EFFECTIVENESS OF AQUAFLOR® AGAINST BKD

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AQFL-09-EFF-02

AQFL-09-EFF-03

OR BETTER FISHING THROUGH CHEMISTRY

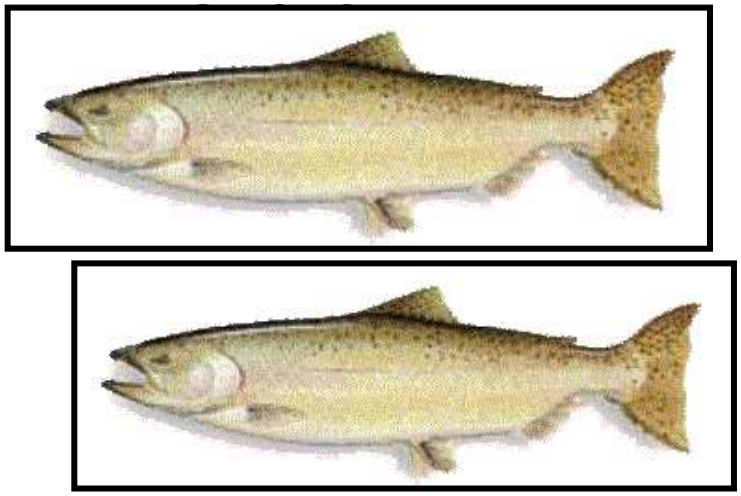
TODAYS PRESENTATION WILL

- PRESENT THE FINDINGS OF TWO PIVOTAL STUDIES CONDUCTED AT EFHL WITH AADAP
- DEMONSTRATE THAT BOTH ERYTHROMYCIN AND FLORFENICOL ARE EFFECTIVE AGAINST BKD

