CASE REPORT

Non-Typhoidal *Salmonella* (NTS) Associated Chronic Enterocolitis in a Kangeyam Heifer Calf - An Uncommon Report

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Salmonellosis in India is reported to be endemic and one of the confirmed bacterial causes of diarrhoea in all age groups of bovines and humans (Nair *et al*., 2015; Hassan *et al*., 2020). The *Salmonella enteric* serotype typhimurium, is an important serotype among the non-typhoidal *Salmonella* (NTS) in cattle and human. The global disease burden of salmonellosis is 3.4 million but the lacking surveillance system led to underestimation of the disease in India (Kumar *et al*., 2022). Salmonellosis in bovines can be either acute or chronic, causing septicaemia in neonates, whereas the infected adults appear to be apparently healthy (Safi *et al*., 2022). The infected adult bovines may exhibit watery or bloody diarrhoea due to necrotic enterocolitis, along with pyrexia, anorexia, dehydration, hypersalivation, and endotoxaemia, and rarely abortion (McGuirk and Peek, 2003; Hoelzer *et al*., 2011). In human, *Salmonella* is the second most common food-borne bacteria causing gastrointestinal illnesses. The human transmission may occur by consumption of foods of animal origin such as milk and meat contaminated by manure and contact with farm animals (Zizza *et al*., 2024). Though cattle is potential carrier for transmission of infection to humans, reports on detection of *salmonella* in bovines especially zoonotic are scarcely available in India. Hence, this study reports the incidence of enterocolitis caused by *Salmonella* in a Kangeyam calf, it's laboratory diagnosis and successful treatment.

Case History and Observations

A seven-month old female Kangeyam calf, weighing 74 kg, was presented to the Veterinary Clinical Complex at Veterinary College and Research Institute, Namakkal with a history of inappetence, dullness, depression and profuse watery diarrhoea with tenesmus for past 15 days. The animal was treated with antibiotic for the past 7 days by the field veterinarian and showed no signs of improvement. The animal had the history of regular deworming and an intensive system of management. On physical examination, the animal was dull and dehydrated, with body temperature 38.7°C, and congested conjunctival mucous membrane. Other vital parameters such as respiratory rate and heart rate were found to be within range.

The diarrhoeic sample was collected directly from the rectum of the heifer using sterile cotton swabs and immediately transported to the laboratory for confirmatory diagnosis. Isolation on eosine methylene blue agar and sheep blood agar with Skirrow medium, respectively, confirmed the absence of other bacterial pathogens such as *Escherichia coli* and *Campylobacter jejuni*. The faecal sample was pre-enriched in peptone water, followed by enrichment in Selenite-F broth, and isolation on the xylose-lysine-deoxycholate (XLD) agar at 37°C for 24 h. Isolation revealed characteristic red colonies with black centres indicating non-lactose fermentation with hydrogen sulphide production, which indicated non-typhoidal *Salmonella* (Fig. 1). The characteristic colonies were subjected to Gram's staining and identified the Gram-negative, short rods suggestive of *Salmonella* under microscopic examination (Fig. 2) (Hassan *et al*., 2020). The isolate was subjected to biochemical tests such as triple sugar iron (TSI) reaction, indole, methyl red and Voges-Proskauer (MR-VP) and citrate utilisation (IMViC) tests for biochemical identification of NTS. The TSI reaction revealed alkaline

slant, acidic butt with H_2S production and IMViC (-/+/-/+) was observed suggestive of NTS (Fig. 3). Hence, based on the clinical signs and laboratory findings, the diagnosis was made as NTS associated enterocolitis.

Treatment and Discussion

The case was treated with parenteral administration of sulphamethoxazole with trimethoprim @ 20 mg/kg b.wt., IV, as an antimicrobial for seven days. The supportive therapy included intravenous dextrose normal saline and Ringer's lactate, for rehydration and oral administration of vitamin AD_3E, as an immunostimulant. The case was successfully treated and recovered after seven days of treatment.

