

Judicious Use of Aquatic Animal Drugs

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Judicious Use of Aquatic Animal Drugs



Judicious

- ❖ **Definition: Having or exhibiting good judgment or sound thinking**
 - ❖ **Synonyms: wise, sensible, prudent**
- ❖ **AVMA Judicious Antimicrobial Use Principles**
 - **Accept responsibility for helping client design management, immunization, production unit, and nutritional programs to reduce the incidence of disease and the need for antimicrobial treatment**



Judicious Use of Therapeutants

- ❖ Treat as a last resort
- ❖ Match “diagnosis” with situation; or utilize historical data for a given facility/fish species/time of year
- ❖ Establish a valid veterinarian/client and/or fish health specialist relationship
- ❖ Select appropriate therapeutant to control mortality
- ❖ Deliver appropriate treatment by following all use guidelines (i.e., dose + duration + frequency) **conduct a small bioassay trial if you're unsure**



Judicious Use of Therapeutants

- ❖ Fate of treated fish
- ❖ Food fish - adherence to withdrawal time before release or slaughter
- ❖ “More is not necessarily better”
- ❖ Adherence to discharge requirements (NPDES – Federal and state agencies)
- ❖ Familiar with EPA Hatchery Effluent Guidelines



Available Drugs

- ❖ **Approved drugs**
- ❖ **Unapproved (but legal to use) drugs**
 - **Investigational New Animal Drugs (INADs)**
 - **Low Regulatory Priority (LRP) Drugs**
 - **Deferred Regulatory Status Drugs**



Approved drugs

- ❖ **Romet TC** (in feed)
- ❖ (limited use)

- ❖ **Terramycin 100** (in feed)
- ❖ (limited use)

- ❖ **Aquaflor[®]** (in feed)
- ❖ (limited use)

- ❖ **OTC** (immersion marking)

- Terramycin 343
- OTC HCL Soluble Powder
- OxyMarine

- ❖ **MS – 222**

- ❖ **Chorulon (HCG)**

- ❖ **Formalin**

- Parasiticide – all FW fish
- Fungicide – all FW eggs



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INADs

- ❖ **Aquaflor[®]**
 - ❖ **OTC** (feed – therapy)
 - ❖ **OTC** (injection – therapy)
 - ❖ **OTC** (immersion – therapy)
 - ❖ **Erythromycin** (feed – therapy)

 - ❖ **SE-MARK[®]** (Calcein)
 - ❖ **OTC** (feed – marking)

 - ❖ **17 alpha-MT**

 - ❖ **Slice**
- ❖ **Formalin**
 - ❖ **Hydrogen peroxide**
 - ❖ **Chloramine-T**
 - ❖ **Diquat**
 - ❖ **Copper Sulfate**
 - ❖ **KMnO₄**

 - ❖ **CCP**
 - ❖ **LHRHa** (injectable)
 - ❖ **sGnRH** (implant)

 - ❖ **AQUI-S**



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Low Regulatory Priority Drugs

- ❖ Acetic acid
- ❖ Calcium oxide
- ❖ Garlic
- ❖ Hydrogen Peroxide
- ❖ Magnesium sulfate
- ❖ Onion
- ❖ Potassium chloride
- ❖ Sodium chloride
- ❖ Calcium chloride
- ❖ Fuller's earth
- ❖ Papain
- ❖ Urea or Tannic acid
- ❖ Povidone Iodine
- ❖ Sodium Sulfite
- ❖ Ice
- ❖ Carbon dioxide gas
- ❖ Sodium Bicarbonate



Deferred Regulatory Status Drugs

- ❖ Copper sulfate (CuSO_4)
- ❖ Potassium permanganate (KMnO_4)



Total Number of Drugs Available

7 approved drugs

17 LPR drugs

2 DRS drugs

18 INADs

Total = 44 drugs



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Case Studies and Treatment Options

