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Prevalence and risk factors of mange in goats in Bangladesh

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ABSTRACT

The study of mange in goat was conducted in Rajshahi district of Bangladesh. It was an attempt to determine the prevalence and the effect of risk factors of mange in goat considering a total of 129 goat rearing farms (containing about a total 1277 numbers of goats) during the period from July'2010 to June'2011. Comparative effects of risk factors like farm size, feeding, season and land topography on the prevalence of mange in goat were measured by logistic regression analysis. Overall prevalence was 5.95% and the prevalence of mange in small, medium and large farms were 4.13%, 6.03% and 9.04%, respectively which was statistically significant (P=0.033). The prevalence was observed 3.61%, 6.03% and 8.25% in good, moderate and poor feedings, respectively and the differences were statistically significant (P=0.044). In case of season, the prevalence of mange was 5.14%, 10.74% and 2.09% in rainy, winter and summer seasons, respectively and the differences among the seasons was statistically highly significant (P=0.000). The prevalence of mange was 8.81%, 5.94% and 3.09% in low, medium and high land, respectively, which were significantly (P=0.022) different among the different land categories. The purpose of this study is mainly concerned with the effects of mange prevalence in goats caused by the different risk factors like farm size, feeding, season and land topography in Rajshahi district of Bangladesh.

Introduction

Goat rearing is popular in rural areas for household income due to its prolificacy character and higher market value for meat and skin. Chevon (goat meat) is most popular meat of ruminant species and is accepted by all communities in Bangladesh. Generally, goat meat is highest priced relative to all other meats sold in the market. Goat milk and its products are known for its properties regarding the health benefits. Goats play an important role to earn supplementary income of rural farmers and accumulate capital, create employment for landless farmers, contribute to soil fertility by returning dung and urine to the soil, to local handicraft industries in which their fibers and skin are used extensively in Bangladesh (Samad, 2008).

The parasitism is an important limiting factor to rear goats in Bangladesh. Ectoparasitic infestations are common in goats among other parasitic problems. Mite is one of the common ectoparasites that cause skin diseases in goats. Mites are microscopic external parasites that cause mild to chronic skin disease known as "Mange" in a wide range of hosts including domestic, farm and wild animals (Pence and Ueckermann, 2002). Mange is a widespread and most important ectoparasitic disease of animals, which may cause significant welfare problems and economic losses (Wall and Shearer, 1997). Goats are infected and skin is damaged by mange mite, causing economic loss to the farming community, tanning and leather industry and ultimately the country (Mekonnen *et al*., 1999). Shanta *et al.* (2006) conducted a study on prevalence and clinico-pathological effects of ectoparasites in Patuakhali district and recorded nine species in which *Menacanthus stramineus* was the most common in Bangladesh. Islam *et al.* (2006) observed the distribution, host preference, and population density of five species in flood plains, hills and steppe Barind in Bangladesh. Nooruddin *et al*. (1987) investigated the occurrence of skin diseases in goats at the Mymensingh, Jessore, Narshingdi and Tangail districts of Bangladesh.

Sheferaw *et al.* (2010) conducted an epidemiological study of small ruminant mange mites in three selected agro-ecological zones of Southern Ethiopia and found the higher infestation of mange mites in small ruminant in the lowland area (F=7.463, P=0.006). Different risk factors are responsible for mange mite infestation in goats. Paul *et al.* (2012) observed that goats with ectoparasites in rainy season (90%), followed by winter (82.6%) and summer (53.1%) in Gaibandha district of Bangladesh. Sarkar *et al. (*2010) ant it was observed significantly ($p<0.01$) higher prevalence of ectoparasites in Black Bengal goats in the rainy season (90%), followed by winter (82.61%), and summer (53.06%). Unfortunately, little attention was paid to the

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epidemiological factors influencing the prevalence of mange infestation in goats by the parasites in Bangladesh. But no work has been done on goat mange in Rajshahi district in Bangladesh. Therefore, the present study was designed to know the prevalence of mange mite in goats caused by some selected risk factors such as farm size, feed, season and land topography in Rajshahi district. This study might help to achieve the knowledge about the prevalence and prevention of mange mite effectively in goats in Bangladesh.

