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## Emergence of *Campylobacter* spp. in grasscutter (*Thryonomys swinderianus*, Temminck, 1827)

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## PEER REVIEW

## ABSTRACT

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**Comments**

This is an interesting research in which authors have isolated *C. coli* in grasscutter's poultry. As the rodents are bred in captivity and in healthy conditions, this revealed that animal feed can also be implied in *Campylobacter* spp. transmission. Thus, a health risk due to consumption of grasscutter meat could really exist.

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**Objective:** To investigate the presence of *Campylobacter* spp. in feces of grasscutter farming in Côte d'Ivoire and then to see the possibility for grasscutter meat consumption to constitute a risk for people.

**Methods:** Standard methods of microbiology were used for the isolation of *Campylobacter* spp. The identification of the bacteria was performed by biochemical and molecular tests.

**Results:** A total of 138 feces samples were collected from 52 paddocks on an experimental farm and a family farm in Abidjan. Of the 138 samples analyzed, three from the experimental farm were positive for *Campylobacter* with a prevalence of 2.18%. All the strains isolated was identified as *Campylobacter coli*.

**Conclusions:** The presence of *Campylobacter coli*, a pathogenic bacterium, in cane rats whose meat is highly valued by Ivorians could pose a risk to consumer's health.

## KEYWORDS

Campylobacteria, Emergence, Risk, Public health

### 1. Introduction

In Côte d'Ivoire (Ivory Coast) as in most countries of West Africa, the grasscutter (*Thryonomys swinderianus*) game is one of the most consumed bushmeat<sup>[1]</sup>. Demand before the year 2000 was estimated at 80 million heads of grasscutter, 300 000 tonnes of meat consumed annually<sup>[1,2]</sup>. Various activities are undertaken in Côte d'Ivoire and in many countries in Africa to promote the breeding of grasscutter<sup>[3–5]</sup>. However, very few studies, taking account both the health risk associated with consumption of meat from grasscutter and diseases as the cause of death rodents

bred in captivity, were performed<sup>[5,6]</sup>. Among the etiologic agents can be incriminated, *Campylobacter* spp. are one of the leading causes of foodborne illness caused by bacteria in the world<sup>[7,8]</sup>. Campylobacteriosis is a zoonosis, the pathogen of which is *Campylobacter* spp., primarily *Campylobacter jejuni* (*C. jejuni*) and *Campylobacter coli* (*C. coli*). It is mainly isolated from poultry. Moreover, various animal species like small rodents have been identified as sources of human contamination<sup>[9–12]</sup>. However, data on large rodents like grasscutter are almost nonexistent in the literature. This fact has motivated this work whose goal was to achieve a surveillance of *Campylobacter* spp. on

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grasscutter farms. Specifically, it came to seek the presence of *Campylobacter* spp. in the droppings of grasscutter.

## 2. Materials and methods

### 2.1. Sample collection

The study was carried out on two farms. The first one was an experimental farm (Mbadon) with 16 enclosures and 22 breeding grasscutter. The second farm (Faya family farm) had 36 enclosures and 145 grasscutters. At the end of the study, 138 fresh feces samples of breeding grasscutter were analyzed, 77 of which were taken from the experimental farm and 61 from the family one. All fresh feces samples of grasscutter were collected in 52 paddocks on these farms.

The fresh droppings were collected in paddocks using sterile plastic spoon. A spoon was used for each paddock and five samples were collected per paddock. These droppings were collected in sterile vials and identified. Each test sample was directly added to 9 mL of Preston broth supplemented with 7% sheep blood lacquered and *Campylobacter* growth supplement (SR 0232E, Oxoid, Basingstoke, Hampshire). The samples were then packaged in an anaerobic jar under microaerophilic atmosphere generated by a packet type CAMPYGen (CN0025A Oxoid, Basingstoke, Hampshire) and then transported to the laboratory.

### 2.2. Isolation and identification of *Campylobacter* strains

To enrich the sample, jar was put directly at 37 °C for 24 h. The isolation of *Campylobacter* was performed on Columbia agar (CM0331B, Oxoid, Basingstoke, Hampshire) supplemented with 5% fresh sheep blood and selective supplement CCDA (*Campylobacter*–Charcoal Deoxycholate agar) (SR0155E, Oxoid, Basingstoke, Hampshire) and then inoculated media were incubated for 2–5 d at 37 °C in microaerophilic conditions. A presumptive colony per culture was inoculated on Columbia agar supplemented with 5% fresh sheep blood and controlled by a Gram stain and no growth aerobically. The species identification was performed using biochemical tests including the demonstration of cytochrome oxydase, catalase, indoxyl acetate esterase and hippuricase.

A confirmation of the biochemical identification was performed using a monoplex PCR with primers asp<sup>[13]</sup>.

## 3. Results

Of the 138 samples, three samples from the experimental farm were positive for *Campylobacter* spp. with a prevalence of 2.17% (3/138) (Table 1). These three positive samples were taken in the same paddock.

