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Universidad Austral de Chile
Valdivia, Chile

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Frequency and antimicrobial behaviour of thermophilic *Campylobacter* species isolated from Ecuadorian backyard chickens

Frecuencia y comportamiento frente a antimicrobianos de especies termófilas de *Campylobacter* aisladas de pollos de traspatio en Ecuador

S Ochoa\(^a\), R J Simaluiza\(^a\), Z Toledo\(^a\), H Fernández\(^b\)*

**ABSTRACT.** The prevalence and antimicrobial behaviour of *Campylobacter jejuni/coli* isolated from backyard chickens from Southern Ecuador were determined. This study revealed that *Campylobacter* sp. frequency was 41.7% with high resistance to tetracycline (94.0%) and ciprofloxacin (88%). *C. jejuni* was the most frequently isolated species (32.5%), followed by *C. coli* (9.2%) being poultry colonization by *Campylobacter* not region dependent. This is the first study on *Campylobacter* antimicrobial resistance in backyard chickens in Southern Ecuador.

*Key words: Campylobacter, backyard chickens, antimicrobial resistance, Ecuador.*

**INTRODUCTION**

*Campylobacter* species, particularly *C. jejuni* and *C. coli*, are the most frequent bacterial etiology of human gastroenteritis associated with foodborne diseases worldwide (Humphrey *et al* 2007, Whiley *et al* 2013, WHO 2013).

Acquisition of *Campylobacter* infections occurs through consumption of contaminated food, mainly of poultry origin, water and unpasteurized milk as well as through direct contact with animals and fowls or their faeces (Humphrey *et al* 2007, Fernández 2011, Whiley *et al* 2013, WHO 2013).

In South American and other developing countries, *Campylobacter* infections occur most frequently in children (Fernández 2011). Few data exist regarding the frequency of *Campylobacter* species in children with diarrhoea in Ecuador where these bacteria have been isolated between 10 and 23% (Guderian *et al* 1987, Vasco *et al* 2014).

In high income countries, 58 to 76% of human cases of campylobacteriosis could be attributed to poultry sources (Mullner *et al* 2009, Batz *et al* 2011). However, in developing countries, probably due to epidemiological data gaps, the possible risk pathways for *Campylobacter* infection via poultry sources are unknown or not well outlined and understood.

Small backyard poultry flocks are popular in Southern Ecuador (Vilcabamba, Loja and Zamora cities) as an economical subsistence way and also as protein source; however there is no epidemiological information about *Campylobacter* in this kind of fowl in this region. For these reasons, the aim of this study was to determine the prevalence and the antimicrobial behaviour of thermophilic *Campylobacter* species isolated from domestic backyard chickens in Southern Ecuador.

**MATERIAL AND METHODS**

Cloacal swabs were randomly collected from a total of 120 chickens, corresponding 41 to birds from Vilcabamba (4 to 12 birds from 6 backyards), 32 from Loja (5 to 11 birds from 5 backyards) and 47 from Zamora regions (all the birds from the same backyard). The birds were maintained in inadequate environmental cleanliness conditions and in contact with other animal species known as reservoirs for *Campylobacter* like pigs, dogs, cats, sparrows and other free living birds. The cloacal samples collected were seeded into the semisolid TEM transport-enrichment medium described by Fernández (1992) consisting of (formule/L) Brucella broth 28 g, agar 1.5 g, sodium metabisulphite 0.5 g, ferrous sulphate 0.5 g, sodium pyruvate 0.5 g, trimethoprim 10 mg, rifampicin 15 mg, colistin 10,000 IU, amphotericine 10 mg and defibrinated horse blood 30 mL, and transported to the laboratory. Following an enrichment period of 24
Prevalencia de especies de Campylobacter en pollos de traspatio de tres localidades del sur de Ecuador.

<table>
<thead>
<tr>
<th>Location of Origin</th>
<th>Number of samples</th>
<th>Campylobacter positive N%</th>
<th>C. jejuni N%</th>
<th>C. coli N%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vilcabamba</td>
<td>41</td>
<td>17/41* 41.5</td>
<td>13/17 76.5</td>
<td>4/17 23.5</td>
</tr>
<tr>
<td>Loja</td>
<td>32</td>
<td>12/32* 37.5</td>
<td>10/12 83.3</td>
<td>2/12 16.7</td>
</tr>
<tr>
<td>Zamora</td>
<td>47</td>
<td>21/47* 44.7</td>
<td>16/21 76.2</td>
<td>5/21 23.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>120</td>
<td>50/120 41.7</td>
<td>39/50 78.0</td>
<td>11/50 22.0</td>
</tr>
</tbody>
</table>

*P > 0.005.
Campylobacter infection (Anderson et al. 2012, Whitehead and Roberts 2014, El-Tras et al. 2015), on which there are not sufficient epidemiological studies and ii) there is a lack of good biosecurity and good management practices applicable to reduce the risk of infection and antimicrobial resistance levels in backyard chickens (Whitehead and Roberts 2014, El-Tras et al. 2015).

All the strains were susceptible to gentamycin, erythromycin and amoxicillin-clavulanic acid but 24.0% were resistant to ampicillin. Resistance to ampicillin and other beta-lactam antibiotics has been found in Campylobacter strains isolated from humans, poultry and poultry products. Since the ampicillin resistant strains were amoxicillin/clavulanic acid susceptible, we can infer that the resistance to ampicillin could be mediated by the production of a beta lactamase (Simaluiza et al. 2015).

Multi-resistance was found in 24% of the strains being most frequent amongst C. coli than in C. jejuni strains. It is known that C. coli are usually more resistant than C. jejuni strains. This was also found in C. coli isolated from chicken livers in Southern Ecuador (Simaluiza et al. 2015).

According to the results, antimicrobial resistance to tetracycline and ciprofloxacin in Campylobacter strains is a serious epidemiological problem in Southern Ecuador, whereas ampicillin resistance may be an emerging problem which could require the establishment of a laboratory surveillance program to assess its real significance. On the other hand, good biosecurity and management practices are needed to be applied to prevent the transmission of Campylobacter from poultry to children and to control antimicrobial resistance spread. Among good biosecurity and management practices are: the use of clean water, avoiding cross contamination through contact with other animals in the same farmyard as well as the implementation of basic sanitation measures in order to obtain better environmental cleanliness.

As far as we know, this is the first attempt to put in evidence the occurrence of Campylobacter species in backyard chickens in Southern Ecuador, as well their antimicrobial susceptibility and resistance profiles.

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