Materials and Methods

The field survey was conducted following a questionnaire which was prepared in accordance with objectives of the study. The goat rearing farms in the study area were grouped into three categories such as small farm (having number of goats up to 8), medium farm (having goats 9 to15) and large farm (having goats above 15). A total of 1277 goats were selected randomly and proportionately from 129 goat rearing farms (small, medium and large farms) from purposively selected five upazilas (Boalia, Puthia, Poba, Gudagari and Baghmara) of Rajshahi district and the relevant data were collected during the period from July'2010 to June'2011. Data were analyzed using SPSS version-15. The relationship between prevalence and risk factors such as farm size, feeding, season and land topography were measured by using chi-square (P^2) test. The logistic regression analysis was done to show the comparative effects of these risk factors on the prevalence of mange in goats. The significant difference was set as $P<0.05$ in the prevalence study. The direct physical inspection was performed to screen ectoparasites accordingly (Hannan *et al*, 2001) in this study. The collected scraped samples were diagnosed for mange mite identification in laboratory. The mange was detected by physical examination of goats and the skin scrapings were done in the affected areas of goats to collect mites using the standard techniques (Bush, 1975). The mange was identified according to the keys and descriptions given by Soulsby (1982) by preparing permanent slides following the procedures described by Cable (1957).

Results and Discussion

The overall prevalence of mange mite infestation in all farms was 5.95% and it was observed that the prevalence of mange were 4.13%, 6.03% and 9.04% in small, medium and large farms of goats in selected areas of Rajshahi district, respectively, and it was significantly (P=0.033) different among the farm groups (Table 1).
In logistic regression analysis, the effect of farm size showed significant difference in prevalence of mange infestations between small farm and medium farm (Odds Ratio=0.402, P=0.026) and between small farm and large farm (Odds Ratio=0.618, P=0.082) (Table 2). It can be said that the prevalence of mange infestation was observed to be higher 40.2% and 61.8% in medium farm and large farm respectively than small farm. The large farms were more affected than the medium and small farms, which was in agreement with Hassan *et al.* (2011).

Table 3 represents the mange mite prevalence in goats 3.61%, 6.03% and 8.25% in good, moderate and poor feedings, respectively and the differences were statistically significant (P=0.044) which was in agreement with the finding of Radostitis *et al.* (2000).

Table 1. Prevalence of mange mite in different goat farms

Farm size	Number of goats	Mange mite			
		Affected	Non-affected	Overall prevalence (%)	P-value
Small	315 (100)	13 (4.13)	302 (95.87)	1.02	
Medium	796 (100)	48 (6.03)	748 (93.97)	3.76	
Large	166 (100)	15 (9.04)	151 (90.96)	1.17	
All farms	1277 (100)	76 (5.95)	1201 (94.05)	5.95	0.033

Figures within parentheses indicate percentages

Table 2. Adjusted multivariate logistic regression, odds ratio and P-values of farm size, feeding, season and land topography for mange mite of goats

Variables		Co-efficient (β)	P-value	Odds Ratio
Farm size	Small (R)	--	--	1
	Medium	-0.911	0.026	0.402
	Large	-0.481	0.082	0.618
Feeding	Good (R)	--	--	1
	Moderate	0.095	0.112	1.02
	Poor	0.020	0.049	1.10
Season	Summer(R)	--	--	1
	Rainy	-3.014	0.003	0.049
	Winter	-2.370	0.001	0.094
Land topography	Low land (R)	--	--	1
	Medium land	0.308	0.814	1.360
	High land	-1.682	0.045	0.186
Constant		0.621	0.594	1.860

(R) indicates the reference category

Table 3. Prevalence of mange mite in goat according to feeding categories

Feeding	No. of goats	Mange mite			
		Affected	Non-affected	Overall prevalence (%)	P-value
Good	332 (100)	12 (3.61)	320 (96.39)	0.94	
Moderate	630 (100)	38 (6.03)	592 (93.97)	2.97	
Poor	315 (100)	26 (8.25)	289 (91.75)	2.04	
Total	1277 (100)	76 (5.95)	1201 (94.05)	5.95	0.044

Note: Figures within parentheses indicate percentages

In logistic regression analysis, the effect of feeding was insignificant between good feeding and moderate feeding (Odds Ratio=1.02, P=0.112) and it was significant between good feeding and poor feeding (Odds Ratio=1.10, P=0.049) (Table 2) which indicated that the risk of mange infestation was 1.02 times and 1.10 times higher in moderate and poor feeding than good feeding, respectively. The poor feeding is one of the causes of weak health of goats which may be one of the predisposing factors to be infested by mange mite.

