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Short Communication

AN OUTBREAK OF CAPRINE PARATUBERCULOSIS IN A NEWLY ESTABLISHED COMMERCIAL GOAT FARM

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SUMMARY

Out of the 35 fecal samples from a suspected outbreak of Johne's disease in a newly established commercial goat farm, 77.1% goats were culture positive. Majority of the cultures were pauci-bacillary (65.7%) and only 11.4% were multibacillary (super shedders). Screening of 35 goats by 'Indigenous ELISA kit', 40.0% were positive and 20.0% each were in low positive, suspected and negative categories. Independently 48.5 and 11.4% goats were detected positive by culture and ELISA, respectively.

Key words: Goat, Johne's disease, *Mycobacterium avium* subspecies *paratuberculosis*, ELISA kit

Johne's disease (JD) caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP), is single most serious infection affecting ruminants worldwide. The MAP gets principally confined to small intestines and draining lymph nodes (Buergelt *et al.,* 2004). However, it may be disseminated to udder, uterus, supra mammary lymph nodes, colostrums, milk, fetus, lungs, semen, vaginal tissues (Sweeney, 1996, Kumar *et al.,* 2007, Vohra *et al.,* 2008). The JD having significant impact on the world economy (Sweeney, 1996) has been frequently reported from farm herds (Mathur *et al.,* 1981, Koul *et al.,* 1989, Singh *et al.,* 1998, Goswami *et al.,* 2000) and in farmer's herd from sacrificed goats (Kumar *et al.,* 2007). The JD is endemic in goats, sheep, cattle and buffaloes population of the country (Singh *et al.,* 1996, 2005 a, b, c), however, outbreaks of disease have not been reported. Study aimed to investigate a rare outbreak of Johne's disease using 'Indigenous ELISA kit' and fecal culture.

A commercial entrepreneur, of village Akosh (Mathura), purchased 40 adult goats from local markets. Purchased goats gave 40 kids in first kidding and kidded 2-3 times more. On 1st Jan., 2006, he had 150 goats (40 purchased and 110 new additions), when weakness and diarrhoea was observed in the animals. Despite treatment with fenbendazole, diarrhoea continued and condition of animals worsened. Milk production was reduced and 13.3% goats aborted. After a month, problems of weight loss, weakness, loss of appetite, off-feed and off water with death of 3-4 goats per day were reported to CIRG, Makhdoom. Within 1 month, 50 goats died due to weakness, diarrhoea and tympanitis. Fecal as well as serum samples of 15 kids and 20 goats were collected in the first visit.

Fecal samples were cultured on HEYM with mycobactin J and without antibiotics and anti-fungal agents as per method of Singh *et al.,* (1996). On the basis of number of colonies, each sample was categorized as pauci-and multi-bacillary. Serum samples were screened by 'indigenous ELISA kit', developed for goats and sheep at CIRG, Makhdoom (Singh *et al.,* 2007). Absorbance was read at 450 nm in ELISA reader (Multiskan, Finland). Positive, negative, substrate and conjugate controls were also run with serum samples. Cut-off OD was calculated as per method described by Singh (1998). The S/P ratios were calculated from the OD values. Animals in positive and strong positive categories of S/P ratio were considered positive reactors in ELISA.

On the day of visit, morbidity was 100.0% and mortality was 33.3% (10 adult and 40 kids

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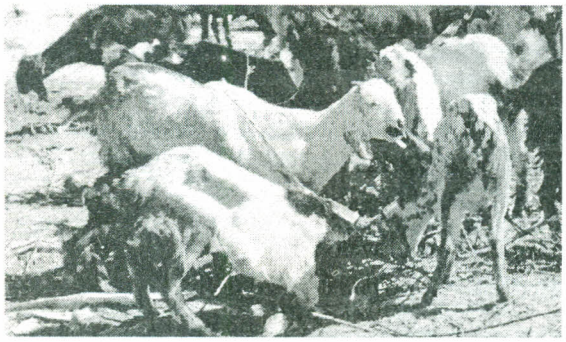

Fig 1. Completely devastated goat herd.

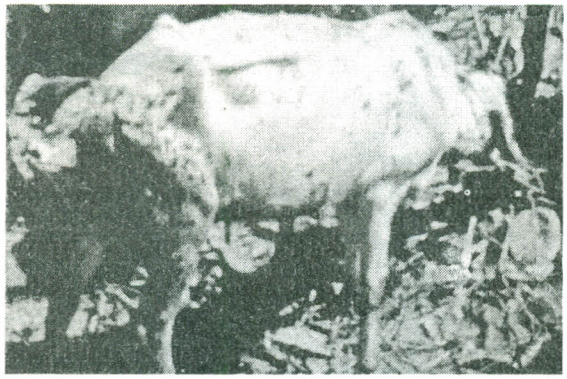

Fig 2. Clinically infected adult goat.

