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A Study on Prevalence of Bovine Paratuberculosis in Semen Station in India

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Abstract A study was conducted on bovine bulls in two bio-secure farms in India using Delayed Type of Hypersensitivity (DTH) to determine the prevalence of bovine paratuberculosis or Johne's disease (JD). The DTH was carried out on the neck of the animals, conducted as per OIE Terrestrial manual 2008. The results of DTH carried out for JD in two farms in western and northern India for a period of five years is being described. Prevalence of JD was found in Jun-10 (0.62%), Oct-10 (0.52%), Dec-10 (0.51%) and May-15 (1.09%) in farm at northern India whereas in western India farm, in Aug-10, May-11 and Mar-12, JD incidence rate was 0.34%, 1.86% and 0.54% respectively. It can be concluded from the present study that JD was present in both the herds with low incidence rate of 0-1.86 percent during the five years.
Keywords *JD; DTH; Semen Station; Bull*

1. Introduction

Bovine paratuberculosis or Johne's disease (JD) is a chronic debilitating disease caused by Mycobacterium avium *subsp.* paratuberculosis and causes heavy economic losses. High prevalence of JD (Raveendran et al., 2011) with low systematic monitoring of the same makes it more significant in India. The common source of infection may be faeco-oral route, contaminated feed, water, milk or colostrums for the calves (Sweeney, 1996). Spreading of the organism through vertical infection to the fetus (Larson *and* Kopecky, 1970) and infection in semen (Munster et al., 2012) has also been reported. Trangadia et al. (2012) found apparent prevalence of JD in Gujarat and Andhra Pradesh 13.39% (true prevalence, 15.68%) and 16.26% (true prevalence, 19.31%) respectively in serological diagnosis. Therefore, it is important that bulls in semen station should ideally be free from JD. Kalis et al. (2003) described the Delayed Type of Hypersensitivity (DTH) for JD as a specific and low-cost test for the early diagnosis of the same in dairy herds. Hence in the present study, DTH was used to investigate the comparative prevalence of JD in bovine bulls in two farms. Both the farms are involved in frozen semen production activities, one located in western India whereas other in northern India. The JD status of the herd was monitored in farms for 5 years i.e. 2010 - 2015. The status of the herds was monitored along with the practices of periodic testing and culling of reactors.

2. Materials and Methods

One hundred and sixty two bulls in semen station located in northern India were tested in Jun 2010. The farm introduced and also culled bulls from the main herd periodically, hence the population tested in this farm varied. In Jun-10, Oct-10, Dec-10, Jun-11, Feb-12, April-12, Aug-12, Feb-13, Aug-13, Feb-14, Dec-14 and May-15, the numbers of animals tested were 162, 194, 197, 204, 214, 218, 245, 257, 260, 286, 316 and 274 respectively.

The farm located in western India (semen station) had 298 bulls in August 2010. The farm introduced animals periodically into the main herd under various breeding programmes with regular culling practices, resulting in changes in the population of bulls. In Aug-10, Nov-10, May-11, Aug-11, March-12, May-12, Nov-12, May-13, Dec-13, Jul-14 and Jan-15, the numbers of animals tested were 298, 277, 323, 360, 372, 364, 378, 389, 421, 432 and 442 respectively.

Proper practices of isolation, sanitation, traffic control, personnel management and herd health management were adopted in the farms.

Screening of exotic Pure Bred (HF, Jersey), indigenous Pure Bred, crossbreds and Buffaloes against JD was carried out half yearly by DTH between 2010 and 2015. Bovine Johnin PPD was obtained from the Indian Veterinary Research Institute (IVRI), Izatnagar, UP. The test was conducted as per OIE Terrestrial manual 2008. In case of any positive reactors, testing of the whole herd was repeated after two months with the objective of keeping the incidence rate of JD less than 1%. All the positive reactors were culled immediately.

3. Results

During the period of 2010-15, a total of 15 animals were found positive for JD consisting of 7 pure exotic, 3 cross breeds and 5 Murrah buffaloes (Table 1 and 2).

In the farm located in northern India, 12 rounds of testing were conducted from 2010 to 2015. Overall prevalence of JD found was: Jun-10 (0.62%), Oct-10 (0.52%), Dec-10 (0.51%) and May-15 (1.09%) (Table 1). Breed wise incidence was found highest in pure exotic (4.23%) followed by crossbred (2.17%) and buffaloes (1.85%) (Table 1).

