

# **Oxytetracycline Medicated Feed Clinical Field Trials - INAD 9332**

## **Year 2002 Annual Summary Report on the Use of Oxytetracycline Medicated Feed in Field Efficacy Trials**

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### **Summary**

The efficacy of oxytetracycline medicated feed (OTF) was evaluated under compassionate Investigational New Animal Drug (INAD) #9332 in 202 disease control/prevention trials during calendar year (CY) 2002. Trials were conducted at 24 state, two tribal, and eight private fish culture facilities to control mortality in a variety of fish caused by one of the following diseases: (1) bacterial coldwater disease, (2) systemic columnaris, (3) streptococcus, (4) gram negative bacterial enteritis, (5) enteric redmouth, (6) bacterial gill disease, and (7) withering syndrom caused by Rickettsia-like prokaryote.

Approximately 26.3 million fish/shellfish were treated with OTF during this period. The current FDA-approved OTF label limits drug use to the control of specific bacterial diseases of specific fish species at water temperatures not below 48.2° F (9° C). Label guidelines do not permit the use of OTF to control mortality of fish caused by any of the above-described disease indications. To accommodate the needs of aquaculturists,

and to collect data critical to an expansion of the existing approved use of OTF, FDA has authorized the use of this compound under INAD #9332 to control mortality in fishes caused by pathogens for which OTF is not currently unapproved. Investigators at aquaculture facilities that used OTF under this INAD during this period administered treatments under the following broad categories: (1) 0.77 - 2.46 g drug/100 lbs fish/d for 12 - 22 days; (2) 2.5 - 3.75 g drug/100 lbs fish/d for 10 - 20 days; (3) 3.76 - 7.39 g drug/100 lbs fish/d for 10 - 15 days; (4) 10.0 g drug/100 lbs fish/d for 10 - 22 days; and (5) 10.6 g drug/100 lbs fish/d for 14 days. Overall, results from OTF treatment trials administered under INAD #9332 during the reporting period indicated that approximately 61% of trials appeared efficacious, 11% appeared ineffective, and 28% were characterized as inconclusive.

## **Introduction**

The current label for OTF use in aquaculture limits use to the control of furunculosis in salmonids caused by *Aeromonas salmonicida*, and the control of bacterial hemorrhagic septicemia in salmonids and catfish caused by *A. hydrophila* or *Pseudomonas sp.* Oxytetracycline medicated feed has been shown to be highly effective in controlling these diseases, especially when predisposing environmental stresses are reduced at the time of treatment (Warren 1991). Furthermore, the current FDA approved label for OTF limits dosage to a range of 2.5 - 3.75 grams of active drug per 100 pounds of fish per day for 10 days, and limits use to water temperatures "not below 48.2° F (9° C). "

These label restrictions severely limit the overall utility of approved OTF use in aquaculture.

Historically, OTF treatments have been used by fish culturists to control mortality in salmonids caused by bacterial cold water disease (CWD; causative agent *Flavobacterium psychrophilus*) and columnaris (causative agent (*F. columnare*). Fish culturists and fish health professionals have also found that OTF is effective therapy to control mortality in fishes caused by enteric redmouth (causative agent *Yersinia ruckeri*), vibriosis (causative agent various members of the genus *Vibrio*), and other less common bacterial diseases. However, at this time, OTF is not approved for such uses.

## **Purpose of Report**

The purpose of this report is to summarize the results of CY2002 OTF field efficacy trials conducted under INAD #9332. However, it is also expected that data from these trials will be used to enhance the existing OTF database that has been established from previous years studies for the purpose of expanding and/or extending the approved label for OTF.

## **Facilities, Materials, and Treatment Procedures**

### **1. Facilities**

A total of 24 state, two tribal, and eight private fish culture facilities (n = 34 total facilities) used OTF to control mortality in a variety of fish caused by a variety of

bacterial and other infections in 202 separate field trials. Water temperature during treatments at the various testing facilities ranged from 38.3 - 83.0 °F, with a mean treatment temperature of 63.7 °F.

## **2. Test article used**

The OTF used in the trials was either Terramycin 100 or Terramycin 100D, both of which contained 100 g active oxytetracycline quaternary salt per pound of premix. All Terramycin 100/100D was supplied by Pfizer, Inc., 1107 South 291 Highway, Lee's Summit, MO. Virtually all oxytetracycline medicated feed used in INAD trials was supplied by several commercial fish feed manufacturers.