of 3-5 months) within a month of development of clinical disease (Figs 1, 2). Entire herd of 100 goats (60 adults and 40 kids) was in grip of severe outbreak of clinical Johne's disease. Body condition was extremely poor and hide bound (> 60.0%) suffering from continuous diarrhoea not responding to drugs. Goats were dull, depressed, anaemic, unable to stand (5.3%), exhibiting symptoms of advanced stage of clinical JD (Fig. 1, 2). Farm was poorly managed, unhygienic and healthy goats mixed freely with sick and young with adult (Figs 1, 2). Milk production was reduced by >75.0%. Excreta and farm waste were compiled within premises. Goats (35–40%) were unable to graze and there was 40–50% reduction in body weights. In second visit after two and half months of first visit, 32 goats (37.2%) were not available (20 sold and 13.9% died).

Of the 35 fecal samples cultured, 77.1% goats were positive. Individually, of 20 adult goats, 75.0% were positive and of 15 kids (3–6 months old), 80.0%, were positive. In majority colonies were paucibacillary (65.7%) and 11.4% were multibacillary (super shedders). Among the pauci-bacillary, majority (31.4%) were in 1 – 2 colonies category.

Of the 35 animals screened, 40.0% (14) were detected as sero-positives by ELISA kit. The 20.0% each were low positives, suspected and negatives. However, of the 14 positive in ELISA, 10 were detected in culture. Similarly, in low positive and suspected groups, 6 and 5 were detected in culture. Of the negative animals in ELISA, six were detected positive in culture. Individually in kids, 40.0, 30.0, 20.0 and 10.0% were positives, low positives, suspected and negatives, respectively and of these 5, 5, 3 and 2 were detected in fecal culture (Table 1). In adult goats, 40.0, 6.6, 20.0, and 33.3% animals positive, low positive, suspected and negatives, respectively and of these except 3 animals all were detected in culture.

Comparative evaluation of fecal culture with ELISA kit showed that fecal culture detected, 27 (77.1%), goats as compared to 14 (40.0%) positive, by ELISA kit. Independently, 48.5% and 11.4% cases were detected by fecal culture and ELISA kit, respectively (Table 2). Based upon the above findings, the sensitivity and specificity of plate ELISA kit was 37.0% and 50.0%, respectively.

In this study, culture had higher sensitivity than ELISA kit. Culture detected 77.1% animals' positive from the clinical cases of JD. High

Table 1

Comparative evaluation of S/P ratios of the results of ELISA kit and fecal culture in clinical cases of JD in goats and kids

S/P ratio	Disease status	Animals	Culture positive	Type of culture
0.00-0.09	Negative	07 (20.0%)	06 (17.1%)	6PB*
0.10-0.24	Suspect	07 (20.0%)	05 (14.2%)	1MB#/4PB
0.25-0.39	Low positive	07 (20.0%)	06 (17.1%)	2MB/4PB
0.40-0.99	Positive	14 (40.0%)	10 (28.5%)	1MB/9PB
1.0-10.0	Strong positive	00 (00.0%)	00 (00.0%)	
Total animals		35	27 (77.1%)	4MB/23PB

*PB- Paucibacillary, #MB-Multibacillary

Table 2

Comparative evaluation of indigenous ELISA kit and fecal culture

Test	Combinations			
	1	2	3	4
Fecal culture	+	-	+	-
ELISA kit	+	-	-	+
Total - 35	10 (28.5%)	4 (11.4%)	17 (48.5%)	4 (11.4%)

prevalence has been reported by other workers in goats (Kumar *et al.*, 2007), sheep (Sharma *et al.*, 1985) using this culture method on feces (Singh *et al.*, 1996, Kumar *et al.*, 2007). The JD has been reported from many farm herds located in the North India (Singh, 1998, Kumar *et al.*, 2007, Goswami *et al.*, 2000). Srivastav and More (1987) reported low prevalence due to use of less sensitive tests (Johnin and fecal examination) as compared to fecal culture and ELISA used in this study. Lowered sensitivity of fecal culture (Tripathi *et al.*, 1999) as compared to present findings may be due to poor standardization of the procedure.

Fecal culture was highly sensitive and detected 80.0% and 75.0%, kids and goats as positives, respectively. Indigenous ELISA kit detected 40.0% positive sero-reactors each in kids and adult goats. If low positives were also included as positives, the kit detected 60.0% goats as positive reactors and of these, fecal culture detected, 80.0% positive shedders. Overall, fecal culture detected 77.1% goats as positive (shedders). Of the 40.0% goats in suspected and negative categories in ELISA kit, 31.3% were positives in cultures. This was mainly due to low humoral response, loss of serum proteins and damage to immune system in JD. None of the animal was in strong positives in ELISA, despite clinical outbreak of caprine Johne's disease in this commercial goat farm.

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