

New Advances for Warmwater Aquaculture



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Study shows that AQUAFLO[®] reduces mortality from NHP-B infection in shrimp

- Key Points
- Study design
- Reduction in mortality significant

Key Points

- Necrotizing hepatopancreatitis (NHP-B) is a bacterial disease that causes mortality in shrimp ranging from 20% to as high as 95%.
- A tremendous increase of NHP-B in the Americas has increased the need for effective methods of controlling the disease.
- In a study, shrimp treated for 12 days with 5 mg/kg of AQUAFLO[®] (florfenicol) showed fewer lesions and significantly decreased mortality compared to 12 days of treatment with 50 mg/kg of oxytetracycline.

Using AQUAFLO[®] (florfenicol) at 5 mg/kg resulted in fewer lesions and significantly decreased mortality compared to oxytetracycline in shrimp infected with necrotizing hepatopancreatitis (NHP-B), reported Dr. Maria Morales of the Research Center for Food and Development (CIAD), Mexico.

NHP-B is a bacterial disease that causes mortality ranging from 20% to as high as 95%. It resides and multiplies in the tubule epithelial cells of the hepatopancreas — the main organ in shrimp, where nutrients are assimilated and stored.

"If the hepatopancreas doesn't work, then you have sick shrimp. That's why NHP-B is so important," Morales said.

NHP-B has been diagnosed in several countries, including Peru, Costa Rica, Brazil, Venezuela, Mexico and in the United States, particularly Texas. The disease occurs when water temperatures are constant at about 29° C (84.2° F) and salinity is between 20 and 38 ppm. In shrimp production, that means NHP-B can occur throughout the production cycle, she said.

The cause of NHP-B is an intracellular, rickettsia-like, gram-negative bacterium that historically has been controlled with oxytetracycline. Nevertheless, NHP-B has been on the rise, Morales said.

In fact, "The tremendous increase in the Americas means that we need to look for new alternatives to control both the dispersion and multiplication of NHP-B," she said.

figure 1

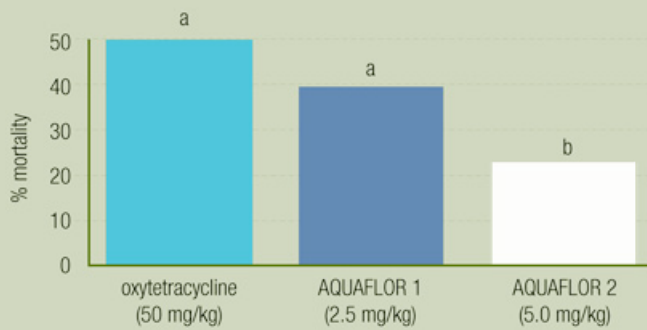


Figure 1: **Results in medicated fish after challenge with NHP-B.** Mortality was lowest in the group that received 5 mg/kg of AQUAFLO. Different superscripts are significant ($P \leq 0.05$)

figure 2

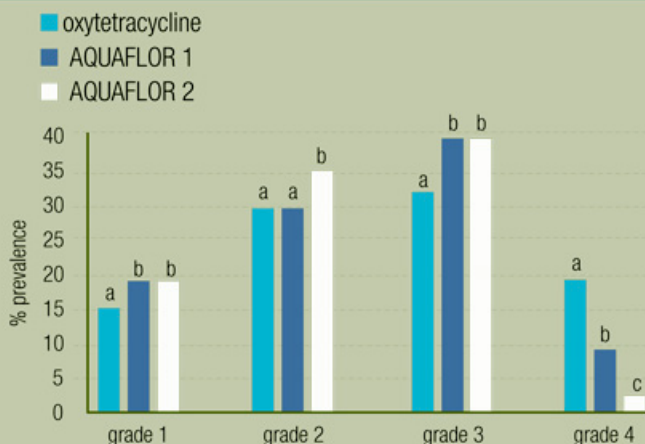


Figure 2: **Results in medicated fish after challenge with NHP-B.** The severity of NHP-B lesions was lowest in the group that received 5 mg/kg of AQUAFLO. Different superscripts are significant ($P \leq 0.05$)

The type of NHP-B on the increase is often the more serious grade-3 disease, which results in high mortality. The severity of NHP-B, she explained, is staged on a scale from 0 to 4, and the severity is determined by the degree of atrophy in the tubules. In grade-3 disease, from 11 to 20 tubules are atrophied.

Study design

Morales led a study to test the effectiveness of two antibiotics against NHP-B disease in shrimp. The antibiotics were AQUAFLO, known as AQUAFEN® in some markets, and oxytetracycline.

NHP-negative shrimp in the study were juveniles obtained from a hatchery. They averaged 4.7 grams in weight and were placed in aquaria where the water temperature and salinity were ideal for NHP transmission. The shrimp were fasted for 2 days, then were fed NHP-infected hepatopancreas for 10 days, she said.

Shrimp with grade-3 or -4 NHP disease were used because the NHP bacterium cannot be replicated *in vitro*, Morales noted.

After the 10-day feeding period, one of three medicated feeds was administered for 12 days. The medicated feed contained either 2.5 mg/kg of AQUAFLO, 5.0 mg/kg of AQUAFLO or 50 mg/kg of oxytetracycline. The study also included control groups.

Mortality in infected shrimp was calculated and live shrimp from each group were sacrificed to look for NHP-B.

"We demonstrated that experimental NHP infection was very successful. NHP was transmitted effectively and resulted in mortality," Morales said.

Reduction in mortality significant

With AQUAFLO administered at 5 mg/kg, histopathological lesions were decreased, and there was a significant decrease in NHP-related mortality compared to the oxytetracycline and the lower dose of florfenicol, she said.

Mortality with the higher, 5.0 mg/kg dose of AQUAFLO was under 23%, compared to nearly 40% for the oxytetracycline group and nearly 50% in the lower-dose AQUAFLO group, Morales said (Figure 1).

The severity of lesions was also least in the fish that received the higher dose of AQUAFLO compared to the other two groups, she said (Figure 2).

"If you use a drug properly, you can inhibit bacterial growth, but the infection is not eliminated. If you do not continue with proper treatment, a relapse can occur," Morales said.

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