EARLY BACTERIAL CONTENT OF COMMON CARP (Cyprinus carpio) AND SBOUR (Tenualosa ilisha) CAUGHT FROM BASRAH

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ABSTRACT

Samples of carp and sbour were examined for bacterial contamination in flesh, skin, gills and intestinal tract. Total bacterial count, psychrotrophic, proteolytic, lipolytic and total coliform bacteria in the flesh of carp were 32x10^3, 56x10^3, 61x10^2, 39x10^2, and 30x10^3 CFU/g respectively in the same order, values for sbour flesh were 11x10^4; 27x10^3; 76x10^2; 65x10^2; and 16x10^3 CFU/g respectively. These values are within the limit recommended by ICMSF (1986). No faecal coliforms were detected in all samples during the study period. Seasonal variations were recorded.

INTRODUCTION

Carp (Cyprinus carpio) and sbour (Tenualosa ilisha) are an important and desirable fishes in Basrah and other parts of Iraq. Although they are caught and consumed in large quantities, local microbiological studies are limited. Bacteria can be found on the slime that covers the outer surface of fish, as well as in gills and intestinal tract and will soon invade the fish flesh after resolution of rigor mortis (Frazier and Westhoff, 1988). Several studies were carried out on different fish (lean and fatty fish) that were spoiled primarily by the action of bacteria (Liston, 1980; Hobbs and Hodgkiss, 1982; Gram et al., 1987; Jorgensen et al., 1988; AL-Sanjary & Alaboudi, 1993; Huss, 1995; Awad, 1998; Majeed, 1999).

+ Part of M. Sc. Thesis
The average values of total bacterial counts on the skin, gills and intestinal tracts of different fish ranged between $10^2$-$10^3$, $10^3$-$10^4$, $10^4$-$10^5$ CFU/g, cm² respectively (Liston et al., 1976; Lima dos santos, 1982; Huang and Leung, 1993). Psychrotrophic bacteria is dominating chilled fish that cause spoilage, they usually show proteolytic and lipolytic activities (Frezier & Westhoff, 1988; Haard, 1992). Gennari & Tomusell (1988) stated that about 50% of chilled fish microflora were proteolytic. Coliform bacteria were $1.1 \times 10^4$ CFU/cm² for carp skin (Arslan, 1993), as well as, in the gills of Rainbow trout (Mustonen, 1992). Faecal coliform is an index of faecal pollution (APHA, 1992) it ranged from $2 \times 10$ to $4 \times 10^3$ bacteria/g of fish in 25% o; the fish samples examined (Iyer et al., 1986).

Thus, this investigation was under taken to assess the early bacterial content of fresh carp and sbour, as the bacterial content of fish is an important feature of quality and affects both the keeping quality and technological characteristics of the fish (Huss, 1995).

**MATERIALS AND METHODS**

Samples of carp and sbour fish were collected from Bab-Sulaiman/Abu-Alkhaseeb/Basrah/ from May 1993 up to May 1994 as soon as they were caught, kept in iced box (about 4°C) and brought to laboratory within 3 hours for analysis.

Ten grams of each fish-flesh, gills and intestinal tract were homogenized with 90 ml of sterile peptone water (0.1%) solution, then serial dilutions were made in the same solution. Skin was examind by swabing (10cm) of carp and sbour according to APHA (1992).

The media used in this study were: Plate Count Agar (oxxoid) for total bacterial count, Nutrient Agar (oxxoid) +1% Skim Milk for proteolytic bacteria, Tributyrin Agar (oxxoid) for lipolytic bacteria, MacConkey Agar (oxxoid) for coliform bacteria, Lauryl Sulphate Broth (Merck) and Lactose Broth (Difco) for faecal coliform bacteria. Microbiological counts were determined using a pour plating technique. Duplicate plates were made and incubated for 2-3 days at 30-32°C. After incubation, colonies had been counted.
Total counts of bacteria were considered as counts of potential spoilage organisms. Psychrotrophic bacterial count were obtained on Plate Count Agar medium incubated for 3 days at 4°C.

Colonies producing clear zones of casein hydrolysis on (Nutrient Agar+1% Skim Milk) were recorded as proteolytic (APHA, 1992). Lipolytic bacteria were determined on Tributyrin Agar, the medium appears opaque but lipolytic colonies were surrounded by zones of clear medium (Bridson, 1998).