GROSS LESION IN SOCKEYE SALMON

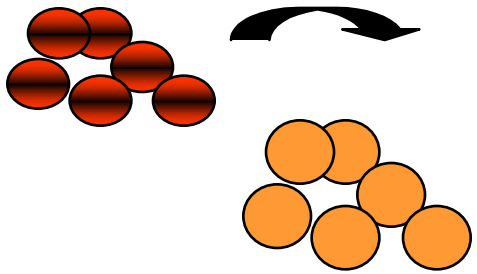
GROSS LESIONS IN CHINOOK SALMON: PIVOTAL STUDY FISH

ADULT

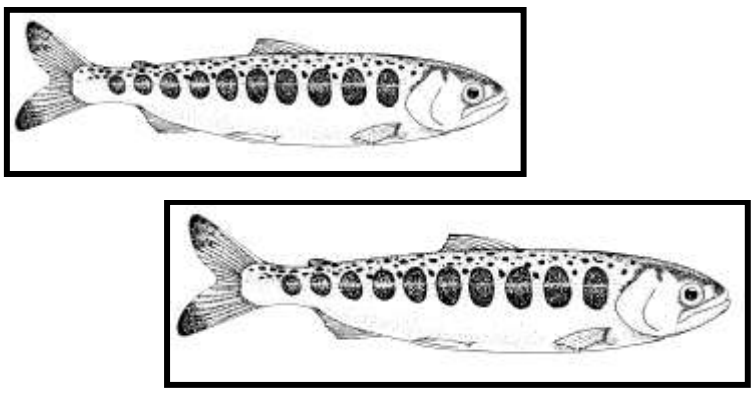


EGG DISINFECTION

ELISA-BASED CULLING

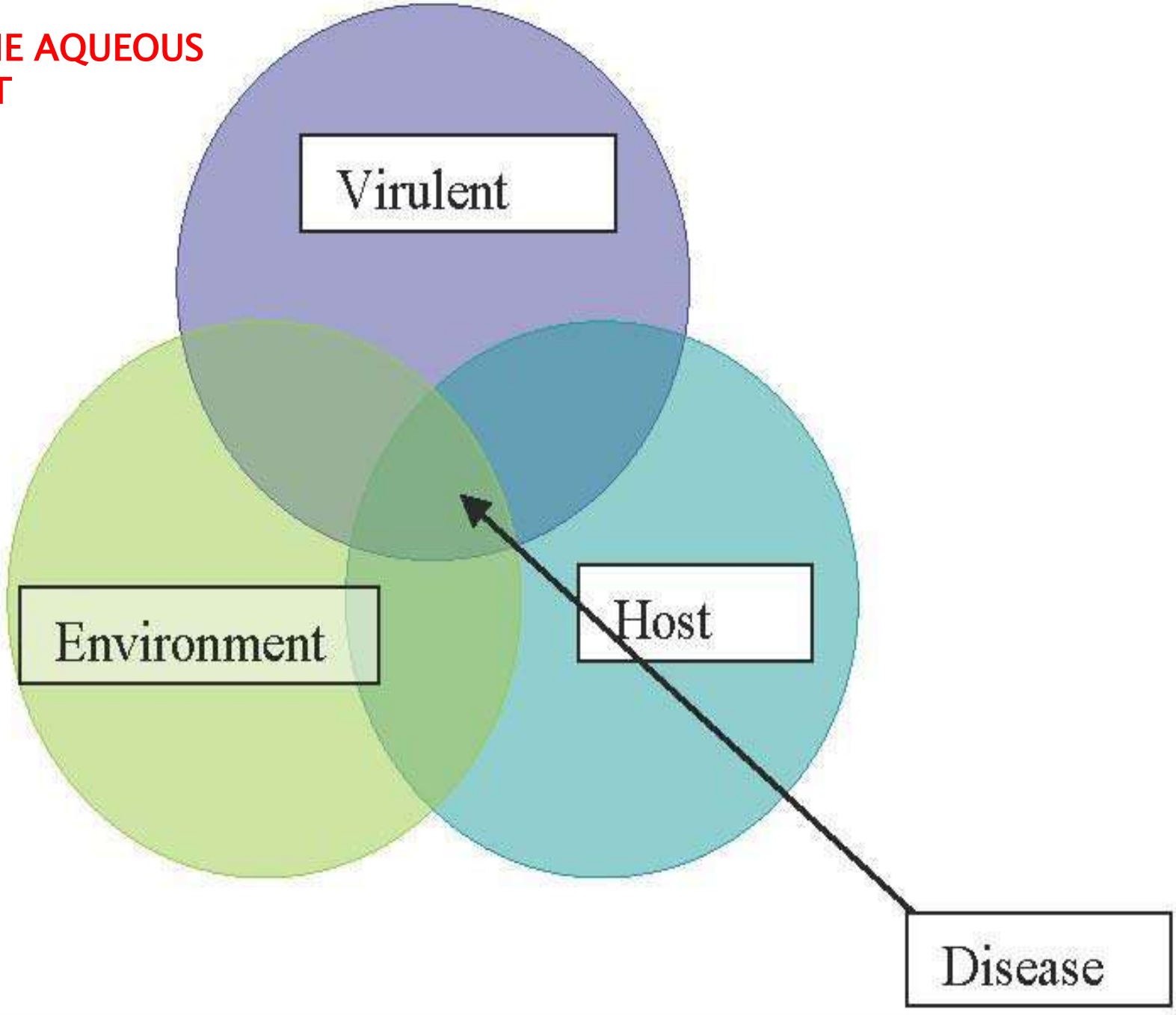


ERYTHROMYCIN MEDICATED FEED

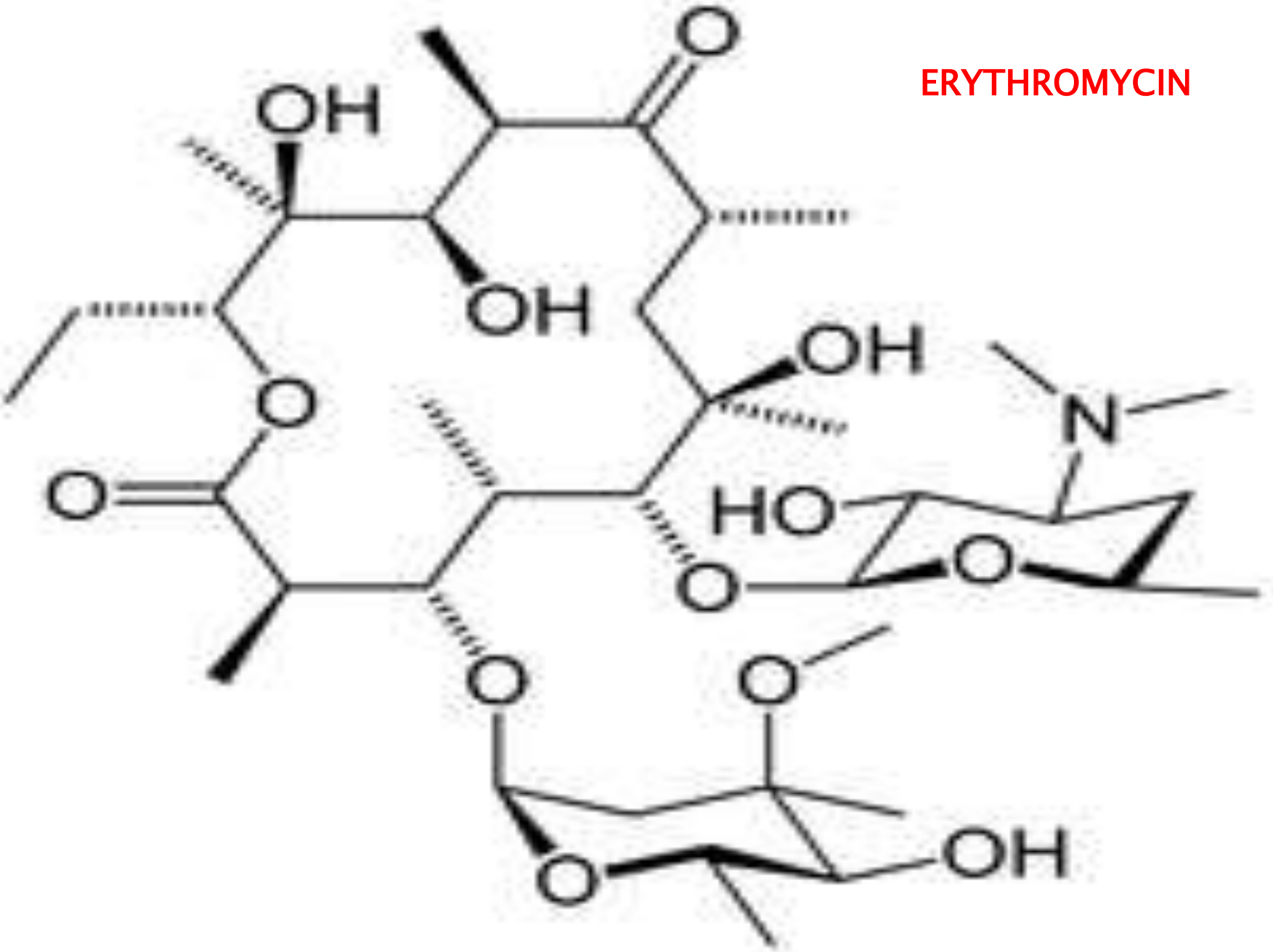


SEGREGATED RELEASES

DISEASE IN THE AQUEOUS ENVIRONMENT



ERYTHROMYCIN



ERYTHROMYCIN

- INAD 6013 METAPHYLACTIC TREATMENT OF BACTERIAL KIDNEY DISEASE (BKD)
- WILL USE AS A FEED ADDITIVE FOR JUVENILE SALMON AGAINST BKD (100 MG/KG/DAY)
- WILL INJECT INTRA-PERITONEALLY ADULTS AGAINST BKD (10-20 MG/KG)
- BACTERIOSTATIC OR BACTERIALCIDAL
- INHIBITS PROTEIN SYNTHESIS AT THE 50S RIBOSOMAL UNITS

ERYTHROMYCIN

- FEED TARGET DOSE IS 100 MG/KG/DAY FOR 28 DAYS
- INJECTION TARGET DOSE IS 10-20 MG/KG
- TOXICITY IN JUVENILES (TETANY/DEATH)
- TOXICITY IN ADULTS (JAUNDICE/DEATH)
- NEED AN INAD TO USE IN MEDICATED FEED
- NEED VETERINARY EXTRA-LABEL PRESCRIPTION FOR ADULT INJECTIONS
- UNPALATABLE
- KRILL COATING CAN CAUSE MYCOTIC INFECTION