- ❖ **Control mortality due to:**
 - Bacterial gill disease/external columnaris
 - Systemic columnaris/motile aeromonad septicemia
 - Saprolegniasis in fish
 - External parasites
- ❖ **Mark skeletal tissue**
- ❖ **Sedate and spawn fish**



External Bacterial Infection

- ❖ **Chloramine-T** (10, 15 or 20 mg/L for 60 min up to 3 times)
- ❖ **Diquat** (2 – 18 ppm for 1 – 4 hr*; 19 - 28 ppm for 30 – 60 min**)
- ❖ **Hydrogen Peroxide** (INAD: 50 - 100 ppm for 30 - 60 min)
- ❖ **Terramycin 343** (20 ppm for 60 min)
- ❖ **KMnO₄** (1 – 10 mg/L for 1 hr)
- ❖ **CuSO₄** (total alkalinity/100 - indefinitely in ponds)

* for treatment of coldwater fishes (up to 4x/wk)

**for treatment of cool- and warmwater fishes (up to 3x/wk)



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Systemic Bacterial Infection

- ❖ **OTC medicated feed** (2.5 - 3.75 g/100 lbs fish/day for 10 d)
 - ❖ **Romet TC** (51 mg/kg fish/d for 5 d)
 - ❖ **Aquaflor[®]** (10 mg/kg fish/d for 10 d)
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- ❖ **OTC medicated feed**
 - ❖ **OTC immersion** (Terramycin 343 - 20 mg/L; one time)
 - ❖ **OTC injectable** (Liquamycin 200 – 20 mg/kg; one time)
 - ❖ **Aquaflor[®]** (10 mg/kg fish/d for 10 d)



Saprolegniasis in Fish

- ❖ **In combination with external parasites?**
 - **Formalin** (up to 250 ppm up to 1 hr)
 - **Hydrogen peroxide** (LRP: 250 – 500 ppm; or INAD: 50 – 100 ppm for 30 – 60 min)
- ❖ **No confounding external parasites**
 - **Formalin** (15 – 2,000 ppm for 30 – 60 min)
 - **Hydrogen peroxide** (LRP or INAD)
 - **CuSO₄** (DRS)



External Parasites

- ❖ **Formalin** (up to 250 ppm for up to 1 hr)
- ❖ **Hydrogen peroxide** (INAD: 50 – 100 ppm for 30 - 60 min)
- ❖ **KMnO₄**
- ❖ **CuSO₄**
- ❖ **Acetic acid**
- ❖ **Calcium oxide** (protozoan)
- ❖ **Garlic** (sea lice in marine salmonids)
- ❖ **Magnesium sulfate** (monogenetic trematode)
- ❖ **Onion** (crustacean parasites and sea lice)



Marking Skeletal Tissue

- **OTC HCL Soluble Powder 343** (IVX Animal Health)
- **Terramycin 343** (Pfizer Inc.)
- **OxyMarine** (Alpharma Inc.)
- **SE-MARK[®]** (Calcein; Western Chemical)



Spawning Aids

❖ Anesthetic

- **MS-222** (Finquel or Tricaine-S)
- **AQUI-S®**

❖ Hormone

- **HCG**
- **LHRHa** (injectable)
- **CCP**
- **sGnRH** (implant)



Summary

...or “what’s this all mean??”

- ❖ Yeah, you’re right, “we” don’t have many approved aquatic animal drugs to chose from...
- ❖ However, access to INADs, LRP drugs, and DRS drugs enhances our medicine chest...
- ❖ Provide us more options to treat fish than we might have previously thought.



Regardless of the “classification” of the accessible drugs, all drugs should be used judiciously

- ❖ Treat as a last resort
- ❖ Know what you’re treating for...don’t guess
- ❖ Use the appropriate drug correctly – more is not necessarily better
- ❖ Adhere to established withdrawal periods and hatchery discharge requirements



Questions?



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