



EFFECT OF GENETIC AND NON-GENETIC FACTORS ON SEROPREVALENCE OF *MYCOPLASMA MYCOIDES* SUBSP. *CAPRI* IN GOAT

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Abstract

A cross sectional study was done to understand the effect of genotypes, farm management and agro-climatic conditions in Kerala and Uttar Pradesh on seroprevalence of *Mycoplasma mycoides* Subsp. *capri* (Mmc) in goats. Goat serum was screened by Slide Agglutination test (SAT) for Mmc antibodies. It was found that there was no statistically significant difference ($P>0.05$) in mycoplasma seroprevalence between the two states and among the genotypes-Malabari, Attapadi Black and non-descript goats. However, the chi-square probability distribution revealed that there was significant difference ($P>0.05$) in seroprevalence in goats reared in government farms than farmer herds and the likelihood of getting mycoplasmosis from farmer herds was 3.40 than government farms.

Key words: Goat, *Mycoplasma mycoides* Subsp. *capri*, seroprevalence, Slide Agglutination Test.

Mycoplasmas are responsible for a variety of diseases in domestic animals that are mainly associated with ailments of the lung, genitourinary tract, joints, mammary gland and other tissues (Simecka *et al.* 1992). CCPP is a very severe disease condition of goats which is highly contagious and often fatal with morbidity and mortality rates can reach up to 100% and 80%, respectively, in naïve

herds. Food and Agricultural Organization (FAO) recognizes CCPP as a major trans-boundary livestock disease of goat and classify it under OIE List B (Singh *et al.* 2007).

In India, many workers have conducted seroprevalence studies on *Mycoplasma mycoides* Subsp. *capri* (Mmc) in small ruminants. A seroprevalence of 5.02 % in goats and 4.44 % in sheep was reported in Himachal Pradesh (Ramdeva *et al.* 2008). In Nagpur district of Vidarbha region, 33.67% goats were found to be seropositive against mycoplasma (Ingle *et al.* 2008). Outbreaks of mycoplasmosis in sheep were also reported in Andhra Pradesh (Kumari *et al.* 2011), in goats in Gujarat (Kumar *et al.* 2011) and West Bengal (Mondal *et al.* 2004). These findings suggest that mycoplasmosis is a major threat to the small ruminant production in India.

In this scenario, it was explored whether breed differences and agro-climatic and farm management conditions have any role on mycoplasma seroprevalence in goats.

Materials and Methods

Blood samples were collected from Attapadi Black goats reared in the Government Goat Farm, Agali, (Palakkad district) and Malabari goats maintained in the Government Goat Farm, Kommeri (Kannur district), the Government Goat Farm, Agali (Palakkad

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district) and two farmer herds (located at Calicut and Wayanad districts) of Kerala and serum was separated and brought to Indian Veterinary Research Institute (IVRI), Izatnagar, Bareilly maintaining cold chain and stored at -20° till further processing.

From Uttar Pradesh, serum separated from blood samples collected from goats reared in the Goat Farm of IVRI and from goats owned by farmers of nearby villages was used for the study. These blood samples were collected during a span of seven months from July, 2012 to January, 2013. All the 247 serum samples were screened for mycoplasma antibodies by Slide Agglutination test (SAT) with *Mmc* coloured antigen procured from the National Referral Laboratory on Mycoplasma, IVRI, Izatnagar. To describe the screening test, in brief, 25µl each of sample serum and coloured antigen were mixed on a clean glass plate using a glass rod followed by rotating the plate in clock wise and anticlock wise direction. Alongside, as positive control, 25µl each of standard positive serum and coloured antigen were also mixed. Then the results were read against a source of light by observing for the presence of agglutination in the serum-antigen mix. Samples where flacks were formed within two minutes were considered as positive for mycoplasma antibodies; agglutination after two minutes was taken as negative. Statistical analysis was performed using PROC FREQ procedure of SAS 9.3 and ODDs ratios were calculated.