FUNGUS MOUTH

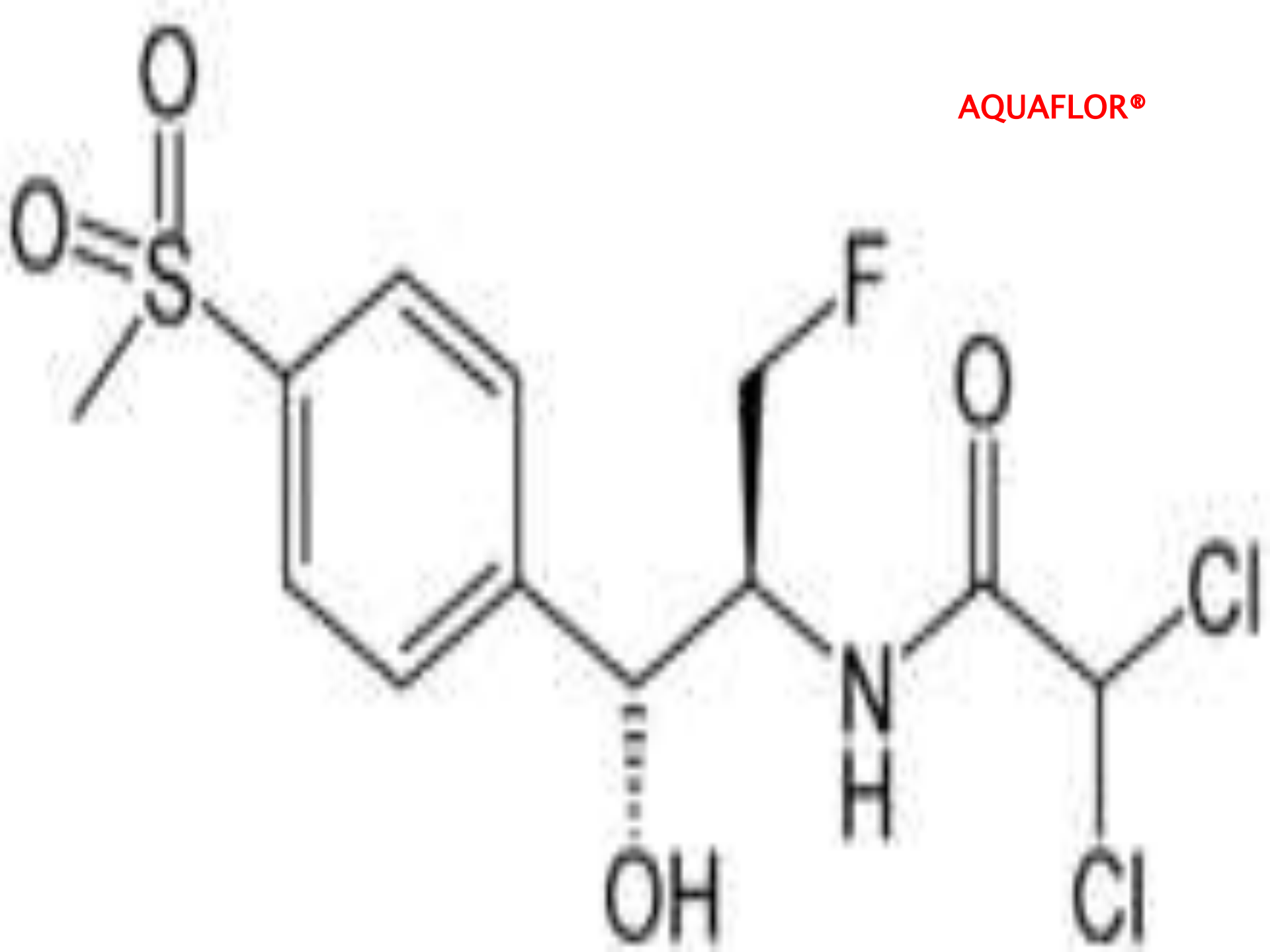
ERYTHROMYCIN TOXICITY

OVER 70,000 FISH LOST TO ERYTHROMYCIN TOXICITY AT RAPID RIVER (2005)

WHAT ELSE COULD WE USE?