Table 4 represents the prevalence of mange mite in goats as 5.14%, 10.74% and 2.09% in rainy season, winter season and summer season, respectively and the association was highly significant (P=0.000). Similarly, the mange mite infestation was higher in winter season in goats of India (Parija *et al.,* 1995; Chakrabarti, 1994; Mittal and Mathur, 1988; Dalapati and Bhowmik, 1995). The close contact between goats in winter and rainy seasons may be a determining factor in transmission of mange to other non-infected goats. In contrast, a relatively higher infestation with ectoparasites was observed in rainy season, followed by winter and summer in Bangladesh (Sarkar *et al.,* 2010). The differences between the present and earlier findings can be explained by the fact of variations in the geographical location of the experimental area, topography and composition of soil type, temperature and humidity.

In logistic regression analysis, effect of season on prevalence of mange mite infestations was observed significant between summer season and rainy season (Odds Ratio=0.049, P=0.003) and between summer season and winter season (Odds Ratio=0.094, P=0.001) (Table 2). These findings indicate that the prevalence of mange infestation was higher at 4.9% and 9.4% in rainy and winter seasons than summer season, respectively, which was in agreement with Kassaye and Kebede (2010) in Tigray region of northern Ethiopia. The present study showed 8.81%, 5.94% and 3.09% of mange mite prevalence in goats in low land, medium land and high land, respectively and the differences in the mange mite prevalence among different land categories was significant (P= 0.022) (Table 5) which were supported by Kassaye and Kebede (2010) in Tigray region of northern Ethiopoa.

In logistic regression analysis, the effect of land topography (Table 2) was insignificant difference in prevalence of mange infestations between low land and medium land (Odds Ratio=1.36, P=0.814) and it was the significant difference between low land and high land (Odds Ratio=0.186, P=0.045). The prevalence of mange infestation was 1.36 times lower in medium land than low land and it was 18.6% lower in high land than low land which was in agreement with the findings of Kassaye and Kebede (2010), Desta (2004) and Pangui (1994). The high prevalence of the mange mite in the low land may be associated with the ideal micro climate environment in these areas which favors the breeding and multiplication of mange mite eggs to their developmental stages (Pangui, 1994). High temperature, humidity and sunlight in the lowland favor mange infestation which account for the difference in the prevalence.

Table 4. Prevalence of mange mite in goat in different seasons

Seasons	Number of goats	Mange mite			
		Affected	Non-affected	Overall prevalence (%)	P-value
Rainy	428 (100)	22 (5.14)	406 (94.96)	1.72	
Winter	419 (100)	45 (10.74)	374 (89.26)	3.52	
Summer	430 (100)	9 (2.09)	421 (97.91)	0.71	
All seasons	1277	76 (5.95)	1201 (94.05)	5.95	0.000

Figures within parentheses indicate percentages

Table 5. Prevalence of mange mite in goat in different land topography

Land topography	No. of goat	Mange mite			
		Affected	Non-affected	Overall prevalence (%)	P-value
Low land	261 (100)	23 (8.81)	238 (91.19)	1.80	
Medium land	757 (100)	45 (5.94)	712 (94.06)	3.52	
High land	259 (100)	8 (3.09)	251 (96.91)	0.63	
All land topography	1277 (100)	76 (5.95)	1201 (94.05)	5.95	0.022

Figures within parentheses indicate percentages

Conclusion

A huge number of goat populations is reared and adapted to different seasons and environmental condition in Bangladesh. However, there is a contribution of goats as meat and skin to the national economy of country. Mange mite infestation is a major cause of the constraint for goat production and it deteriorates the export skin quality in Bangladesh. The farmers are not conscious about the effect of mange mite in goats rearing and its productivity, deaths and skin damages in Bangladesh. They have limited knowledge about skin lesion due to ectoparasitic infestation in goats. Therefore, the overall prevalence of mange mite in goats caused by different risk factors are responsible for economic loss of goat rearing farms through decreased production, deaths and skin damages in Bangladesh. The information achieved from this study would certainly increase our present state of knowledge to protect mange mite effectively in Bangladesh.

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