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*Short Communication*

# Prevalence of *Campylobacter* species in apparently healthy goats in Sokoto state (Northwestern) Nigeria

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**A total of 1312 rectal swabs (feacal) samples were collected from apparently healthy goats across Sokoto state and processed for *Campylobacter* organisms. 264 (20.1%) of the samples were positive and yielded 272 *Campylobacter* species. *Campylobacter* species isolated in this study were *Campylobacter jejuni* 169(62.1%), *Campylobacter coli* 58(21.3%), *Campylobacter lari* 24(8.8%), *Campylobacter upsaliensis* 13(4.8%) and *Campylobacter sputorum* 8(3.0%). Biotyping of the isolates indicated that *C. jejuni* biotype I (52.6%) and *C. coli* biotype II (82.8%) were the most common biotypes while all the *C. lari* isolates were biotype I. The isolation of C*ampylobacte*r organisms and the identification of *C. jejuni* biotype I and *C. coli* biotype II from goats in this study is a clear indication of the presence of *Campylobacter* in goats in Sokoto state. *Campylobacter* organisms must be considered as potential agent of enteritis and abortion in goats as well as a serious public health problem.**

**Key words:** Biotypes, *Campylobacter*, *Campylobacter jejuni, Campylobacter coli,* Nigeria, prevalence, goats.

## INTRODUCTION

In Nigeria, small ruminants (sheep and goats) constitute about 35% of the total meat supply (FAO, 1995). Sheep and goats have played very important role in offsetting the protein deficiencies which are fairly rampant in the country. There are about 24,500,000 goats in Nigeria (FAO, 1995) . There is a growing appreciation of the importance of goats in small-scale integrated farming system in developing countries (Devendra and Mcleroy, 1992). The small ruminants provide a subsidiary source of income and a safeguard against crop failures. Because of the growing human population and concomitant pressure on traditional grazing lands, small ruminant production in urban and semi-urban areas is on the increase. The Sokoto red goats are the predominant breed of goats in the north-western part of Nigeria. The goats are often kept with cattle, sheep and poultry with very poor veterinary inputs and hygiene. The husbandry systems under which goats are reared in Sokoto, Nigeria bring them in close contact with humans and other animals including dogs and cats.

*Campylobacter jejuni* have been reported among healthy and diseased farm animals (Olubunmi and Adeniran, 1986; Jiwa et al., 1994; Raji et al., 2000). The natural habitat of most *Campylobacter* spp. is the intestine of birds and other warm-blooded animals, including seagulls and several other wild birds (Kapperud and Rosef, 1983). The role of *Campylobacter* as a cause of enteric disease in man was not fully recognized until the development of isolation methods and selective media during 1970 (Penner, 1988). Campylobacteriosis is primarily a food-borne disease, because of its low infective dose, it has been estimated that 500 cells of *C. jejuni* can cause human illness (Black et al., 1988). It therefore, implies that even small number of *Campylobacter* cell in water or food due to faecal contamination may be a potential health hazards. The risk factors associated with the infection include occupational exposure to farm animals, consumption of raw milk or milk products and unhygienic food preparation practices (Alterkruse et al., 1999). It has been suggested that difficulty in *Campylobacter* detection is responsible for deficiency in the accu-

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rate information concerning *Campylobacter* infection in developing countries (Baserisalehi et al., 2006), but *Camylobacter* is hyperendemic in developing countries. The objective of the study was to establish the presence and determine the prevalence of *Campylobacter* spp. in goats in Sokoto state.

## MATERIALS AND METHODS

A total of 1312 faecal samples were collected from apparently healthy goats in Sokoto state (Northwestern Nigeria) over a period of 2 years (October 2006 to February, 2009) . The samples were collected from each animal via the rectum with a sterile swab sticks and were transferred to the laboratory within 2 h of collection. The samples were inoculated directly on blood free charcoal selective agar (mCCDA, Oxoid, CM739) supplemented with CCDA selective supplement (Oxoid, SR155E) and incubated at 42$^{O}$C for 48 h under micro-aerophilic condition by the use of CampyGen (oxoid, CN 35A). From each of the positive agar plates, 2 - 3 typical *Campylobacter* colonies were subcultured and tested for Gram-staining, motility, production of oxidase and catalase. The isolates were stored in bisulphate pyruvate (RBP) with 15% (V/V) glycerol at -20$^{O}$C prior to biochemical characterization and biotyping. The biochemical characterization was carried out using standard *Campylobacter* phenotypic identification tests recommended by Atabay and Corry (1997). Biotyping of the *Campylobacter* isolates was carried out using the Lior scheme (1984). The scheme requires hippurate hydrolysis, rapid production of $H_2S$ and Deoxyribonuclease enzyme production (DNase) tests.