Results and Discussion

The results of serum screening are given in Table 1. The prevalence of *Mmc*

antibodies were 23.13 % and 31.03% among goat population from Kerala and UP, respectively and the difference in percent seroprevalence between the states was not significant ($P>0.05$). This shows that different agro-climatic conditions prevailing in Kerala and UP have no effect on mycoplasma seroprevalence. A comparable mycoplasma seroprevalence of 28.92% was reported in the goat population of Wayanad district in Kerala (Priya *et al.* 2008). However, a relatively low mycoplasma seroprevalence of 9.64% was reported in the goat population of Uttar Pradesh (Kashoo *et al.* 2011).

To elucidate the effect of management conditions on mycoplasma prevalence, the data from government farms and farmer herds in Kerala as well as in Uttar Pradesh were compared. In Kerala, a seroprevalence of 15.97% in goats reared in government farms was significantly ($P<0.05$) lower than prevalence in farmer herds which stood at 43.90%. Similarly, in Uttar Pradesh, a seroprevalence of 20% in government farms was significantly ($P<0.05$) lower than prevalence of 38.46% in farmer herds. It was estimated that the ODDs of getting seropositive cases for mycoplasmosis from farmer herds was 3.40 (1.88 to 6.14; 95% CI) as against government farms.

A seroprevalence study on CCPP in the migratory goat flocks in India found that 97 per cent of the goats were positive with Latex agglutination (LA) test and 78% were positive with enzyme linked immunosorbent assay (ELISA) (Rana *et al.* 2009). A high seroprevalence of 62.5% was recorded in a

Table 1. Results of serum screening by SAT for *Mmc* antibodies

Si.No	Kerala			Uttar Pradesh	
	Government Farms		Farmer herds	IVRI Farm	Farmer herds
	Malabari (n=65)	Attapadi Black (n=54)	Malabari (n=41)	Nondescript (n=35)	Nondescript (n=52)
Sero Positive	10	9	18	7	20
Sero Negative	55	45	23	28	32

private farm in Kannur district of Kerala. (Ravishankar *et al.* 2011). The probable reason for a high level of prevalence in farmer herds could be due to the extensive method of rearing that is popular among goat farmers and the consequent high chance for contacting infection from infected and/or carrier animals. In addition, stress factors due to exposure to cold and wet conditions, malnutrition and movement over long distances could predispose the animal to disease (Vihan 2010). As against this, a probable consistent minimum adherence to veterinary, hygienic and husbandry measures in the government farms under the supervision of veterinarians reduce the possibility of contacting and/or spreading infection in the government farms and hence the prevalence was low.

To evaluate the effect of genotype on seroprevalence of mycoplasma, goats reared under similar management conditions i.e. intensive rearing under government farms and extensive system at farmer's door were compared separately. Seroprevalence of mycoplasma was 15.38%, 16.67% and 20% respectively, in Malabari, Attapadi Black and non-descript goats reared in the government farms. The chi-square probability distribution shows that there was no significant ($P>0.05$) genotype difference in the prevalence of mycoplasma. There are several reports on breed differences for mycoplasma infection in goat as well as other livestock species. Kwantesav and Harbyb (1995) reported breed difference in susceptibility to mycoplasmal arthritis among Batinah, Dhofari and Jebel Akthar goats, while Abegunde *et al.* (1981) reported differences in vulnerability to *Mycoplasma putrefaciens* infection in goat breeds of California. Similarly, significant differences in susceptibility to *Mycoplasma hyorhinis* arthritis have been reported in Piney Woods Miniature swine and Yorkshire swine by Barden *et al.* (1973). Moreover, brown leghorns were found to be more susceptible than white varieties to amyloid arthropathy associated with *Mycoplasma synoviae* (Landman and Bronneberg, 2003). However, our results of non-significant differences in *Mmc* seroprevalence between different genotypes were contrary to these reports. Similarly, in the goats reared in the farmer's households, the seroprevalence of mycoplasma was 43.9% in Malabari and 38.46% in non-descript and this difference was

also non-significant statistically ($P>0.05$).

It was found out that the likelihood of getting mycoplasmosis in farmer herds was 3.40 than government farms. This might be due to the high chance for exposure to infected and/or carrier animals and stress factors in the extensive method of rearing. Therefore, it could be concluded that the managerial environment as a whole played an important role in the development of mycoplasmosis in goat.

