, the PAT is the routine test, and is sometimes the only one used even though it can give false-negative results[12]. For these reasons the PAT and RBT were used as screening tests in this study, with the TAT and MET used to confirm the diagnosis.

Table 4. Prevalence of brucellosis in goats associated with abnormal uterine discharge

Species	Uterine discharge	Sera collected and tested	Number (%) of sera positive by				Level of significance
			RBT	PAT	TAT	MET	
Goat	Abnormal	10	1 (10.00)	1 (10.00)	1 (10.00)	1 (10.00)	*
	None	290	4 (1.38)	4 (1.38)	5 (1.72)	6 (2.07)	

* Significant at 1% level of probability ($P<0.01$); Results based on RBT, PAT, TAT and MET.

The present investigation revealed that the overall seroprevalence of brucellosis is 2.33 % in goats. Sharma et al[14] reported prevalence of brucellosis in goat 5.53% and Cerri et al[15] reported 2% brucellosis of goats. The difference of that might be due to the time passed, variation in methodology, sanitation and rearing system, keeping pattern, hygienic management, awareness of people, treatment of animals, improvement of veterinary services and reducing the number of goats. Hadad and Al-Azawy[16] reported the prevalence was 5.3% in goats and Ahmad[17] found 1.85% positive goats. Rao et al[18] recorded the prevalence of brucellosis was 7% in goats of Andhra Pradesh. Sandhu et al[19] found 1.18% of goats were positive for brucellosis. Burriel et al[20] found 13.1% of goats were positive to *Brucella* infection in Greece. Al-Majali[21] investigated the seroprevalence of brucellosis in goats in Jordan and reported 27.7% goats had a ntibodies against *Brucella*.

In this study, the significantly ($P<0.01$) higher prevalence of brucellosis (20% by MET) in goats was found in aborted or previously aborted animals than that of non aborted animals (1.40%). Tome et al[22]

reported that a abortions torm observed in a goat herd in Argentina and abortion was observed in 26% of the females and serological studies using RBT, TAT, and MET showed a prevalence of brucellosis of 68.5 %. Al-Ani et al[23] stated that the goats with brucellosis had a higher abortion rate.

In this study, the prevalence of brucellosis existed a significantly associated with retention of placenta when the sera samples were tested with RBT, PAT and MET. In case of goats the significantly ($P<0.01$) highest prevalence (13.33%) of brucellosis was found in she goats having retention of placenta. In this study, the prevalence of brucellosis was significantly higher in goat with abnormal uterine discharge when the sera were tested with RBT, TAT and MET.

The prevalence of brucellosis in goats in Bangladesh is not negligible, and it is therefore worth considering the adoption of preventive measures. This is the first report from Bangladesh that considers the prevalence of brucellosis alongside its association with reproductive diseases.

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