## **3. Treatment regimen**

As described in the Study Protocol, Investigators were allowed to use OTF either within the current label range of 2.5 - 3.75 g of active drug/100 lbs of fish/d for 10 - 20 days (approximately 57% of trials were conducted using this treatment regimen) or at 10.0 g of active drug/100 lbs of fish/d for 10 - 22 days (approximately 19% of trials were conducted using this treatment regimen). However, the treatment regimen administered in the remaining 24% of the trials deviated from the protocol. In these trials, fish were fed at rates of either 0.77 - 2.49 g drug/100 lbs fish/d for durations ranging from 10 - 22 days, or at 10.6 g drug/100 lbs fish/d for 14 days.

## Fish Species and Fish Diseases Involved in Year 2002 Trials

### 1. Species of fish treated

Six salmonids, nine non-salmonids, and one species of shellfish were treated during CY 2002. Treated fish ranged in length from 0.75 - 14.8 in. Mean length of treated abalone was 2.2 in. Species treated included:

**Salmonids:** (1) rainbow trout *Oncorhynchus mykiss*; (2) steelhead trout *O. mykiss*; (3) coho salmon *O. kisutch*; (4) chinook salmon *O. tshawytscha*; (5) kokanee salmon *O. nerka*; and (6) cutthroat trout *O. clarki*.

**Non-salmonids:** (1) channel catfish *Ictalurus punctatus*; (2) Mozambique tilapia *Tilapia mossambica*; (3) hybrid striped bass *Morone chrysops* x *M. saxatilis*, (4) bluegill *Lepomis macrochirus*, (5) muskellunge *Esox masquinongy*, (6) tiger musky *E. lucius* x *E. masquinongy*, (7) northern pike *Esox lucius*, (8) smallmouth bass *Micropterus dolomieu*, and (9) yellow perch *Perca flavescens*.

**Shellfish:** red abalone *Haliotis rufescens*.

## 2. Diseases treated

Test fish were treated to control mortality caused by the following diseases during CY 2002:

1. Coldwater disease (causative agent *Flavobacterium psychrophilus*)
2. Systemic columnaris (causative agent *F. Columnare*)
3. Streptococcus (causative agent *Streptococcal iniae*)
4. Gram negative bacterial enteritis
5. Enteric redmouth (causative agent *Yersina ruckeri*)
6. Rickettsia-like prokaryote (RLP)
7. Bacterial gill disease (causative agent *F. branchiophilum*)

Bacterial coldwater disease (37% of trials) and columnaris (37% of trials) were the diseases most frequently treated during CY 2002. Treatment of the other five diseases listed above accounted for the remaining 26% of the treatment trials.

## Data Collected

### 1. Pathologist's reports

Approximately 50% of the data sets submitted to AADAP for CY 2002 treatment trials included pathologist's reports. Fish health pathology reports typically include: (1) a description of how the identity of disease agent(s) was verified; (2) disease identification records that confirm the presence of the disease agent; and

(3) the name and title of the individual performing the diagnosis. Additionally, pathology reports often provide documentation that there were no secondary infections or infestations caused by unrelated disease agents in a population of test fish. As a result, pathology reports provide essential information if efforts are to expand/extend an existing approved label.

## **2. Mortality data**

As stated in the Study Protocol, mortality data were to be collected 5 days prior to treatment, during the treatment period, and for at least 20 days post-treatment. Investigators were strongly encouraged to collect mortality data on a daily basis. However, daily collection of post-treatment mortality data was not always possible due to factors such as fish being moved into other tanks or raceways, and fish being stocked to rivers and other bodies of water.

## **Discussion of Study Results:**

### **1. General observations on the efficacy of OTF for the control of bacterial**

**diseases in salmonid and non-salmonid fish** (Note: Table 1 provides a summary of all efficacious trials; Table 2 provides a summary of all non-efficacious trials; Table 3 provides a summary of all inconclusive trials; Table 4 provides summary data for all trials; and Tables 5a and 5b provide a summary of all trials conducted during CY 2002 under INAD #9332; Table 5a is sorted by study number; Table 5b is sorted first by disease treated, second by whether treatments were efficacious or not, and lastly by fish species).

