Bacteriological Quality of Chevon and Pork in Mathura City

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ABSTRACT

A cross-sectional study of raw meat samples of goats and pigs from the local meat markets of Mathura, India was carried out to investigate bacterial load in ready-to-sale chevon and pork with special emphasis on isolation and identification of Salmonella spp. Samples were collected from 40 goat and 40 pig carcasses from local retail meat shops of Mathura. On carcasses of pigs and goats, the mean of the log_{10} standard plate count was 7.78 cfug^{-1} and 7.03 cfug^{-1}, respectively and that of total coliform count was 4.29 log_{10} cfug^{-1} and 4.15 log_{10} cfug^{-1}, respectively. All the samples were found positive for coliforms, and 1.25% of goat and 10% of pig meat samples were positive for Salmonella. Salmonella Kissi (6, 7: d;1,2) was isolated from chevon. Antibiogram revealed the highest sensitivity towards streptomycin, ciprofloxacin, chloramphenicol, amikacin, ceftriaxone, colistin sulphate, gentamicin and nalidixic acid, followed by cefuroxime and tetracycline and cotrimoxazole. The strains were resistant to ampicillin, neomycin, erythromycin and Bacitracin.

Keywords: Coliforms, goat, meat, pig, Salmonella.

Foodborne infections remain one of the maladies of public health worldwide. Different countries report increase in the incidence of foodborne diseases, but these data may not always represent the actual fact on the ground (WHO, 1996). Different types of organisms are known to cause foodborne infections; the most common bacteria worldwide are camplyobacters, Salmonella, toxigenic/verocytotoxonic E. coli, shigellae, toxigenic Staphylococcus and Clostridium perfringens (Roels et al. 1997; Thuttle et al., 1999; Sofos et al., 1999).

Food production, processing and distribution, differ from country to country depending upon local consumer preference and the influence of other country’s practices on the local consumer’s lifestyle (Abdusalam et al. 1989). Freshly slaughtered animals may harbour few bacteria, but the surface of the meat is, in most cases, exposed to contamination during slaughter, evisceration and other post-slaughter operations (Price and Schweigert, 1971). The present study has been carried out to investigate bacterial load in ready-to-sale goat and pig meat with special reference to Salmonella.

Prior to initiation of study, the vendors were sensitized regarding the purpose of meat sample collection. A total of 80 meat samples (40 goats and 40 pigs) comprising of about 100 g of meat were collected from different parts of carcass aseptically and transported to the laboratory on ice within two hours after collection and kept at 4°C till bacteriological examination. Total aerobic mesophilic bacterial counts were determined using plate count agar. MacConkey agar (Difco) was used for coliforms counts. Agar plates for enumeration of total mesophilic bacteria and coliforms were incubated at 37°C aerobically for 16 - 24 h.
Table 1: Mean and range of standard plate count (SPC) and coliform count of goat meat.

<table>
<thead>
<tr>
<th>Source</th>
<th>Attributes</th>
<th>Standard plate count</th>
<th>Coliform count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kutchery, Mathura.</td>
<td>Mean ± SE N</td>
<td>7.0467 ± 0.41</td>
<td>4.1246 ± 0.05</td>
</tr>
<tr>
<td>Near Bharatpur gate</td>
<td>Mean ± SE N</td>
<td>6.9194 ± 0.48</td>
<td>4.2119 ± 0.01</td>
</tr>
<tr>
<td>Aurangabad</td>
<td>Mean ± SE N</td>
<td>7.0362 ± 0.46</td>
<td>4.1452 ± 0.01</td>
</tr>
<tr>
<td>Dhauli pyau</td>
<td>Mean ± SE N</td>
<td>7.1300 ± 0.45</td>
<td>4.1500 ± 0.01</td>
</tr>
<tr>
<td>Total</td>
<td>Mean ± SE N</td>
<td>7.0331 ± 0.41</td>
<td>4.1579 ± 0.08</td>
</tr>
</tbody>
</table>

Table 2: Mean and range of standard plate count (SPC) and coliform count of pig meat.

