Oxytetracycline Dihydrate Does Not Enhance Growth or Conversion Efficiency in Fish

Lack of Growth Promotion Effect Suggests Virtually No Incentive for Antibiotic Misuse

Jesse Trushenski
EAGLE FISH HEALTH LABORATORY
IDAHO DEPARTMENT OF FISH AND GAME
USES OF ANTIBIOTICS

- Human Medicine
- Animal Agriculture
- Plant Agriculture
THERAPEUTIC VS. NONTHERAPEUTIC USES

FDA-APPROVED USES OF OXYTETRACYCLINE DIHYDRATE PRODUCTS
ANTIBIOTICS AS GROWTH PROMOTERS

Nontherapeutic use of antibiotics to enhance terrestrial animal growth performance is a common, but controversial practice.

Misconception that antibiotics are used this way in U.S. aquaculture.

Such uses are illegal, generally believed to be ineffective in fish.

Little quantitative data available that unequivocally demonstrate the effect(s) of antibiotic administration on fish growth.

This study was conducted to demonstrate whether oral administration of oxytetracycline dihydrate (OTC) affects growth performance in fish.

THIS STUDY WAS NOT CONDUCTED IN SUPPORT OF PRODUCTION CLAIMS FOR ANTIBIOTICS IN U.S. AQUACULTURE
## EXPERIMENTAL DESIGN AND ANALYSIS

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Commercial feed + 50 mL tap water/kg feed + 5 g fish oil/kg feed</th>
<th>OTC/kg fish/d if fed at 3% BW/d</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td>0 mg</td>
</tr>
<tr>
<td><strong>Standard Dose OTC</strong></td>
<td></td>
<td>80 mg</td>
</tr>
<tr>
<td><strong>Low Dose OTC</strong></td>
<td></td>
<td>16 mg</td>
</tr>
</tbody>
</table>
Weight gain, specific growth rate (SGR), feed conversion ratio (FCR), hepatosomatic index (HSI), viscerosomatic index (VSI)

One-way ANOVA with Tukey’s HSD pairwise comparison tests, PROC GLIMMIX, SAS 9.4

Normal vs. abnormal appearance of external and internal features

Chi-square test for differences in the frequency of normal vs. abnormal observations, PROC FREQ, SAS 9.4
Hybrid Striped Bass

27 g

10

26.5°C

Channel Catfish

5 g

10

26.8°C

Nile Tilapia

54 g

20

28.8°C
Weight Gain $P = 0.122$
FCR $P = 0.120$
SGR $P = 0.119$
RESULTS

\[ HSI \quad P = 0.021 \]
\[ VSI \quad P = 0.243 \]
RESULTS

Weight Gain $P = 0.122$
FCR $P = 0.120$
SGR $P = 0.119$
RESULTS

**HSI** $P = 0.728$

**VSI** $P = 0.518$
**RESULTS**

Weight Gain $P = 0.201$

FCR $P = 0.281$

SGR $P = 0.197$
RESULTS

**HSI** $P = 0.972$

**VSI** $P = 0.579$
RESULTS

Skin & Body Surface $P = 0.017$

- Control
- Standard Dose OTC
- Low Dose OTC

* Significance mark
CONCLUSIONS AND FUTURE WORK

Continuous feeding of OTC, at a standard therapeutic dose or a low dose, had no significant effect on growth performance of the taxa tested. Nonsignificant trends, when apparent, suggested a negative effect of OTC. Only significant difference in the frequency of normal vs. abnormal tissues indicated greater incidence of abnormalities among fish fed OTC-medicated feed.

Collectively, our results indicate there is no growth performance benefit associated with continuous feeding of OTC-medicated feed and little-to-no incentive to misuse OTC in fish this way.

Additional experiment planned with Rainbow Trout.

As of 2017, antibiotics will be accessible only with veterinary oversight. FDA is encouraging drug sponsors to voluntarily withdraw production claims.
Questions? Please ask!

Jesse Trushenski
jesse.trushenski@idfg.idaho.gov
208-939-2413

The Eagle Fish Health Laboratory provides comprehensive, responsive fish health services to the Idaho Department of Fish and Game and its partners.