**A. Efficacy at 0.77 - 2.46 g/100 lbs fish/d for 12 - 22 days at water temperatures above 48.2° F**

Fish or shellfish were treated with 0.77 - 2.46 g OTF/100 lbs of fish/d for 12 - 22 days in 19 trials (Tables 1 & 3). Trials involved abalone diagnosed with RLP or tilapia diagnosed with streptococcus. OTF treatments appeared efficacious in eight trials and inconclusive in 11 trials.

**B. Efficacy at 2.50 - 3.75 g/100 lbs fish/d for 10 - 20 days at water temperatures above 48.2° F**

Fish or shellfish were treated with 2.50 - 3.75 g OTF/100 lbs of fish/d for 10 - 20 days in 111 trials (Tables 1 - 3). Trials involved abalone, bluegill, channel catfish, cutthroat trout, hybrid striped bass, kokanee salmon, muskellunge, northern pike, rainbow trout, smallmouth bass, tiger musky, tilapia, or yellow perch. Fish and shellfish were diagnosed with either CWD, systemic columnaris, streptococcus, RLP, or bacterial gill disease. OTF treatments appeared efficacious in 75 (68%) of the trials, ineffective in 11 (10%) of the trials, and 25 (22%) of the trials were characterized as inconclusive.

**C. Efficacy at 2.50 - 3.75 g/100 lbs fish/d for 10 - 14 days at water temperatures below 48.2° F**

Fish were treated with 2.50 - 3.75 g OTF/100 lbs of fish/d for 10 - 14 days in five trials (Tables 1 & 3). Trials involved chinook salmon, coho salmon, or rainbow trout diagnosed with CWD or enteric redmouth. OTF treatments

appeared efficacious in three trials, while two trials were characterized as inconclusive.

**D. Efficacy at 3.76 - 7.39 g/100 lbs fish/d for 10 - 15 days at water temperatures above 48.2° F**

Fish or shellfish were treated with 3.76 - 7.39 g OTF/100 lbs of fish/d for 10 - 15 days in 26 trials (Tables 1 - 3). Trials involved abalone, cutthroat trout, hybrid striped bass, tilapia, or yellow perch diagnosed with CWD, columnaris, gram negative bacterial enteritis, streptococcus, or RLP. OTF treatments appeared efficacious in 17 trials, ineffective in four trials, while five trials were characterized as inconclusive.

**E. Efficacy at 3.76 - 7.39 g/100 lbs fish/d for 14 days at water temperatures below 48.2° F**

Fish were treated with 3.76 - 7.39 g OTF/100 lbs of fish/d for 14 days in two trials (Tables 1 & 3). Trials involved coho salmon diagnosed with CWD. OTF treatments appeared efficacious in one trial, while one trial was characterized as inconclusive.

**F. Efficacy at 10.0 g/100 lbs fish/d for 10 - 16 days at water temperatures above 48.2°F**

Fish were treated with 10.0 g OTF/100 lbs fish/d for 10 - 16 days in 32 trials (Tables 1 - 3). Trials involved chinook salmon, coho salmon, cutthroat trout,

rainbow trout, and steelhead trout diagnosed with CWD or columnaris. OTF treatments appeared efficacious in 17 trials; ineffective in six trials; while nine trials were characterized as inconclusive.

**G. Efficacy at 10.0 g/100 lbs fish/d for 14 - 22 days at water temperatures below 48.2°F**

Fish were treated with 10.0 g OTF/100 lbs fish/d for 14 - 22 days in six trials (Tables 1 - 3). Trials involved coho salmon, chinook salmon, cutthroat trout, rainbow trout, and steelhead trout diagnosed with CWD. OTF treatments appeared efficacious in two trials, ineffective in two trials, while two trials were characterized as inconclusive.

**H. Efficacy at 10.6 g/100 lbs fish/d for 14 days at water temperatures above 48.2° F**

Fish were treated with 10.6 g OTF/100 lbs of fish/d for 14 days in one trial (Table 3). The trial involved cutthroat trout diagnosed with CWD. The OTF treatment was characterized as inconclusive.

**2. Observed Toxicity**

No toxicity or adverse effects relating to OTF treatment were reported.