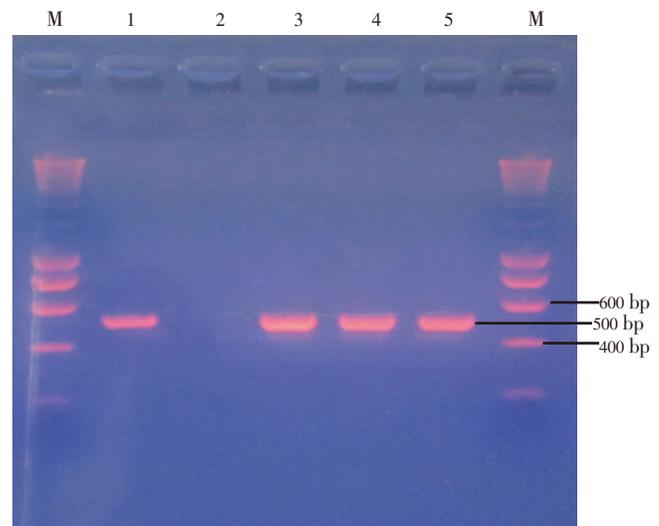
**Table 1**

Different *Campylobacter* species isolated on different farms.

| Identity of the farm               | Mbadon | Faya | Total |
|------------------------------------|--------|------|-------|
| <i>Campylobacter</i> spp. isolated | 3      | 0    | 3     |
| <i>C. coli</i>                     | 3      | 0    | 3     |
| <i>C. jejuni</i>                   | 0      | 0    | 0     |
| <i>C. lari</i>                     | 0      | 0    | 0     |

All *Campylobacter* spp. strains were identified as *C. coli*

by biochemical test. This identification was confirmed by molecular test (Figure 1). Figure 1 shows photograph of agarose gel carried after amplification of the gene asp of *Campylobacter* aspartokinase. Neither *C. jejuni* nor *C. lari* (*Campylobacter lari*) has been detected (Table 1).



**Figure 1.** Agarose gel of PCR products of the 500-bp *asp* gene of *C. coli*.

Lane M: Molecular marker (Smart Ladder); Lane 1: Positive control; Lane 2: Negative control; Lane 3: Sample CA 75; Lane 4: RDD sample 78; Lane 5: CA 157 samples.

## 4. Discussion

Previous studies found *Campylobacter* species (*C. coli* and *C. jejuni*) in some rodents such as rats and mice<sup>[11]</sup>. This study is the first report of *Campylobacter* sp. in grasscutter, a significant protein source for some African populations<sup>[2]</sup>. In rodents, the prevalence of *Campylobacter* sp. varies by countries (3.4% in Trinidad and Tobago, 18% in France and 57.4% in Portugal<sup>[11,14,15]</sup>). In the present study, the prevalence of *Campylobacter* sp. was low (2.17%). All strains were identified as *C. coli*. This low prevalence could be explained by captivity. Indeed, the grasscutters of the study were bred in captivity. In wild animals, many contamination sources are available including soil and droppings of bird or other animals. In breeding grasscutter, enclosures were cemented and cleaned daily. These hygiene conditions could reduce contamination sources. Likely, contamination sources could be water or food. There is no data available to compare this condition. This low prevalence could also be explained by the isolation technique used. We have not added to the medium the Preston selective supplement for its inhibitory action on some strains of *C. coli*. This could promote the growth of saprophytic bacteria and mask *Campylobacter* spp. strains which are weaker competitors. In this study, none strain of *C. jejuni* has been detected contrary to the results of other studies on rodents<sup>[11,12]</sup>.

In conclusion, this study was the first report of *C. coli* circulation in breeding grasscutter. Although the prevalence was low, the detection of *C. coli* could be a topic of concern in foodborne diseases. Further studies are needed to understand the real prevalence of this bacterium in wild and breeding grasscutter in Côte d'Ivoire. In addition, studying the sanitary risks related to grasscutters contaminated by *Campylobacter* sp. strains are also needed.

## Conflict of interest statement

We declare that we have no conflict of interest.

## Acknowledgements

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## Comments

### Background

*Campylobacter* spp., a pathogen bacterium isolated from poultry and feces, can cause foodborne illness in animals. Grasscutter, a rodent largely consumed in West Africa, is nowadays bred in captivity. However, in breeding conditions, a high death level has been noticed. Thus, it will be interesting to establish a relationship between poultry, meat contamination and rodent death.

### Research frontiers

The study has been performed to appreciate *Campylobacter* contamination in grasscutter feces bred in captivity using microbiological and PCR methods. Only *C. coli* has been isolated in the poultry of grasscutter and the prevalence is low.

### Related reports

*C. coli* has been isolated in 2.17% of fresh feces of grasscutter, but this is in contradiction to Nkogwe *et al.* (2011), who have not identified *C. coli*. However, this result is lower than that of small rodents (rats and mice) prevalence revealed by Nkogwe *et al.* (2011), Henzler and Opitz (1992) and Cabrita *et al.* (1992). This may be due to the captivity environment conditions (paddock cemented and cleaned) and the microbiological method which was not selective.

### Innovations and breakthroughs

Grasscutter (*Thryonomys swinderianus*) meat is appreciated by Ivorian. To promote this activity, people initiated their livestock farming. In this known conditions of captivity, it is useful to research pathogen germ such as *Campylobacter* spp. responsible for foodborne illness. In fact, both grasscutter and human can be contaminated. This work was one of the first reports in this field.

### Applications

*C. coli* has been isolated from rats and mice in variables frequencies (from 3.4% to 57.4%), but any study has been already done for grasscutter. In this study, the authors revealed that only 2.17% of poultry samples were contaminated by this germ. This shows that contamination level is low in captivity.

### Peer review

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that animal feed can also be implied in *Campylobacter* spp. transmission. Thus, a health risk due to consumption of grasscutter meat could really exist.

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