In the Farm located in western India, 11 rounds of testing were conducted from 2010 to 2015. Over all prevalence of JD was found relatively higher during testing in May-11 (1.86%) followed by Mar-12 (0.54%) and Aug-10 (0.34%) (Table 2). Breed wise, the incidence was found relatively higher in pure exotic (5.08%) followed by crossbreds (1.61%) and buffaloes (0.97%) (Table 2).

4. Discussion

An overall comparison of the positive animals from our data on DTH shows relatively higher incidence (Table 1 and 2) of JD in the pure exotic breeds followed by crossbreds and buffaloes in both the semen stations. Rawat et al. (2014) reported outbreak of paratuberculosis in a HF dairy farm in Rajasthan. Singh et al. (2004) found the prevalence of bovine paratuberculosis at 2.71% in organized dairy farms in Ludhiana using DTH test. Sharma et al. (2007) found overall prevalence of paratuberculosis 1.72% with 2.31 and 0.33% in cows and buffaloes, respectively in Punjab. In the present study, JD was present in both the herds with incidence rate ranging between 0-1.86 percent which is in accordance with the observations of the previous authors.

Table 1: *Breed Wise Distribution of JD in Northern India Farm*

Sl No	Month and year of testing	Breed wise												Total animal tested	Total positive	% positive
		Pure exotic			Indigenous			Cross Bred			Buffalo					
		Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive			
1	Jun-10	55	0	0.00	21	0	0.00	46	1	**2.17**	40	0	0.00	162	1	**0.62**
2	Oct-10	66	0	0.00	28	0	0.00	43	0	0.00	57	1	**1.75**	194	1	**0.52**
3	Dec-10	65	0	0.00	29	0	0.00	49	0	0.00	54	1	**1.85**	197	1	**0.51**
4	Jun-11	73	0	0.00	27	0	0.00	50	0	0.00	54	0	0.00	204	0	0.00
5	Feb-12	69	0	0.00	29	0	0.00	55	0	0.00	61	0	0.00	214	0	0.00
6	Apr-12	71	0	0.00	29	0	0.00	53	0	0.00	65	0	0.00	218	0	0.00
7	Aug-12	73	0	0.00	34	0	0.00	68	0	0.00	70	0	0.00	245	0	0.00
8	Feb-13	88	0	0.00	31	0	0.00	66	0	0.00	72	0	0.00	257	0	0.00
9	Aug-13	86	0	0.00	31	0	0.00	66	0	0.00	77	0	0.00	260	0	0.00
10	Feb-14	94	0	0.00	31	0	0.00	71	0	0.00	90	0	0.00	286	0	0.00
11	Dec-14	101	0	0.00	37	0	0.00	72	0	0.00	106	0	0.00	316	0	0.00
12	May-15	71	3	**4.23**	34	0	0.00	64	0	0.00	105	0	0.00	274	3	**1.09**

Table 2: *Breed Wise Distribution of JD in western India Farm*

Sl No	Month and year of testing	Breed wise												Total animal tested	Total positive	% positive
		Pure exotic			Indigenous			Cross Bred			Buffalo					
		Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive	Nos. tested	Nos. positive	% positive			
1	Aug-10	58	0	0.00	34	0	0.00	103	0	0.00	103	1	**0.97**	298	1	**0.34**
2	Nov-10	54	0	0.00	35	0	0.00	92	0	0.00	96	0	0.00	277	0	0.00
3	May-11	59	3	**5.08**	36	0	0.00	124	2	**1.61**	104	1	**0.96**	323	6	**1.86**
4	Aug-11	65	0	0.00	43	0	0.00	141	0	0.00	111	0	0.00	360	0	0.00
5	Mar-12	79	1	**1.27**	45	0	0.00	131	0	0.00	117	1	**0.85**	372	2	**0.54**
6	May-12	76	0	0.00	42	0	0.00	129	0	0.00	117	0	0.00	364	0	0.00
7	Nov-12	78	0	0.00	45	0	0.00	137	0	0.00	118	0	0.00	378	0	0.00
8	May-13	79	0	0.00	44	0	0.00	138	0	0.00	128	0	0.00	389	0	0.00
9	Dec-13	81	0	0.00	45	0	0.00	148	0	0.00	147	0	0.00	421	0	0.00
10	Jul-14	80	0	0.00	50	0	0.00	142	0	0.00	160	0	0.00	432	0	0.00
11	Jan-15	81	0	0.00	50	0	0.00	162	0	0.00	149	0	0.00	442	0	0.00