Red non mucoid and pink-mucoid colonies developed on MacConkey Agar were recorded as coliform. Faecal coliforms were determined by using most probable number (MPN) Techniques with three tubes for each dilutions (1.0, 0.1, 0.01 gram of the sample) incubated at 37°C in Lauryl Sulphate Broth (Merck). Eijkmans Lactose Broth (Difco) was used for the confirmative test and incubated at 44.5°C from which the faecal coliform were estimated.

RESULTS AND DISCUSSION

Table (1) shows the average values of total bacterial, psychrotrophic, proteolytic, lipolytic and coliforms counts were 32x10^4, 56x10^3, 61x10^2, 39x10^2, and 130x10^3 CFU/g respectively for fresh carp flesh, while values for fresh sbour flesh were 11x10^4; 27x10^3; 76x10^2; 65x10^2 and 16x10^3 CFU/g respectively. The data obtained were higher then that reported by Joseph et al., (1980) and Arslan (1993) and lower than that of Okafar and Nzeako (1985). Faecal coliforms were not detected in all tested samples during the investigation and this might be due to good handling practice of fish. Total bacterial and psychrotrophic counts were higher in carp than in sbour fish. Whereas, sbour were highly loaded with proteolytic, lipolytic and total coliforms than carp fish and this might be related to the differences in the chemical composition of fish. As both protein and fat contents in sbour were 18.72% and 12.12% respectively as compared to those that for carp of 17.06% protein and 2.46% fat (AL-Shatty, 1994). This might in turn relatively affects the counts of some bacterial groups (Hindi et al., 1996).
Table 1: Bacterial content of the fresh flesh of carp and sbour during (May 1993-May 1994)

<table>
<thead>
<tr>
<th>Group of Bacteria</th>
<th>Type of Fish</th>
<th>Summer</th>
<th>Autumn</th>
<th>Winter</th>
<th>Spring</th>
<th>Average</th>
<th>May 1993</th>
<th>May 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bacterial Count</td>
<td>Carp</td>
<td>63x10⁴</td>
<td>19x10⁴</td>
<td>29x10⁴</td>
<td>15x10⁴</td>
<td>32x10⁴</td>
<td>30x10⁴</td>
<td>0.4x10⁴</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>28x10⁴</td>
<td>7x10⁴</td>
<td>0.9x10⁴</td>
<td>8x10⁴</td>
<td>11x10⁴</td>
<td>14x10⁴</td>
<td>9x10⁴</td>
</tr>
<tr>
<td>Psychrotrophic</td>
<td>Carp</td>
<td>140x10³</td>
<td>50x10³</td>
<td>17x10³</td>
<td>15x10³</td>
<td>56x10³</td>
<td>10x10³</td>
<td>1x10³</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>52x10³</td>
<td>47x10³</td>
<td>0.6x10³</td>
<td>7x10³</td>
<td>27x10³</td>
<td>24x10³</td>
<td>11x10³</td>
</tr>
<tr>
<td>Proteolytic</td>
<td>Carp</td>
<td>220x10²</td>
<td>17x10²</td>
<td>2.3x10²</td>
<td>1.4x10²</td>
<td>61x10²</td>
<td>21x10²</td>
<td>0.4x10²</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>150x10²</td>
<td>130x10²</td>
<td>1x10²</td>
<td>22x10²</td>
<td>76x10²</td>
<td>15x10²</td>
<td>4x10²</td>
</tr>
<tr>
<td>Lipolytic</td>
<td>Carp</td>
<td>140x10²</td>
<td>12x10²</td>
<td>3.3x10²</td>
<td>0.2x10²</td>
<td>39x10²</td>
<td>20x10²</td>
<td>0.3x10²</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>130x10²</td>
<td>110x10²</td>
<td>3x10²</td>
<td>18x10²</td>
<td>65x10²</td>
<td>5x10²</td>
<td>3x10²</td>
</tr>
<tr>
<td>Total coliforms</td>
<td>Carp</td>
<td>52x10³</td>
<td>26x10³</td>
<td>20x10³</td>
<td>20x10³</td>
<td>30x10³</td>
<td>4x10³</td>
<td>0.3x10³</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>34x10³</td>
<td>22x10³</td>
<td>0.4x10³</td>
<td>6x10³</td>
<td>16x10³</td>
<td>3.3x10²</td>
<td>7.3x10²</td>
</tr>
</tbody>
</table>