## Summary of Study Results

Oxytetracycline medicated feed was used at dosages ranging from 0.77 - 10.6 g active drug/100 lbs fish/d. Treatment durations ranged from 10 - 22 days. Treatment trials involved fifteen different fish species and one species of shellfish (i.e., abalone), and approximately 26.3 million fish/shellfish. Treated fish ranged in length from 0.75 - 14.8 in. Mean length of treated abalone was 2.2 in. Water temperature during treatment ranged from 38.3 - 83.0 °F, with a mean treatment temperature of 63.7 °F.

Approximately 61% of trials appeared efficacious, 11% appeared ineffective, and 28% were characterized as inconclusive. Twenty-six trials involved the use of untreated, healthy-appearing, control fish, and approximately 50% of the trials included pathologist's reports. In most cases, OTF treatments appeared efficacious, or at worst were inconclusive, in controlling mortality in a (1) variety of salmonids, particularly cutthroat and rainbow trout, caused by bacterial coldwater disease, (2) abalone caused by withering syndrome, (3) hybrid striped bass caused by gram negative bacterial enteritis, (4) bluegill, northern pike, tiger musky, yellow perch, channel catfish, hybrid striped bass, and a variety of salmonids caused by columnaris, and (5) hybrid striped bass caused by streptococcus (Table 5b). Results of trials indicated that mortality decreased during or following the treatment period, and remained at normal levels throughout the post-treatment period. Furthermore, investigators reported no evidence of toxicity or adverse effects related to OTF treatment. However, based on a general lack of untreated control fish, replication, randomization, etc., it is understood that these data can only be considered as supportive or ancillary data. None-the-less, the data

described above should provide useful corroborative data to support a future expanded label claim for OTF for these disease indication. It is anticipated that additional ancillary efficacy data will continue to be collected under INAD #9332. In future trials conducted under INAD #9332, efforts will be directed towards the generation of higher quality data.

### **References**

Warren, J.W. 1991. Diseases of hatchery fish. U.S. Fish and Wildlife Service, Portland, Oregon, 92 p.

**Table 1. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Efficacious Trials**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of Treatment Days	Dose (g/100 lbs)	Temp. (°F)
Channel Islands Marine Resource Inst.	2	Abalone	1.00	16,731	Withering Syndrome	14	0.77 - 2.46	60.0
The Abalone Farm, Inc	1	Abalone	2.75	15,000	Withering Syndrome	14	0.77 - 2.46	55.1
Simaron Fresh Water Fish Inc.	5	Tilapia	8.9 - 14.8	102,100	Streptococcus	14	0.77 - 2.46	75.2 - 82.4
The Abalone Farm, Inc	3	Abalone	2.8 - 3.0	66,261	Withering Syndrome	14	2.50 - 3.75	54.0
Hackettstown SFH	1	Bluegill	2.50	6,000	Columnaris	10	2.50 - 3.75	76.0
Rathbun SFH	5	Channel Catfish	4.6 - 6.9	328,452	Columnaris	10	2.50 - 3.75	68.0 - 81.0
Solomon Gulch Hatchery	2	Coho Salmon	1.4 - 3.2	2,250,000	CWD	10	2.50 - 3.75	41.0 - 43.0
Grace SFH	1	Cutthroat Trout	1.50	154,364	CWD	13	2.50 - 3.75	52.0
Farlington SFH	1	Hybrid Striped Bass	2.30	2,625	Columnaris	10	2.50 - 3.75	83.0
Milford SFH	5	Hybrid Striped Bass	1.5 - 7.3	193,442	Columnaris	10 - 14	2.50 - 3.75	58.0 - 81.0
St. Croix Waters Tribal Fishery	7	Hybrid Striped Bass	2.1 - 4.3	372,290	Columnaris	10	2.50 - 3.75	71.0
Hackettstown SFH	2	Northern Pike	4.5 - 5.9	14,500	Columnaris	10	2.50 - 3.75	65.0
American Falls SFH	6	Rainbow Trout	3.7 - 8.2	276,311	CWD	10 - 11	2.50 - 3.75	55.0