- IN TIMES OF HIGH STRESS CLINICAL SIGNS WOULD APPEAR
- INAD (9332) HIGH DOSE OTC (10 g active OTC/100#'s of fish, for 14 DAYS)
- CALLED JIM BOWKER WOULD AADAP BE INTERESTED IN EXPANDING LABEL FOR OTC
- JIM CALLED BACK AND SUGGESTED AQUAFLOR®

AQUAFLOR®



NEED FOR ANOTHER ANTIBIOTIC

- CURRENTLY WE MUST PREDICT OUR ERYTHROMYCIN NEEDS IN JANUARY
- UNDER STRESSFUL CONDITIONS, CHINOOK HATCHERIES STILL EXPERIENCE LOSSES TO BKD
- ANTIBIOTIC RESISTANCE
- AVAILABILITY OF INJECTABLE ERYTHROMYCIN IS DUBIOUS

AQUAFLOR (FLORFENICOL)

- FIRST FEED ANTIBIOTIC FOR U.S. AQUACULTURE IN MORE THAN 20 YEARS
- BACTERIOSTATIC or BACTERIOCIDAL
  - CONCENTRATION OR DURATION DEPENDENT
- BROAD SPECTRUM
- HIGHLY PALATABLE
- SAFE (POSSIBLE UV SENSITIVITY IN STHD/RBT)

AQUAFLOR®

- CAN BE USED WITH A VETERINARY FEED DIRECTIVE
- INHIBITS PROTEIN SYNTHESIS BY BINDING TO RIBOSOMAL SUBUNITS OF SUSCEPTIBLE BACTERIA

FIRST PIVOTAL STUDY

- EGGS WERE COLLECTED, FERTILIZED, AND WATER HARDENED **WITHOUT** IODOPHOR FROM A FEMALES WITH GROSS SIGNS OF BKD (SOUTH FORK OF THE SALMON RIVER SUMMER CHINOOK SALMON)
- THESE FEMALES DID NOT RECEIVE AN INJECTION OF ERYTHROMYCIN
- EGGS WERE INCUBATED AT McCALL HATCHERY
- FRY WERE TRANSPORTED TO EFHL AND HELD UNTIL SIGNS OF BKD WERE NOTICED

FIRST PIVOTAL STUDY

- COMPARE MORTALITY RATES BETWEEN AQUAFLOR MEDICATED FEED AND CONTROL FEED
- BOTH TREATMENTS FED AT 4.0% BODY WEIGHT
- AQUAFLOR MEDICATED FEED TARGET DOSE AT 15 MG/KG FOR 10 DAYS
- FOUR CONTROL TANKS WITH 206 FISH PER TANK AND FOUR TREATMENT TANKS WITH 206 FISH PER TANK
- OBSERVE 14 DAYS POST TREATMENT


