ANTIBIOTIC RESISTANCE OF ZOONOTIC BACTERIA ISOLATED FROM FRENCH HEALTHY CATTLE AT SLAUGHTER

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Introduction
Survey of antibiotic resistance of bacteria collected in healthy animals is useful to evaluate the prevalence of resistant bacteria in normal flora and the evolution of this resistance over years. It could also be a tool to appreciate veterinary use of antibiotics and risk factors spread for public health. French surveillance programmes of resistance in commensal bacteria (Escherichia coli and Enterococcus) and zoonotic bacteria (Salmonella and Campylobacter) have been carried out in poultry and swine since 1999 [1]. In 2002, this surveillance programme of resistance was set up in cattle.

Materials and Methods
This survey was performed in three main types of French bovine production : calves, steers and culling cows. Isolation of zoonotic bacteria was performed on 600 faecal samples collected each year in 2002 and 2003 in nine French slaughterhouses representative of the bovine production. All isolated strains were identified : Salmonella were serotyped according to the Kauffmann-White scheme. Thermotolerant Campylobacter were isolated and characterization of Campylobacter jejuni and coli was realized by PCR. Antimicrobial susceptibility testing for Salmonella was carried out by disk diffusion method according to the guidelines of the Antiibiogram Committee of the French Society of Microbiology [2]. The following antibiotics were tested : AMX, AMC, CAZ, CF, FOX, CFM, S, K, Apra, GM, TET, C, TMP, SXT, NAL, OA, ENR. Campylobacter isolates were screened for resistance to AM, GM, ERY, ENR, TET, NAL by the dilution method according to NCCLS guidelines. Detection of resistance genes in Salmonella was performed by PCR.

Results
The prevalences of Salmonella isolated in 2002 and 2003 were quite similar (6/600 (1%) in 2002 and 9/600 (1.5%) in 2003). In 2002, all of the Salmonella were susceptible to the antimicrobials tested. In 2003, most Salmonella were susceptible excepting two Salmonella Typhimurium with the following multidrug resistance profiles : AMX/AMC/S/TET/C and AMX/AMC/Apra/GM/TET/C/SXT/TMP. Both Salmonella Typhimurium showed a decreased susceptibility to cefalotin. PCRs performed on these two strains assessed the presence of the multidrug resistance region (MDR) and Salmonella genomic island 1 (SGI1) described in multidrug resistant Salmonella Typhimurium DT 104 [3]. Moreover, additional resistances to gentamicin and trimethoprim were observed in one of the two strains harboring SGI1. Characterization of genes conferring this resistance is in progress to assess localization of these genes on MDR.

Campylobacter was isolated in 60/600 (10%) and 130/600 (21.6%) of faecal samples in 2002 and 2003 respectively. C. jejuni was the predominant species (49/60 in 2002 and 100/130 in 2003). This species was mostly isolated from calves (37/60 (75%) and 68/100 (68%) in 2002 and 2003 whereas the frequency of this species was lower in culling cows (5/49 (10%) and 17/100 (17%)), and in steers (7/49 (14.3%) and 15/100 (15%)).

Campylobacter coli was mainly isolated from calves (10/60 in 2002 and 30/130 in 2003). The percentages of Campylobacter resistant strains are shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
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<tbody>
<tr>
<td></td>
<td>C. jejuni, (n=48)</td>
<td>C. coli, (n=10)</td>
</tr>
<tr>
<td>AM</td>
<td>20 0</td>
<td>12 16.6</td>
</tr>
<tr>
<td>GM</td>
<td>0 10</td>
<td>0 3.3</td>
</tr>
<tr>
<td>ERY</td>
<td>16 10</td>
<td>4.7 36.6</td>
</tr>
<tr>
<td>TET</td>
<td>56 80</td>
<td>49.4 96.6</td>
</tr>
<tr>
<td>NAL</td>
<td>35 20</td>
<td>28.2 43.3</td>
</tr>
<tr>
<td>ENR</td>
<td>23 30</td>
<td>27 43.3</td>
</tr>
</tbody>
</table>

Distribution of MICs showed that most of C. jejuni strains were sensitive or intermediately sensitive to ampicillin, erythromycin and enrofloxacin.

Discussion
The prevalence of Salmonella isolated from healthy animals in 2002 and 2003 was very low. However, isolation of multidrug resistant S. Typhimurium harboring SGI1 is particularly interesting. Indeed, SGI1 and variants were described in other Salmonella serovars [4, 5] suggesting an horizontal transfer of this element and its contribution to the rapid dissemination of multidrug-resistant strains of Salmonella serotypes. A decrease in the percentage of resistance to erythromycin and ampicillin was observed for C. jejuni. However, distribution of MICs showed that most strains were sensitive or intermediately sensitive to these antibiotics. Surveillance of resistance of Campylobacter is important to monitor over time to appreciate evolution of resistance. Moreover, use of antimicrobials in cattle should be analysed to evaluate the influence on resistant Campylobacter.

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References