**Table 1. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Efficacious Trials - continued**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of Treatment Days	Dose (g/100 lbs)	Temp. (°F)
2703881	2	Rainbow Trout	2.5 - 3.3	85,090	CWD	10	2.50 - 3.75	53.0
Finger Rock Rearing Unit	1	Rainbow Trout	3.34	231,578	CWD	10	2.50 - 3.75	46.0
Fish Research SFH	1	Rainbow Trout	4.00	4,500	CWD	20	2.50 - 3.75	54.0
Grace SFH	1	Rainbow Trout	5.70	41,770	CWD	10	2.50 - 3.75	52.0
Hagerman SFH	5	Rainbow Trout	2.7 - 6.8	850,417	CWD	10	2.50 - 3.75	59.0
Nampa SFH	1	Rainbow Trout	4.62	190,000	CWD	10	2.50 - 3.75	59.0
Rifle Falls SFH	6	Rainbow Trout	3.3 - 4.0	724,558	CWD	10	2.50 - 3.75	58.0
Hackettstown SFH	2	Tiger Musky	5.3 - 8.0	28,500	Columnaris	10	2.50 - 3.75	66.0 - 68.0
Simaron Fresh Water Fish Inc.	4	Tilapia	7.5 - 14.0	53,000	Streptococcus	14 - 19	2.50 - 3.75	75.2 - 80.6
St. Croix Waters Tribal Fishery	22	Yellow Perch	3.1 - 8.4	659,552	Columnaris	10	2.50 - 3.75	71.0 - 72.0
The Abalone Farm, Inc.	2	Abalone	3.00	51,515	Withering Syndrome	14	3.76 - 7.39	60.0 - 60.3
Whitman Lake Hatchery	1	Coho Salmon	3.30	413,759	CWD	14	3.76 - 7.39	38.3
Washoe Park Trout SFH	1	Cutthroat Trout	2.70	101,000	CWD	14	3.76 - 7.39	52.0
Kent SeaTech Corp.	11	Hybrid Striped bass	2.00	2,703,881	Gram Negative Bacterial Enteritis	10	3.76 - 7.39	77.0

**Table 1. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Efficacious Trials - continued**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of Treatment Days	Dose (g/100 lbs)	Temp. (°F)
Simaron Fresh Water Fish Inc.	3	Tilapia	6.0 - 11.3	44,100	Streptococcus	13 - 15	3.76 - 7.39	75.2 - 77.0
Dexter Ponds SFH	1	Chinook Salmon	4.70	441,915	Columnaris	14	10.0	60.9
Neets Bay Hatchery	1	Coho Salmon	2.40	1,608,483	CWD	14	10.0	52.9
Murray Springs Trout SFH	6	Cutthroat Trout	1.0 - 3.3	428,865	CWD	14	10.0	43.5 - 52.0
Washoe Park Trout SFH	3	Cutthroat Trout	1.0 - 2.9	266,900	CWD	14 - 15	10.0	52.0 - 55
Hagerman SFH	6	Rainbow Trout	0.75 - 1.8	940,786	CWD	14	10.0	59.0
Marion Forks SFH	1	Rainbow Trout	2.00	298,914	CWD	14	10.0	41.0
Hagerman SFH	1	Steelhead Trout	1.68	96,000	Columnaris	14	10.0	59.0

**Table 2. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Non-efficacious Trials**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of Treatment Days	Dose (g/100 lbs)	Temp. (°F)
Rathbun SFH	1	Channel Catfish	6.20	58,464	Columnaris	10	2.50 - 3.75	79.0
St. Croix Waters Tribal Fishery	4	Hybrid Striped Bass	4.1 - 5.6	132,004	Columnaris	10	2.50 - 3.75	71.0
Durango SFH	1	Kokanee Salmon	1.20	667,800	Bacterial Gill Disease	12	2.50 - 3.75	52.0
Bellvue SFH	1	Rainbow Trout	2.10	67,900	CWD	11	2.50 - 3.75	54.0
Hagerman SFH	1	Rainbow Trout	2.65	260,515	CWD	10	2.50 - 3.75	59.0
Wray SFH	1	Smallmouth Bass	1.43	85,727	Columnaris	10	2.50 - 3.75	78.0
St. Croix Waters Tribal Fishery	2	Yellow Perch	3.0 - 8.0	109,153	Columnaris	10	2.50 - 3.75	71.0 - 72.0
The Abalone Farm, Inc.	1	Abalone	3.20	85,600	Withering Syndrome	11	3.76 - 7.39	52.0
St. Croix Waters Tribal Fishery	3	Yellow Perch	2.3 - 3.3	99,450	Columnaris	10	3.76 - 7.39	72.0
Bonneville SFH	1	Coho Salmon	5.75	799,375	CWD	22	10.0	48.0
Nez Perce Tribal Hatchery	1	Coho Salmon	4.50	60,000	CWD	21	10.0	41.0
Murray Springs Trout SFH	1	Cutthroat Trout	1.14	15,000	CWD	14	10.0	52.0
Hagerman SFH	5	Rainbow Trout	0.75 - 1.5	846,579	CWD	14	10.0	59.0

