FIRST REPORT OF PASTEURELLOSIS IN FRESHWATER HYBRID TILAPIA (OREOCHROMIS AUREUS X O. NILOTICA) IN ISRAEL

BY S. NIZAN* AND E. HAMMERSCHLAG*‡

Introduction
The first report concerning pasteurellosis was received after an epizootic among white perch in the Potomac River, U.S.A. (Bullock et al., 1971). Environmental conditions, such as high water temperature and low dissolved oxygen, were reported to be contributors to the outbreak of the disease. The etiological agent itself, the Pasteurella bacterium, was assumed to be a normal part of perch flora (Allen & Pelczar, 1967). Later reports concerned mainly marine fish: striped mullet (Lewis et al., 1970), yellowtail, from which the bacterium P. piscicida was isolated (Kusuda et al., 1978), and red sea bream (Yasunaga et al., 1983). Outbreaks of pasteurellosis caused by the same bacteria were reported in some euryhaline fishes along the Italian coasts (Ceschia et al., 1991), while a different species, P. multocida, called Avian cholera, studied in connection with a number of environmental variables (Bredy & Botzler, 1989), was found to survive in water samples for over a year.

Material and Methods
The present report concerns a new outbreak of the disease in a freshwater fish farm, located north of the Sea of Galilee. Tilapia were stocked during the winter season in the farm, in two covered concrete ponds, of 660 m³ and 800 m³ volume. Both ponds were stocked with 280, 000 tilapia (18g) at 424 fish/m³ and 3000 carp (30g).
They were fed pellets (25% protein) at a daily rate of 1-2% fish biomass. Water parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salinity</td>
<td>11-14 mg/l</td>
</tr>
<tr>
<td>Oxygen</td>
<td>7.5-8.0 mg/l</td>
</tr>
<tr>
<td>NH₄⁺</td>
<td>0.5-0.25 mg/l</td>
</tr>
<tr>
<td>NO₃⁻</td>
<td>0.05-0.25 mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>7.3-9.0</td>
</tr>
<tr>
<td>Temp</td>
<td>15-17°C</td>
</tr>
</tbody>
</table>

Fish were examined weekly for gill-skin parasites, which were controlled as required.

Results
The findings were abundant: granular white deposits, 1-1.5 mm, were found in the liver, spleen, kidney, peritoneum and visceral cavity in every case. In general, fish were emaciated, very weak, and subject to rapid infestation by a variety of protozoa on the body gills and intestines. In addition, Saprolegnia sp. was found on the body and gills. By innoculating a nodule from the kidney, we isolated a gram negative bacterium, which was first tested for sensitivity to antibiotics. Two antibiotics were tested by MIC test: "Quinabig" (Norfloxacin nicotinate, from "Abic" Co., Israel), and "Baytril" (Enrofloxacin). The results obtained were 0.08µg/ml and 0.16µg/ml, respectively. Accordingly, the fish were medicated through their food by "Quinabig" at a dose of 20mg/kg body weight per day, for six days, with good results.

The bacteria were cultivated on (a) BHI+ Y agar (brain heart infusion + yeasts); (b) RS agar (Rimmeller-Shotts), at 25-30°C for 24-48h. Examination showed the following characteristics: Short rods. Gram negative Fermentive Non-motile Bi-polar staining Acid fast (-) Catalase (+) Oxidase - weak (+) Pigmentation of colonies: grey/white--yellow Acid production on triple sugar iron-agar (+)
Biochemical properties with API 20 NE:

- Reduction of nitrates to nitrates
- Acidification of glucose
- Arginine dihydrolase
- Urease
- Hydrolysis (β-glucosidase)
- Hydrolysis (protease)
- β-Galactosidase
- Assimilation of:
  - Glucose
  - Arabinose
  - Mannose
  - Maltose
  - N-acetyl-glucosamine
  - Galactose
  - Glucosamine
  - Galactosamine
  - Adipate
  - Malate
  - Citrate
  - Phenyl acetate

These tests identified them as *Pasteurella multocida*.

Six weeks after the outbreak (2 March 93), and two weeks after the treatment, mortality ceased, and the fish appeared to have recovered: in 20 fish that we examined, we did not find a single nodule.

**Discussion**

It is possible that the outbreak of pasteurellosis that occurred this year was not the first on this farm. While collecting data on the spot, we learned that white nodules were also observed on the inner organs of the tilapia of the same ponds, the previous winter (1991-92). A renewed outbreak after one year is consistent with the description (Bredy & Botzler, 1989) of the ability of these bacteria to survive over a year in water. The high stocking density in the ponds, and other adverse water conditions, may have been the causes of the epizootic outbreak as also assumed by Bullock et al. (1971). The existence of *P. multocida* among fowl may be a source of infection in fish ponds, through fowl manure. Therapy with "Quinabics" was effective. Before next winter, we will recommend a thorough disinfection of the ponds, to prevent a further outbreak. *P. multocida* infected only the tilapia, without affecting the carp in the same ponds. We observed the same phenomenon previously in connection with another disease, streptococcosis. It is likely that the high sensitivity of tilapia to environmental conditions makes it more prone than carp to pathogenic infections in water.

**Summary**

An outbreak of pasteurellosis in tilapia is described. *P. multocida* was isolated from the diseased fish. Therapy with "Quinabics" (Norfloxacine nicotinate), by oral administration was effective.

**Authors Address**

* Ministry of Agriculture, Fisheries Division, Central Fish Health Laboratory, Nir David, 19150, Israel.
** Migal-Galilee Technological Center, Kiryat-Shmona, 10200, Israel.

**References**


