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Occurrence of *Salmonella enterica*, subspecies *enterica* serovar Berta (*Salmonella* Berta) in bovine calves, in Himachal Pradesh, India

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ABSTRACT

Salmonellosis is an important zoonotic disease of economic significance. It infects both man and animals alike around the globe. *Salmonella enterica*, subspecies *enterica* serovar Berta (9,12 : f, g, t : -) was isolated from three out of five blood samples of 3-6-month-old ailing calves. The isolates were sensitive to ciprofloxacin, enrofloxacin, ofloxacin and moderately sensitive to gentamicin, lomefloxacin, oxytetracyclines, tetracyclines, but refractory to ampicillin and penicillin. Treatment with enrofloxacin resulted in cent per cent recovery. The infection might have been picked up by calves from poultry birds reared in the same premises.

Key words: enrofloxacin, Jersey cross-bred calves, *Salmonella* Berta

Introduction

Salmonellae are considered to be potential pathogens having economic significance the world over. The frequency of isolation of salmonella serovars from different clinical sources varies from time to time and from place to place. New salmonella serovars are

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added to the list every year throughout the world. Approximately 2.500 serovars have been recognized to date (POPOFF, 2001).

Salmonella enterica subspecies *enterica* serovar Berta (*S. Berta*) was first isolated from pigs in Uruguay in 1936 (HORMAECHE et al., 1938). Of great concern is the ability of many serovars of *S. enterica* to colonize the intestinal tract of birds without showing any overt symptoms of disease (BROWN et al., 1992). *S. Berta* has been isolated from poultry, humans, cattle, pigs and slurry. Indeed, most reports on this serovar have originated from its isolation from poultry broiler flocks in the United States (COX et al., 1990); Australia (ANON., 1990); Canada (POPPE et al., 1991) and Denmark (SORENSEN et al., 1991). However, MORENO et al. (1995) isolated this organism from cold blooded animals in Spain. Community outbreaks of *S. Berta* associated with ingestion of contaminated meat and meat and milk products in humans with diarrhoeal illness have been reported from England and Wales (THRELFALL et al., 1992) and Canada (ELLIS et al., 1998).

The present investigation reports the isolation of *S. Berta* from blood samples of pyretic calves reared in an organized dairy farm in Kangra District of Himachal Pradesh, India.

Materials and methods

Anamnesis revealed that there have been infrequent, sudden deaths among Jersey cross-bred calves aged between three and six months, of either sex, for over one month. In May, 1999 seven out of 18 calves developed pyrexia with associated symptoms. Blood samples taken from the jugular vein of five calves were collected randomly at the height of fever for microbiological investigations, while observing all aseptic precautions.

These samples were streaked on 10 per cent sheep blood agar, McConkey's agar and brilliant green agar. After inoculation these plates were incubated aerobically and micro-aerophillically at 37 °C and examined daily. The isolates were identified on the basis of cultural, morphological and biochemical characteristics (BOVRE, 1984; CARTER and CHENGAPPA, 1990). All the isolates were finally serotyped at the National Salmonella and Escherichia Center, Central Research Institute, Kasauli, Himachal Pradesh, India. Serotyping was reconfirmed from the Division of Bacteriology and Mycology, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India. The isolates were tested for their antibiotic sensitivity pattern using standard disc diffusion method, employing Mueller and Hinton agar.

Results

Seven (38.88%) out of 18 calves developed signs of respiratory distress, pyrexia (104 -106 °F) and acute tympany, but no diarrhoea. Sternal recumbency was one of the predominant signs in all the ailing calves. These calves did not respond to conventional

treatment for tympany. Similar symptoms were also noticed in calves that had died during the previous month.

Three out of five blood samples yielded small Gram-motile rods in pure culture. The growth on solid media was rounded, smooth, whitish or colourless colonies. Cultural, morphological and biochemical characteristics were typical of genus *Salmonella*. Serologically, all three isolates were confirmed as *S. Berta* (9,12 : f, g, t : -) by both the typing institutes. All the three isolates revealed a similar antibiotic susceptibility profile. The isolates were highly sensitive to ciprofloxacin, enrofloxacin, ofloxacin, and moderately sensitive to gentamicin, lomefloxacin, oxytetracyclines, and tetracyclines, but refractory to ampicillin and penicillin.

Discussion

Salmonella enterica subspecies *enterica* serovar Berta is mainly associated with poultry (SORENSEN et al., 1991) but has been reported in relation to large outbreaks of Salmonellosis among humans, presumably due to consumption of contaminated poultry products (OLSEN et al., 1992; THREFFALL et al., 1992). Scanning of available literature has not incriminated this organism as a causative agent of disease/outbreaks in animals with definite signs, except in humans. Although Salmonellosis has been studied almost thoroughly many details of its pathogenesis are lacking and many researchers all over the world are engaged in solving this mystery. WRAY (1995) has rightly opined that Salmonellosis is "a hundred years old and still going strong." In humans the main clinical manifestation is diarrhoea after the consumption of contaminated meat and meat and milk products. Diarrhoea was not observed at all in the calves in this study. It appears that in the present sporadic outbreak the organism has assumed an invasive role. These observations are in agreement with those of OLSEN et al. (1996). They have also opined that *S. Berta* could be invasive in poultry.

In India, isolation of *S. Berta* has been reported from human blood and four variable sources by SAXENA et al. (1983) and subsequently as a source of contamination of pork and pork products (KALIMUDDIN and CHOUDHARY, 1999). The reasons for the current sporadic outbreaks among calves are unknown but may be related either to the fact that infection might have been picked up from adjacent carrier broiler unit, or asymptomatic human attendants.

OLSEN et al. (1992) studied 175 strains of *S. Berta* for antibiotic resistance and found only six per cent strains resistant to one or more anti-microbial agent, such as ampicillin, carbenicillin, tetracyclines and trimethoprim. The antibiotic resistance pattern in the present study is almost in agreement with that of OLSEN et al. (1992) as isolates were found to be resistant to only two antibiotics, i.e. ampicillin and penicillin.

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The treatment of calves with enrofloxacin in standard doses and a schedule coupled with segregation of sick calves resulted in uneventful full recovery of all five calves. This indicates a positive correlation between the *in vivo* and *in vitro* antibiotic susceptibility pattern. This study acts as a pointer for further detailed investigation into the role of *S. Berta* as a causative agent of systemic infection in animals and birds.

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SAŽETAK

Salmoneloza je važna zoonoza od velikog gospodarskoga značenja. Javlja se u ljudi i životinja diljem svijeta. *Salmonella enterica* subspecies *enterica* serovar Berta (9,12 : f,g,t : -) izdvojena je iz tri od pet uzoraka krvi slabunjava teladi u dobi od 3 do 6 mjeseci. Izolati su bili osjetljivi na ciprofloksacin, enrofloksacin, ofloksacin, a umjereno osjetljivi na gentamicin, lomefloksacin, oksitetraciklin, tetraciklin te neosjetljivi na ampicilin i penicilin. Davanje enrofloksacina dovelo je do izliječenja. Telad se vjerojatno zarazila od peradi držane u istim nastambama.

Ključne riječi: enrofloksacin, telad pasmine Jersey, *Salmonella* Berta
