

New Advances for Warmwater Aquaculture



Dr. Pat Gaunt, Mississippi State University, USA

Studies demonstrate AQUAFLO[®] (florfenicol) efficacy for control of *S. iniae* mortality in tilapia

- Key Points
- Sensitivity confirmed
- Dose confirmation

Key Points

- The active ingredient in AQUAFLO[®] and AQUAFEN[®] (florfenicol) was tested in a series of controlled studies for efficacy against *S. iniae* in Nile tilapia.
- Mortality was reduced with three different dosages of florfenicol compared to fish that were not treated.
- Even under severe challenge conditions, 15 mg of florfenicol per kilo of body weight effectively controlled mortality caused by *S. iniae* in Nile tilapia.

A series of controlled studies demonstrates that AQUAFLO[®] (florfenicol) effectively controls mortality due to *Streptococcus iniae* in Nile tilapia, according to Dr. Pat Gaunt, of Mississippi State University College of Veterinary Medicine and a veterinary toxicologist.

AQUAFLO, also known in some markets as AQUAFEN[®], is a broad-spectrum antimicrobial designed specifically for use in animals. The efficacy of florfenicol against *S. iniae* was tested by Gaunt and associates in a series of studies sponsored by Intervet/Schering-Plough Animal Health.

The investigators conducted four experiments: an *in vitro* study; an LD₅₀ study, which determines the lethal dose needed to result in the death of half the test animals; a dose titration study; and a dose-confirmation study, said Gaunt, who initially presented the results at Aquaculture 2004, a World Aquaculture Society meeting.¹

Fish used in the study were pearl white male Nile tilapia weighing from 15 to 25 grams. They tested negative for streptococcus and had no history of prior *S. iniae* exposure, she said.

The isolate of *S. iniae* used for the studies was obtained in Louisiana. It was identified biochemically to confirm the species and was passaged through known experimental fish to enhance its virulence, Gaunt said.

Sensitivity confirmed

In the *in vitro* study, the mean disc diffusion was 27.2 mm, which demonstrated that *S. iniae* was sensitive to florfenicol. The minimum inhibitory concentration (MIC) was 2 µg/mL, she said.

For the LD₅₀ study, fish were arbitrarily assigned to 24 tanks with 10 fish per tank and were injected with *S. iniae*. The LD₅₀ was determined to be between 10⁵ and 10⁶ cfu/mL, she said.

The dose titration study involved 30 tanks with 20 fish per tank. The fish were challenged with *S. iniae* then treated or not treated with florfenicol, which was administered in commercial extruded tilapia

feed blended with water. There were five treatments administered with six tanks assigned to each treatment. Fish received either 5 mg florfenicol/kg body weight, 10 mg florfenicol/kg body weight or 15 mg florfenicol/kg body weight. Treatment was administered for 10 days.

There were also two control groups: One group was not challenged with *S. iniae* and received no treatment, and the other group was challenged with the bacterium and received no florfenicol treatment.

The fish developed signs of *S. iniae* infection such as anorexia, erratic swimming, dark skin, ascites, a congested spleen and vent, and liver hemorrhage, demonstrating that the challenge was valid, Gaunt noted.

Mortality was reduced in all three florfenicol groups. Mean mortality in challenged fish was over 35% in untreated controls, compared to 19.2% in those that received 5 mg florfenicol, 12.5% in those that received 10 mg florfenicol and 2.5% in those that received 15 mg, she said.

Dose confirmation

Since the lowest mortality occurred with the 10 mg and 15 mg dose/kg body weight, she said, these two dosages were used to conduct the dose-confirmation studies, which involved 30 tanks with 10 tanks assigned to each of three treatments. Fish were challenged with *S. iniae*, then received 10 days of either 10 mg or 15 mg florfenicol/kg body weight, or they served as controls and received no florfenicol.

Mortality was 11% in those that received 10 mg florfenicol and a low 5.5% in fish that received the 15 mg florfenicol compared to 20.5% in fish that were not treated (Figure 1). The dose-confirmation study was repeated with similar results, she said.

"Every dose rate produced statistically significant results," Gaunt added.

Gaunt and associates also took bacteria from the tank studies and performed susceptibility tests for florfenicol using both the disc and dilution methods. The MIC range was 1 µg/mL for the LD₅₀, 0.5-1 µg/mL for the dose titration and 1 µg/mL for dose confirmation.

"In these studies involving experimental challenge, 15 mg of florfenicol per kilo of body weight was the most efficacious for the control of mortality caused by *S. iniae* in Nile tilapia," she said.

AQUAFLO and AQUAFEN are registered trademarks of Intervet International or its related companies.

ⁱ Gaunt Pat *et al*, Efficacy of Florfenicol for control of mortality caused by *Streptococcus iniae* in tilapia. *Proceedings of Aquaculture, the World Aquaculture Society, 2004*, Honolulu. Pg. 216.

figure 1

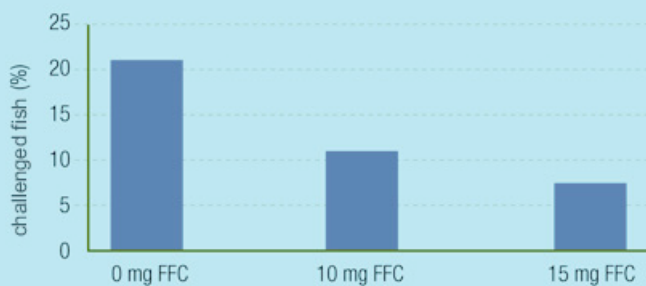


Figure 1: Dose-confirmation results
The reduction in mortality in tilapia infected with *S. iniae* following administration of 10 mg/kg and 15 mg/kg florfenicol was statistically significant.