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References

- Abegunde, T. O., Adler, H. E., Farver, T. B., DaMassa A. J. 1981. A serologic survey of *Mycoplasma putrefaciens* infection in goats. *Am. J. Vet. Res.*, **42**:1798-801.
- Barden, J. A., Decker, J. L., Dalgard, D. W. and Aptekar, R. G. 1973. *Mycoplasma hyorhinis* Swine Arthritis III. Modified Disease in Piney Woods Swine. *Infect. Immun.*, **8**: 887-890.
- Ingle, V. C., Sivakumar P., Kalorey, D. R., Pote, D. E., Dhamanna Patil, P. S. Chavhan, S. K., Nagdive, A. A. and Hatkar, D. N. 2008. Seroprevalence of Contagious Caprine Pleuropneumonia in goats in Nagpur district of Vidarbha region. *Vet. World.*, **1**: 270-271.
- Kashoo, Z. A., Singh, V. P., Rana, R., Sankar, M., Gazalli, H. and Cheema, P.S. 2011. Evaluation of different serological tests for diagnosis of contagious agalactia in goats. *Indian J. Anim. Sci.*, **81**: 1201-1203.
- Kumar, P., Roy, A., Bhandari, B. B. and Pal, B. C. 2011. Isolation, identification and molecular characterization of *Mycoplasma* isolates from goats of Gujarat State, India. *Vet. Arhiv.* **81**: 443-458.
- Kumari, R., L., Muqueeth, M. A., Mrunalini, N. and Sudersan Rao, M. 2011.

- Mycoplasma Infections in Small Ruminants. *Andhra Pradesh Veterinarian*, **14**:32-33.
- Kwantesav, L. J. and Harbyb, H. A. M. 1995. Caprine mycoplasmal arthritis in the Sultanate of Oman. *Small Ruminant Res.*, **16**: 287-289
- Landman, W. J. and Bronneberg, R. G. 2003. *Mycoplasma synoviae*-associated amyloid arthropathy in White Leghorns: case report. *Tijdschr Diergeneesk.*, **128**:36-40.
- Mondal, D., Pramanik, A. K. and Basak, D. K. 2004. Clinico-haematology and pathology of caprine mycoplasmal pneumonia in rain fed tropics of West Bengal. *Small Ruminant Res.*, **51**: 285-295.
- Priya, P. M., Baburaj, N. K., Kiran, N., Rajan, S., Ravishankar, C. and Jayesh, V. 2008. A cross sectional investigation on contagious caprine pleuropneumonia among goats of Wayanad district of Kerala, India. *Biosci. Biotech. Res. Comm.*, **1**:140-142.
- Ramdeva, J., Sharma, Katoch, V. C., Dhar, P. and Chahota, R. 2008. Seroprevalance of mycoplasmosis in sheep and goats of Himachal Pradesh. *Indian J. Small Ruminants.*, **14**: 276-278.
- Rana, R., Mehra, S., Kumar, V., Kumar, A. and Vihan, V.S. 2009. Seroprevalence of contagious caprine pleuropneumonia in goats using native *M. mycoides* subsp. *capri* isolate. *Indian Vet. J.*, **86**: 115-117.
- Ravishankar, C., Priya, P. M., Ravindran, R. and Ajithkumar, S. 2011. Outbreak of mycoplasmosis in an organized goat farm in Kannur district of Kerala. *J. Vet. Anim. Sci.*, **42**: 66-67.
- Simecka, J. W., Davis, J. K., Davidson, M. K., Ross, S. E., Stadtlander, C. T. K. H. and Cassell, G.H. 1992. Mycoplasma diseases of animals. In: Maniloff (Ed). *Mycoplasmas-Biology and Pathogenesis*. American Society for Microbiology, Washington.D.C : 391-396.
- Singh, N., Singh, V. P. and Rana, R. 2007. Mycoplasma infections in goat and sheep in Indian perspective. In: V.S. Vihan, A. Kumar, V.K. Gupta, and N.P. Singh, (Eds) *Small Ruminant-Emerging Diseases, Containment under WTO Regime*. Sathish Serial Publishing House, Delhi: 241-247.
- Vihan, V. S. 2010. Mycoplasmal and rickettsial Diseases. In: *Diseases of Small Ruminant*. Sathish Serial Publishing House, Delhi. 197-211.