**Table 3. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Inconclusive Trials**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of treatment days	Dose (g/100 lbs)	Temp. (°F)
Channel Islands Marine Resource Inst.	7	Abalone	1.00	55,149	Withering Syndrome	12 - 22	0.77 - 2.46	60.0
The Abalone Farm, Inc	1	Abalone	2.75	33,000	Withering Syndrome	14	0.77 - 2.46	55.1
Simaron Fresh Water Fish Inc.	3	Tilapia	4.0 - 8.9	152,879	Streptococcus	15	0.77 - 2.46	75.2 - 77.0
The Abalone Farm, Inc.	5	Abalone	2.8 - 3.3	238,500	Withering Syndrome	10 - 14	2.50 - 3.75	53.0 - 56.0
Hackettstown SFH	1	Bluegill	6.00	12,200	Columnaris	10	2.50 - 3.75	82.0
Rathbun SFH	1	Channel Catfish	6.30	56,619	Columnaris	10	2.50 - 3.75	68.0
Elmendorf SFH	1	Chinook Salmon	3.00	396,000	Enteric Redmouth	14	2.50 - 3.75	46.0
Hackettstown SFH	1	Hybrid Striped Bass	1.50	28,000	Columnaris	10	2.50 - 3.75	76.0
St. Croix Waters Tribal Fishery	2	Hybrid Striped Bass	2.4 - 4.4	89,727	Columnaris	10	2.50 - 3.75	71.0
Spirit Lake SFH	1	Muskellunge	1.93	3,000	Columnaris	10	2.50 - 3.75	69.8
Bellvue SFH	3	Rainbow Trout	1.8 - 2.4	177,200	CWD	10	2.50 - 3.75	54.0
Farlington SFH	1	Hybrid Striped Bass	1.80	38,272	Columnaris	10	2.50 - 3.75	83.0
Grace SFH	1	Rainbow Trout	5.90	42,012	CWD	10	2.50 - 3.75	52.0

**Table 3. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Inconclusive Trials**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of treatment days	Dose (g/100 lbs)	Temp. (°F)
Hagerman SFH	1	Rainbow Trout	4.91	76,654	CWD	10	2.50 - 3.75	59.0
	1	Rainbow Trout	6.38	81,530	Columnaris	10	2.50 - 3.75	59.0
Nampa SFH	1	Rainbow Trout	5.00	69,000	CWD	10	2.50 - 3.75	59.0
Roaring Judy SFH	2	Rainbow Trout	3.1 - 5.4	474,978	CWD	10	2.50 - 3.75	51.0 - 54.0
Sawtooth SFH	1	Spring Chinook Salmon	5.51	113,200	CWD	14	2.50 - 3.75	43.5
St. Croix Waters Tribal Fishery	4	Yellow Perch	2.6 - 6.4	153,344	Columnaris	10	2.50 - 3.75	71.0 - 72.0
The Abalone Farm, Inc.	1	Abalone	3.00	45,406	Withering Syndrome	14	3.76 - 7.39	58.0
Whitman Lake Hatchery	1	Coho Salmon	3.30	209,460	CWD	14	3.76 - 7.39	38.3
Kent SeaTech Corp.	1	Hybrid Striped Bass	2.00	385,516	Gram Negative Bacterial Enteritis	10	3.76 - 7.39	77.0
St. Croix Waters Tribal Fishery	3	Yellow Perch	2.9 - 5.3	235,927	Columnaris	10	3.76 - 7.39	72.0
Crystal Lake Hatchery	1	Chinook Salmon	2.30	1,800,700	CWD	14	10.0	46.9
Rapid River SFH	1	Chinook Salmon	3.40	2,839,665	CWD	14	10.0	51.8
Murray Springs Trout SFH	1	Cutthroat Trout	1.32	100,000	CWD	14	10.0	52.0