Temperature (°C)

32  26  13  26

Table 2: Bacterial contents of skin, gills and intestinal tract in carp and sbour

<table>
<thead>
<tr>
<th>Group of Bacteria</th>
<th>Type of Fish</th>
<th>CFU/cm² of skin</th>
<th>CFU/g of gills</th>
<th>CFU/g of Intestine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Bacterial Count</td>
<td>Carp</td>
<td>65x10⁵</td>
<td>150x10⁴</td>
<td>54x10⁸</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>56x10⁵</td>
<td>63x10⁴</td>
<td>27x10³</td>
</tr>
<tr>
<td>Psychrotrophic</td>
<td>Carp</td>
<td>27x10⁴</td>
<td>200x10⁴</td>
<td>82x10⁵</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>8.8x10⁴</td>
<td>86x10⁴</td>
<td>33x10⁶</td>
</tr>
<tr>
<td>Proteolytic</td>
<td>Carp</td>
<td>65x10³</td>
<td>19x10³</td>
<td>25x10³</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>73x10³</td>
<td>10x10³</td>
<td>110x10³</td>
</tr>
<tr>
<td>Lipolytic</td>
<td>Carp</td>
<td>16x10³</td>
<td>14x10³</td>
<td>17x10³</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>56x10³</td>
<td>100x10³</td>
<td>45x10³</td>
</tr>
<tr>
<td>Total coliforms</td>
<td>Carp</td>
<td>72x10³</td>
<td>45x10⁴</td>
<td>110x10⁴</td>
</tr>
<tr>
<td></td>
<td>Sbour</td>
<td>43x10³</td>
<td>34x10³</td>
<td>15x10³</td>
</tr>
</tbody>
</table>

* Average readings of six months
Early bacterial content of common carp and sbour

Seasonal variations also affected the level of bacterial contents which were higher during Summer and Autumn as composed to Winter and Spring. Table (1) also shows that all values in May 1993 were slightly higher than those of May 1994, and this may reflect environmental changes especially the temperature of environment (Al- Shatty , 1994).

Bacterial contents of skin, gills and intestinal tract of carp and sbour are shown in ( Table 2 ). Total bacterial count of carp was higher (54 x 10^6 CFU/g) than that of sbour (27x10^7 CFU/g) and this could be as a reflection of feeding habits, as carp is a deep feeder whereas sbour is a filter feeder or may be because sbour cease feeding or being so hungry after long journey to approach spawning ground at Shatt- AL-Arab river (Hussian et al., 1994). These results were similar to those obtained by Qudrat-I-Khuda et al., (1962) Joarder (1974) and Lima dos santos (1982).

In conclusion, although these fresh fish samples were slightly highly loaded with different types of bacteria but they were still within the microbiological standards of ICMSF (1986) taking into account that warm condition prevailed in Iraq accelerates and promote microbial growth.

REFERENCES


المحتوى البكتيري المبكر لأسماك الكارب الاعتيادي والصبور (Cyprinus carpio) والمصطادة من البصرة (Tenualosa ilisha)

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الخلاصة

جمعت عينات من أسماك الكارب والصبور خلال الفترة من مارس 1993 لغاية مارس 1994 وفحص المحتوى البكتيري المبكر لكل من اللحم والجلد والغلافsm والاحساء الداخلية، شملت الفحوصات كل من العد الكلي للبكتيريا، البكتيريا المتحللة للبروتين، البكتيريا المحللة للدهن، البكتيريا القولون الكلية وبكتيريا القولون البرازية في دم كل من أسماك الكارب وكانت الإعدادات كالتالي: $3 \times 10^{10}$، $6 \times 10^{12}$، $3 \times 10^{16}$، $2 \times 10^{22}$، $2 \times 10^{25}$، $3 \times 10^{26}$، $10 \times 11$

لم يلاحظ وجود بكتيريا القولون البرازية في كل العينات المفحوصة خلال فترة الدراسة.

درس كذلك تأثير التغيرات الموسمية.