Transmission of Escherichia coli O157: H7 to cattle by house flies

Barhan Mustapha Muhamed

Department of Biology, College of Education, University of Tikrit, Tikrit, Iraq

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Abstract

The aims of this study were to determine the prevalence of and characterize E. coli O157: H7 associated with houseflies, Musca domestica, collected from different sites on a cattle farm over a 5-month period and processed individually for E. coli O157: H7 isolation and quantification. E. coli T O157 counts ranged from $5 \times 10^6$ to $3 \times 10^7$ CFU among positive houseflies. Microbial resistance of five different antimicrobial agents revealed that all the E. coli O157: H7 isolates from all isolates were resistant to one or more of antimicrobial agents.

تكال بكتيريا أيشريتشيا قولون الأبقار بواسطة ثيابا المنزل

أبراهيم مصطفى محمود

المستخلص

استهدف الدراسة الإقليمية التعرف على ظهور وسمائة E. coli O157: H7 المسمنية لثيابا المنزلية Musca domestica. تم جمع الثياب المنزلية من مواقع مختلفة لطول الفترة على مدى خمسة أشهر ومعاملتها كـ E. coli O157: H7. وتميزت النتائج، تراوح تعداد E. coli O157: H7 $5 \times 10^6$ من موقع E. coli O157: H7 في الثياب المنزلية. تم تجربة الجرعة المبتكرة ومضادات ميكروبية متعددة مع عزلات E. coli O157: H7 وتأكدت أن جميع السلالات الميكروبيية مقاومة لميكروبية متعددة.
Introduction

Enterohemorrhagic Escherichia coli (EHEC) has emerged in recent years as the predominant cause of hemorrhagic colitis in humans. This illness, with characteristic symptoms of bloody diarrhea and abdominal cramps, can progress into a more severe, life-threatening complication known as hemolytic uremic syndrome (HUS). The pathogenicity of EHEC appears to be associated with a number of virulence factors, including the production of several cytotoxins. These toxins are collectively referred to as Shiga-like toxins (SLTs) because the SLT-1 and SLT-2 toxins closely resemble the Shiga toxin of Shigella dysenteriae type 1. Although more than 60 E. coli serotypes produce SLT toxins and more are being identified as capable of producing SLT-2, serotype O157:H7 is the predominant pathogen in the EHEC group and the one most associated with frequently with human infections worldwide. The broadly (Mississippi Delta) and S. and Enterohemorrhagic E. coli in general, are considered to be the most common causes of nearly all cases of patients such as patients.

Materials and Methods

Stool samples (Ogpara, Moulali) were collected by at least four different sites on cattle feedlot in College of Agriculture, Tikrit University from January to the end of May 2006. Fifty (50) samples were randomly selected and purified for E. coli O157, isolation and quantification. Individual batches were homogenized in lids of phosphate buffer saline (pH 7.2) and serially diluted. Dilutions were plated by a direct drop plate plate technique into sorbitol Mac Conkey agar with colistin (25 μg/ml). Plates were incubated overnight at 37°C and lactose-hemagglutination colonies with morphology characteristic of E. coli O157 were tested for O157 antigen by the latex agglutination assay. Colonies positive for the O157 serogroup were counted, and one pure colony, microbiological resistance for Ampicillin (10 μg/ml), Erythromycin (30 μg/ml), Tetracyclins (50 μg/ml), and biochemical tests for E. coli O157: H7 were confirmed according to Scott et al. (11) and Crittace (12).

Results

A total of 78 samples of E. coli were isolated from the majority of patients, from different sites on cattle feedlot in College of Agriculture, Tikrit University from January to the end of May 2006. Data revealed showing the period of the study that there was a significant (p=0.05) difference in the usage in the
percentage of E. coli O157: H7 between the differing results of study. The total mean microbiological counts demonstrate that the total number of O157 is equal to $3.76 \times 10^7$ CFU/g of hens (Table 1). Microbial resistance of five different antimicrobial agents (A, T, S, C, C) revealed that all the E. coli O157: H7 isolates from all isolates were resistant to one or more of antimicrobial agents (Table 2). Results showed that 22 (33%) of positives were resistant to ampicillin and tetracycline while 16 (53.8%) were resistant for two antibiotics and only 9 (13.9%) were resistant for three antibiotics.