**Table 3. Summary of CY 2002 Oxytetracycline Medicated Feed Efficacy Results - Inconclusive Trials - cont.**

Hatchery	Number of Trials	Fish Species	Fish Size (inches)	Number of Fish	Disease	Number of treatment days	Dose (g/100 lbs)	Temp. (°F)
Hagerman SFH	4	Rainbow Trout	0.75 - 1.6	694,200	CWD	10 - 14	10.0	59.0
	1	Rainbow Trout	1.55	158,850	Columnaris	14	10.0	59.0
Murray Springs Trout SFH	1	Rainbow Trout	1.09	55,000	CWD	14	10.0	52.0
Washoe Park Trout SFH	1	Rainbow Trout	1.00	24,000	CWD	16	10.0	55.0
Bonneville SFH	1	Steelhead Trout	4.10	118,750	CWD	14	10.0	41.5
Murray Springs Trout SFH	1	Cutthroat Trout	1.67	34,500	CWD	14	10.6	52.0

**Table 4. Summary Data Regarding CY 2002 Oxytetracycline Medicated Feed Efficacy Trials**

**Total Fish Treated:** **26,343,964**

Number of fish treated in efficacious trials	14,063,159
Number of fish treated in ineffective trials	3,287,567
Number of fish treated in inconclusive trials	8,993,238

**Total number of trials:** **202**

Efficacious trials	123 (61%)
Ineffective trials	23 (11%)
Inconclusive trials	56 (28%)

**Trials that Included Control Fish:**

Study Numbers: 9332-01-019; 9332-01-063; 9332-01-070; 9332-01-105; 9332-02-029; 9332-02-085; 9332-02-085 (2); 9332-02-086; 9332-02-086 (2); 9332-02-087, 9332-02-087 (2); 9332-02-087 (3); 9332-02-093; 9332-02-102, 9332-02-105 (7), 9332-02-105 (8), 9332-02-105 (9), 9332-02-111, 9332-02-113, 9332-02-117, 9332-02-119, 9332-02-120, 9332-02-124, 9332-02-125, 9332-02-128, and 9332-02-135

**Treatment Regimes Used:**

0.77 - 2.46 g/100 lbs fish/day for 12 - 22 days (above 48.2°F)	19 trials
2.50 - 3.75 g/100 lbs fish/day for 10 - 20 days (above 48.2°F)	111 trials
2.50 - 3.75 g/100 lbs fish/day for 10 - 14 days (below 48.2°F)	5 trials
3.76 - 7.39 g/100 lbs fish/day for 10 - 15 days (above 48.2°F)	26 trials
3.76 - 7.39 g/100 lbs fish/day for 14 days (below 48.2°F)	2 trials
10.0 g/100 lbs fish/day for 10 - 16 days (above 48.2°F)	32 trials
10.0 g/100 lbs fish/day for 14 - 22 days (below 48.2°F)	6 trials
10.6 g/100 lbs fish/day for 14 days (above 48.2°F)	1 trial

**Treatment Water Temperature (°F):**

Temperature Range	38.3 - 83.0
Mean Temperature	63.7

**Size of Treated Fish (in.):**

Size Range	0.75 - 14.8
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**Species Treated:**

**Salmonids**

rainbow trout *Oncorhynchus mykiss*  
steelhead trout *O. mykiss*  
coho salmon *O. kisutch*  
chinook salmon *O. tshawytscha*  
cutthroat trout *O. clarki*  
kokanee salmon *O. nerka*

**Non-salmonids**

bluegill *Lepomis macrochirus*  
channel catfish *Ictalurus punctatus*  
hybrid striped bass *Morone chrysops* x *M. saxatilis*.  
Mozambique tilapia *Tilapia mossambica*  
muskellunge *Esox masquinongy*  
northern pike *E. lucius*  
smallmouth bass *Micropterus dolomieu*  
tiger musky *E. lucius* x *E. masquinongy*  
yellow perch *Perca flavescens*

**Shellfish:**

red abalone *Haliotis rufescens*





