The diagnosis was made based on the isolation on selecto-differential medium and biochemical tests as recommended by Markey *et al*. (2013). Culture-based detection is considered the gold standard technique for detecting *Salmonella* spp. because they are highly reliable and are more cost-effective compared to other detection methods (Patel *et al*., 2024). The clinical signs observed in this case were in agreement with those reported by McGuirk and Peek (2003) and Hoelzer *et al*. (2011). Salmonellosis observed in young pure breed cattle in this study was in concordance with that of Sharma and Joshi (2020), who also reported that in India, *Salmonella* was only detected in faeces of diarrhoeic calves aged 16 to 60 days. In contrast, Gutema *et al*. (2019) observed the *Salmonella* occurrence to be higher in faeces of adult cattle. Previouslly, Sharma and Joshi (2020) also reported *salmonella* in diarrhoeic crossbred calves and absence of the pathogen in indigenous and buffalo-calves.

The primary reservoir of NTS is the intestinal tract of domestic animals, and the dairy animals with chronic diarrhoea act as potential carriers shedding *Salmonella* in faeces at a rate of 10^{14} organisms per day being a potential source of infection for other herd animals (Hassan *et al*., 2020; Zizza *et al*., 2024). Further, the shedding of Salmonella might increase in diarrhoeic cases and during stress (House *et al*., 2003). Since in India, the reports on NTS prevalence are

Fig. 1: Pink colonies with black centre of NTS observed on XLD agar medium

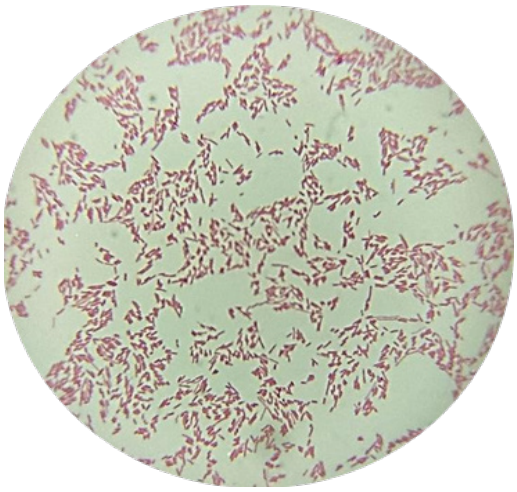

Fig. 2: Microscopic identification of Gram negative rods of NTS by Gram's staining (100x)

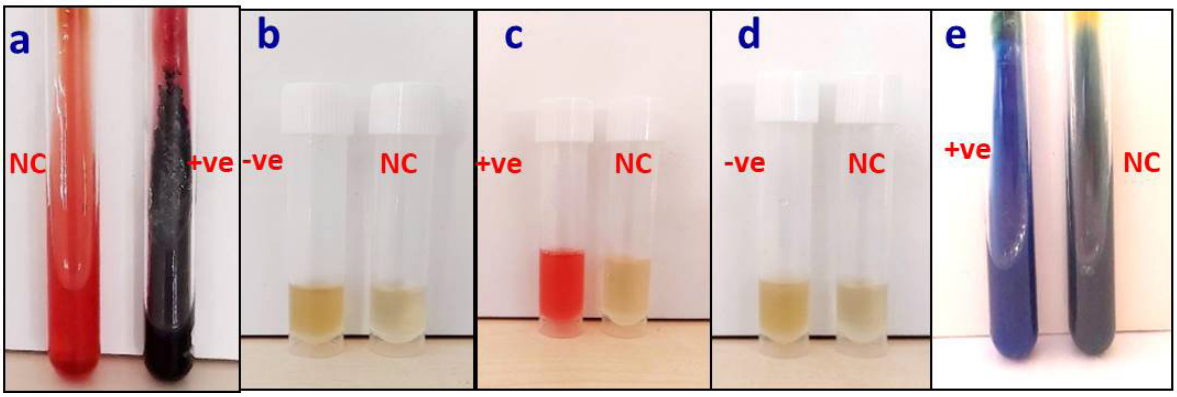

Fig. 3: Positivity for NTS by (a) TSI reaction (b)Indole test (c) M-R test, (d) V-P test and (c) Citrate test

lacking, the lack of surveillance could lead to the chances of higher level of contamination and transmission among the cattle population (Kumar *et al*., 2022). Hence, under one-health stewardship, an active surveillance covering a wide geographical region is essential to identify the actual prevalence of NTS in bovines and determine it's zoonotic potential in the transmission of food-borne illness to humans.

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