

New Advances for Warmwater Aquaculture



John Hayes, Schering-Plough Research Institute, USA

Validated assay shows that AQUAFLO[®] remains stable in floating or sinking pelleted feed for catfish, salmonids

- Key Points
- Medicated feed study
- Storage, high-temp testing

Key Points

- AQUAFLO[®] (florfenicol) was tested for stability and consistency after incorporation into pelleted feeds for catfish and salmonids.
- A validated assay demonstrated that AQUAFLO survives the high temperatures used in the pelleting production process and that it is highly stable in both floating and sinking pelleted fish feeds.
- Feed medicated with AQUAFLO also remains stable for at least 4 to 13 weeks, depending on storage conditions.

Studies have demonstrated that AQUAFLO[®] (florfenicol) remains stable in both floating and sinking pelleted feed for catfish and freshwater-reared salmonids, providing producers with a reliable method of controlling bacterial disease and preventing devastating losses, said John Hayes, of Schering-Plough Research Institute.

"Medicated feed is usually the most cost-effective method for stemming a bacterial disease outbreak and restoring fish health, but the availability of antimicrobials approved for use in aquaculture is limited and bacterial resistance to some agents has been reported," he said.

In addition, incorporating antimicrobials into pelleted feed can be difficult because some antibiotic compounds cannot survive the high heat and moist conditions involved in the manufacturing process, Hayes explained.

AQUAFLO, known in some markets as AQUAFEN[®], is a palatable, broad-spectrum in-feed antimicrobial. Formulated for aquaculture use, it is effective against a variety of bacteria affecting fish and has been widely used throughout the world for treating disease in both warmwater and coldwater fish. AQUAFLO may be added to fish feed before pelleting/extrusion or by top-dress and, depending on the species, is used in both floating and sinking feed. The medication is administered to catfish and salmonids at the rate of 10 mg florfenicol per kg body weight daily for 10 days, he said.

Medicated feed study

To demonstrate the stability and consistency of AQUAFLO, a study was conducted with five medicated feeds. Three of the feeds were sinking salmonid feeds and two were floating catfish feeds. Some were expanded and some were extruded feeds (Table 1).

A validated assay was used to determine the concentration of florfenicol in the medicated feeds.¹ The homogeneity of active ingredient in the finished feed was characterized by sampling feed at regular intervals at the bagging point in the feed mill. To see if

table 1

Feed	Florfenicol concentration (ppm)	Nominal pellet size	Method of manufacture	Florfenicol medication method	Acceptable assay limits (% label claim)*
Salmonid A	200	2.4	expanded	top-dress	80-110%
Salmonid B	4000	10	expanded	top-dress	80-110%
Salmonid C	4000	3	expanded	incorporated	80-110%
Catfish A	200	2.5	expanded	incorporated	80-110%
Catfish B	4000	5	expanded	incorporated	80-110%

* Acceptable FDA-approved assay limits (% label claim) are 80%-110% for all fish feeds. Assay specifications may vary by country.

Table 1: **Production characteristics of five florfenicol-mediated feed batches (three sinking salmonid feeds and two floating catfish feeds).**

florfenicol segregated during transportation of the medicated feeds, samples were taken from the top, middle and bottom of bags randomly chosen from each batch before and after the bags were transported 50 miles.

“In contrast to some of the other antimicrobials used in aquaculture, appropriate target drug concentrations of florfenicol were seen across batches and throughout bags after transportation in all the feed formulations tested, regardless of the manufacturing processes used,” Hayes said. “AQUAFLOr-mediated feed remained homogenous, and there was no tendency for segregation in any of the batches tested.”

“These studies show that AQUAFLOr readily survives the pelleting production process and that it’s highly stable in pelleted fish feed,” Hayes said.

Storage, high-temp testing

Feed medicated with AQUAFLOr was shown to remain stable for 3 months under long-term storage conditions of 25° C (77° F) and 60% relative humidity and for 4 weeks under accelerated storage conditions of 40° C (104° F), he added.

Besides stability, AQUAFLOr has some other advantages, Hayes said. It can be used during any stage of production, and because it can be used as a top-dress, any size batch of feed can be produced.

AQUAFLOr’s ability to survive the high production temperatures needed to make pelleted feed helps keep feed production costs in check; in contrast, antibiotics such as oxytetracycline that degrade during the manufacturing process require that extreme overages of the drug be used to produce feed pellets containing adequate amounts of antibiotic, he said.

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

ⁱ Hayes, John M., Determination of Florfenicol in Fish Feed by Liquid Chromatography, *Journal of AOAC International*. Vol. 88, No. 6, 2005.