<table>
<thead>
<tr>
<th>Source</th>
<th>Attributes</th>
<th>Standard plate count</th>
<th>Coliform count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near railway crossing</td>
<td>Mean ± SE N</td>
<td>7.7724 ± 0.10</td>
<td>4.2991 ± 0.03</td>
</tr>
<tr>
<td>Mathura Sadar</td>
<td>Mean ± SE N</td>
<td>7.7906 ± 0.10</td>
<td>4.2824 ± 0.04</td>
</tr>
<tr>
<td>Total</td>
<td>Mean ± SE N</td>
<td>7.7800 ± 0.10</td>
<td>4.2907 ± 0.03</td>
</tr>
</tbody>
</table>

About 50 ml portions of 1:10 suspension were centrifuged at 10,000 rpm for 30 min in a refrigerated centrifuge (4°C). After decanting the supernatant, a loop-full of the pellet was streaked onto blood agar, MacConkey and Salmonella-Shigella (SS) agar and incubated at 37°C for 18–24 h under aerobic condition. Gram’s staining was done for preliminary identification of the isolates, followed by standard biochemical tests (Cruickshank et al. 1975). Plates with counts between 30–300 colonies were selected for the determination of colony forming unit per gram (cfug⁻¹). Presumptive Salmonella colonies were picked up and characterized biochemically as per methods described by Edwards and Ewing (1972) and got serotyped at National Salmonella Centre (Vet.), IVRI, Izatnagar. Antibiogram of test organism was conducted as per Cruickshank et al. (1975).

Standard plate counts (cfug⁻¹) of 7.7800 ± 0.10 and 7.0331 ± 0.41 were recorded from meat samples of pig and goats, respectively. Pork samples recorded high mean coliform count (4.2907 ± 0.03), while samples of goat meat recorded 4.1579 ± 0.08 log₁₀ cfug⁻¹ (Table 1 and 2). Out of 40 chevon samples, only one was found positive for Salmonella and got confirmed as Salmonella Kisii (6,7:d;1,2). While 4 samples of pork were found positive for Salmonella, but could not be serotyped, but confirmed by biochemical characterization using Salmonella identification kit (HiMedia, Mumbai). Antibiogram of isolates revealed highest sensitivity towards ciprofloxacin, chloramphenicol, amikacin, ceftriaxone, colistin sulphate, gentamicin and nalidixic acid, followed by cefuroxime and tetracycline and cotrimoxazole. The strains were resistant to ampicillin, neomycin, erythromycin and bacitracin.
In Mathura city, goats and pigs are slaughtered in large numbers on daily basis by local butchers under most unhygienic conditions. In the present study, meat samples of pig had the higher standard plate count (SPC) i.e. 7.78 log₁₀ cfug⁻¹ compared to goat meat with 7.03 log₁₀ cfug⁻¹. From these findings, it is clear that mean values recorded for fresh meats were slightly higher than the Indian standards. These results are comparable with the finding of John (1978), Himanshu (2003) and Indu (2004). The high microbial load in chevon and pork could be attributed to the poor hygienic conditions as is prevalent in most of the retail shops and contamination during processing (Tiwari et al., 2002).

The samples also revealed Salmonella, which is not permissible as per BIS standards for meat. The greater risk of food poisoning certainly lies with the type of microorganisms. It might be due to use of contaminated water, unhygienic conditions in and around meat shops, improper bleeding and cross contamination with gut contents. Improper storage facilities could also contribute to heavy contamination (Tiwari et al., 2002). Cross contamination of meat is also a common feature as sellers kept carcasses in close vicinity and used same knives for cutting various carcasses. Based on comparative standard plate counts and coliform counts at 6 different places, it was observed that the counts were higher at the places where slaughtering was done in open environment. Besides public health implications, the higher SPC also influences the economy of meat industry as there is early indicate spoilage. The Salmonella isolates were resistant to many antibiotics, which is of great public health concern. It is obvious that there is rising trend of bacterial resistance to antibiotics due to indiscriminate use of antibiotics either to control disease or as growth promoters in animals.

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References