The influence on specificity by apparent presence of environmental mycobacterium may also be a factor resulting in false-positive skin test. The quality of sawdust used as animal bedding may perhaps have some influence on the proportion of false-positive skin tests. Fodstad et al. reported sawdust as a source of *M. avium*, causing false-positive tests in cattle and pigs. According to Vinodh et al., the diagnostic sensitivity and specificity of Johnin DTH over gamma interferon assay was 38.09% and 93.75% respectively. Also, the performance of DTH may also be significantly affected by different batches of antigen due to occurrence of minor antigenic differences (Kalis et al., 2003). So with a lesser sensitivity, eradication of JD from a herd may not be possible solely by DTH and culling of positives. However, the practice of performing DTH bi-annually in both the farms with regular culling practices helped lower the incidence of JD in the semen stations.

5. Conclusion

It can be concluded from the present study that JD was present in both the herds with incidence rate ranging between 0-1.86 percent during the five years under study. Strict bio-security, regular disease monitoring and herd management protocol at farm helps in lowering the incidence of bovine JD.

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Competing Interest

The authors declare that they have no competing interests.

References

Fodstad, F.H. *Tuberculin Reactions in Bulls and Boars Sensitized with Atypical Mycobacteria From Sawdust.* Acta Vet. Scand. 1977. 18; 374-383.

Kalis, C.H.J., Collins, M.T., Hesselink, J.W. and Barkema. H.W. *Specificity of Two Tests for the Early Diagnosis of Bovine Paratuberculosis Based On Cell-Mediated Immunity: The Johnin Skin Test and the Gamma Interferon Assay.* Veterinary Microbiology. 2003. 97; 73-86.

Larson, A.B. and Kopecky, K.E. *Mycobacterium Paratuberculosis in Reproductive Organs and Semen of Bulls.* Am. J. Vet. Res. 1970. 31; 255-258.

Munster, P., Volkel, I., Wemheuer, W., Schwarz, D., Doring, S. and Czerny, C.P., 2012: A Longitudinal Study to Characterize the Distribution Patterns of *Mycobacterium avium* ssp. *paratuberculosis* in Semen, Blood and Faeces of a Naturally Infected Bull by IS 900 Semi-Nested and Quantitative Real-Time PCR. Transboundary and Emerging Diseases. 2013. 60 (2) 175-87.

OIE, 2008: Paratuberculosis (Johne's disease). OIE *Terrestrial Manual.* Chapter 2.1.11; 276-291.

Rawat, K.D., Chaudhary, S., Kumar, N., Gupta, S., Chaubey, K.K., Singh, S.V., Dhama, K., and Deb, R. *Economic Losses in a Commercial Dairy Farm Due to the Outbreak of Johne's Disease in India*. Res. J. Vet. Pract. 2014. 2 (5) 73-77.

Remya Raveendran, Priya, P.M., John, K, Nair, G.K. and Vijayakumar, K. *Detection of Mycobacterium Avium Subsp. Paratuberculosis in Asymptomatic Bovines by IS900 Polymerase Chain Reaction.* Veterinary-World. 2011. 4 (6) 248-249.

Singh, B.B, Gumber, S., Randhawa, S.S, Aradhana, Dhand, N.K. *Prevalence of Bovine Tuberculosis and Paratuberculosis in Punjab.* Indian-Veterinary-Journal. 2004. 81 (11) 1195-1196.

Sweeney, R.W. *Transmission of Paratuberculosis.* Vet. Clin. N. Am. Food Anim. Pract. 1996. 12; 305-313.

Trangadia, B.J., Rana, S.K., Nagmani, K., Srinivasan, V.A. *Serological Investigation of Bovine Brucellosis, Johne's Disease and Infectious Bovine Rhinotracheitis in Two States of India.* Journal of Advanced Veterinary Research. 2012. 2 (1) 38-41.

Vinodh, Kumar O.P., Gunaseelan, L., Ronald, B.S.M., Rishikesavan, R., Senthil, N.R. and Gopi, H. *Comparative Evaluation of John in Intradermal Test and Gamma Interferon Assay in Bovine Paratuberculosis.* Indian J. Vet. Med. 2011. 31 (1) 30-31.