**Table 1.** Percentage distribution of the different strains of *Campylobacter* from the positive samples.

| Species | Percentage |
|---|---|
| *C. jejuni* | 169 (62.1%) |
| *C. coli* | 58 (21.3%) |
| *C. lari* | 24 (08.8%) |
| *C. upsaliensis* | 13 (04.8%) |
| *C. sputorum* | 8 (03.0%) |
| Total | 272 (100%) |

**Table 2.** Distribution of the different *Campylobacter* biotypes from the isolates.

| *Campylobacter* spp | Biotypes | Distribution (%) |
|---|---|---|
| *C. jejuni* | I | 89(52.6) |
| | II | 00(00.0) |
| | III | 65(38.5) |
| | IV | 15(8.9) |
| *C. coli* | I | 10(17.2) |
| | II | 48(82.8) |
| *C. lari* | I | 24(100) |
| | II | 00(00.0) |

## RESULTS

Of all the 1312 faecal samples collected and analyzed for *Campylobacter* spp., 264 samples were positive for *Campylobacter* spp. It is apparent that 20% of the goats harboured *Campylobacter* spp. The *Campylobacter* spp isolated from the positive samples were *C. jejuni*, *C. coli*, *C. lari, C. upsaliensis* and *C. sputorum.* A total of 272 species of *Campylobacter* were isolated and identified as follows: *C. jejuni* 169 (62.1%), *C. coli* 58 (21.3%) and *C. lari* 24 (8.8%). Others are *C. upsaliensis* 13 (4.8%) and *C. sputorum* 8 (3.0%) (Table 1).

The biotyping of the *Campylobacter* ( *C. jejuni, C. coli* and *C. lari*) shows that *C. jejuni* biotype I 89 (52.6%), *C. coli* biotype II 48 (82.8%) and *C. lari* biotype I 24 (100%) were the most predominant biotypes of the isolates. Other biotypes identified in this study were *C. jejuni,* biotypes III and IV and *C. coli* biotype I 10 (17.2%) (Table 2).

## DISCUSSION

The study demonstrated the significance of goats as reservoirs in the dissemination of *Campylobacter* species. The isolation of more than one *Campylobacter* species suggest that goats can harbour a variety of *Campylobacter* species. The prevalence of *Campylobacter* spp. in goats from this study was 20%. This is however, relatively low when compared with the isolation rates in other domestic animals and livestock as reported in literatures (Stanley and Jones, 2003; Sato et al., 2004; Workman et al., 2005; Verma et al., 2005; Baserisalehi et al., 2007; Uaboi-Egbenni et al., 2008)

The frequently isolated *Campylobacter* species from goats in this study was *C. jejuni* with isolation rate of 62.1%. The higher rate of isolation of *C. jejuni* from goats is of serious public health concern, as environmental sources such as water can be contaminated with goats' faeces and the organisms can easily be transmitted to humans and animals via these environmental sources. The lower isolation rate of *C. upsaliensis* and *C. sputorum* and non-isolation of other non-thermophilic *Campylobacter* may be due to the incubation temperature of 42$^{O}$C which enhances the growth of thermophilic *Campylobacter* species. The use of microaerobic generating packs (CampyGen, Oxoid, N35A) may have further suppressed the growth of non-thermophilic *Campylobacter* species (Workman et al., 2005). *C. jejuni* is the main causative agent of food-borne gastroenteritis in humans and also causes a variety of diseases, such as enteritis, abortion, septicaemia and mastitis in animals (Aydin et al., 2001).

The most predominant biotype of *C. jejuni* in this study was biotype I; however, *C. jejuni* biotypes III and IV were also identified. This implies that goats can harbour diverse strains of *C. jejuni. C. jejuni* biotype I have been isolated from human and animal (Lior, 1984). This indicates that goats can be regarded as a potential reservoir for human and animal campylobacteriosis. *Campylobacter*

*coli* biotype II was the most common *C. coli* biotype isolated from goats in this study, while all the *C. lari* isolates were biotype II. *Campylobacter coli* and *C. lari* biotypes have been reported in other species of domestic animals and livestock such as cattle, sheep, camel, pigs, poultry and even dogs and cats (Raji et al., 2000; Hutchison et al., 2004; Workman et al., 2005; Baserisalehi et al., 2007; Uaboi-Egbenni et al., 2008). The implication of these findings is that *C. jejuni* biotype I is the common cause of the disease in humans, hence their isolation from goats is of serious public health concern. The finding from this study has clearly shown that goats in Sokoto state harbour *Campylobacter* species.

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