Table 1: Total number of isolated E. coli O157 from hens at the end of the study

<table>
<thead>
<tr>
<th>Month</th>
<th>Total No. of positives</th>
<th>Percentage of isolates</th>
<th>Mean of microbiological count (CFU/g) O157</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>6 / 12</td>
<td>66</td>
<td>$5 \times 10^7$</td>
</tr>
<tr>
<td>February</td>
<td>7 / 10</td>
<td>70</td>
<td>$8 \times 10^7$</td>
</tr>
<tr>
<td>March</td>
<td>26 / 34</td>
<td>76</td>
<td>$2.5 \times 10^7$</td>
</tr>
<tr>
<td>April</td>
<td>15 / 18</td>
<td>83</td>
<td>$2 \times 10^7$</td>
</tr>
<tr>
<td>May</td>
<td>11 / 12</td>
<td>91</td>
<td>$2.3 \times 10^7$</td>
</tr>
<tr>
<td>Total</td>
<td>67 / 76</td>
<td>88</td>
<td>$3.76 \times 10^7$</td>
</tr>
</tbody>
</table>

Table 2: Antibiotic Resistance pattern for isolated E. coli O157

<table>
<thead>
<tr>
<th>Antibiotic, resistance pattern</th>
<th>No. of resistant isolates</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ampicillin resistance (1)</td>
<td>14</td>
<td>20%</td>
</tr>
<tr>
<td>Tetracycline resistance (2)</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td>Final</td>
<td>22</td>
<td>33%</td>
</tr>
<tr>
<td>Resistance against 3 antibiotics</td>
<td>15</td>
<td>22%</td>
</tr>
<tr>
<td>Resistance against 4 antibiotics</td>
<td>7</td>
<td>10.5%</td>
</tr>
</tbody>
</table>
### Discussion

Escherichia coli O157:H7 is a well-known zoonotic agent of hemorrhagic colitis and hemolytic uremic syndrome in humans. Outbreaks of the food-borne illness caused by E. coli O157:H7 have been reported throughout the world. In this study, and for the reason that livestock, in general are considered to be mechanical vectors of many kinds of pathogens, it was used as indicator of contamination of dairy, because the main reservoir for E. coli O157:H7 is the intestinal tract of healthy cattle. Individual cattle are occasionally colonized and shed E. coli O157:H7 in their feces. The source of E. coli O157:H7, which colonize cattle, are not well understood. Additionally, the high variability in the prevalence of E. coli O157:H7 among cattle suggest, the necessity of a survey of E. coli O157:H7 external to cattle. However, aside from the detection of E. coli O157:H7 in meat-eating animals, including sheep, horses, dogs and wild birds, the ecology of this pathogen has not been extensively studied. Diseases such as hemorrhagic (HUS), that develop in an ingesting organism, are not very common. Antibiotic-resistant bacteria from the source of cattle to which it develops (e.g., manure), its dependence, on other potential contaminate, the feeding mechanism (digestion), its attraction to human-hired, and its ability to fly long distances make this insect a very good candidate for dissemination of antibiotic-resistant strains. This study showed that bovine stools in a cattle feedlot serving facilities carry antibiotic resistant and potentially resistant E. coli O157:H7 that have the capacity for horizontal transfer of antibiotic resistance genes to other bacteria. Mobilizing resistance in clinical isolates has antibiotics that are effective for treatment of human infections. It has been suggested that there is a connection between the antibiotic resistance of food animals, the antibiotic resistance of clinical isolates, and community health.

### References