DO NOT

DAILY DATA COLLECTION

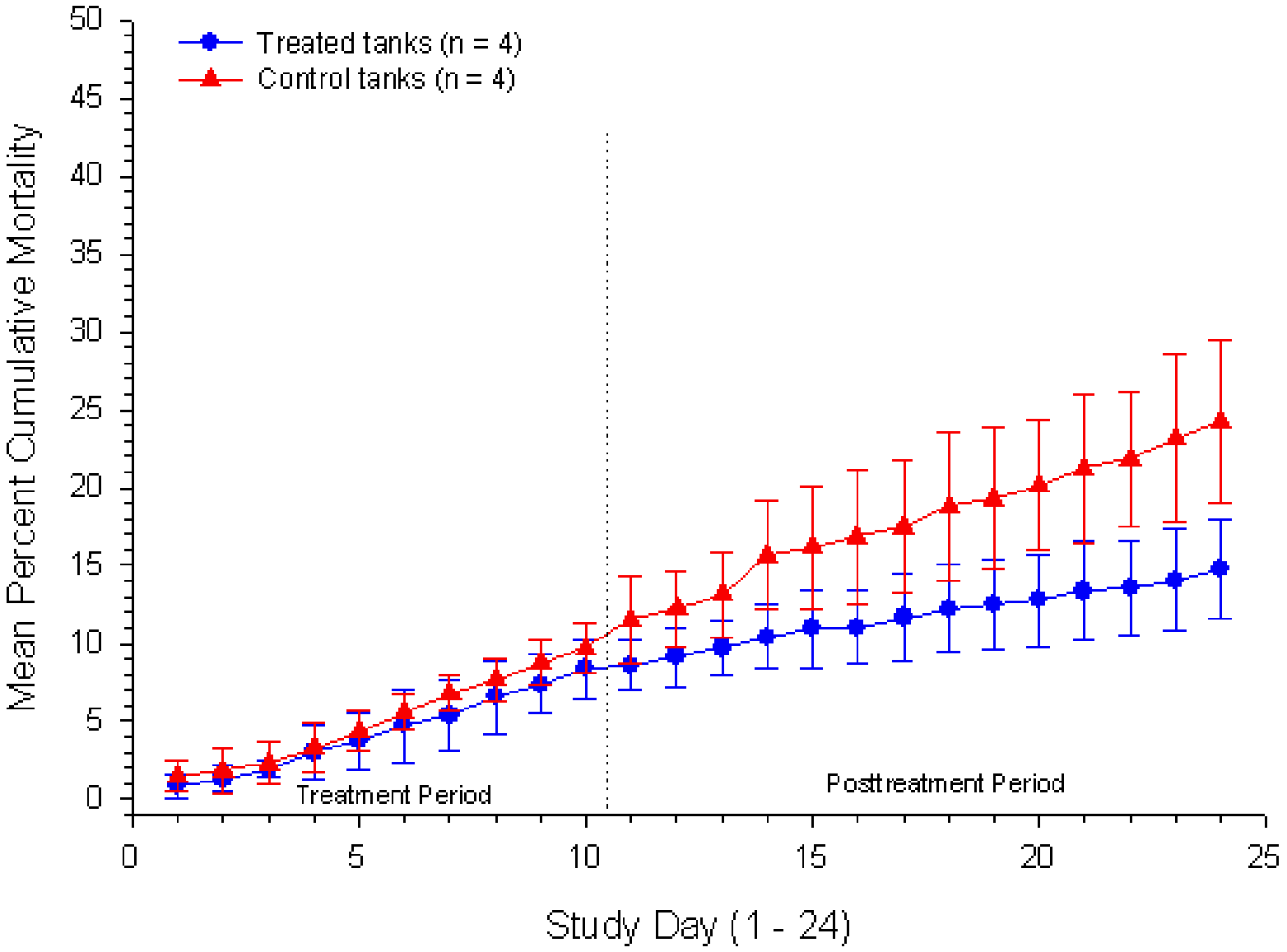
- MORTALITY IN EACH TANK
- FEEDING RESPONSE
- DISSOLVED OXYGEN
- TEMPERATURE
- WATER CHEMISTRY
- ALL DATA COLLECTED BY MASKED INVESTIGATOR
- UNMASKED INVESTIGATOR WEIGHS OUT FEED (KNOWS WHICH TANKS ARE WHICH)

OTHER INFORMATION

- FISH FED BY BELT FEEDERS (FIRST TRIAL)
- DAILY WATER QUALITY PARAMETERS MEASURED BY YSI 556 MPS METER (DISSOLVED OXYGEN, pH, AND TEMPERATURE)
- HACH KIT WAS USED FOR ALKALINITY AND HARDNESS

MORE INFORMATION

- INFECTION CONFIRMED BY DFAT, ELISA, AND PCR
- SAS PROC GLIMMIX (general linear mixed model) $P<0.05$
- ACCLIMATION 1d, TREATMENT 10d,POST-TREATMENT 14 d (SECOND STUDY 18 d)
- STUDY 1 BIO-OREGON BIOVITA STARTER #2
- MEAN WATER TEMPERATURE WAS 13.6°C
- AVERAGE D.O. WAS 6.1 mg/L
- HARDNESS, ALKALINITY, pH
  - 85 mg/L, 8 mg/L, 7.2


Treated tanks (n = 4)
Control tanks (n = 4)
Mean Percent Cumulative Mortality
50
45
40
35
30
25
20
15
10
5
0
Treatment Period
Posttreatment Period
0
5
10
15
20
25
Study Day (1 - 24)

AQUAFLOR MEDICATED FEED VS CONTROL FEED: CONTROL OF BKD

	TANK NUMBER							
	1	2	3	4	5	6	7	8
TOTAL MORTALITY	47	39	24	45	32	43	27	66
POST TREATMENT	24	18	10	24	12	28	14	44

TREATED TANKS: MEAN % CUMULATIVE MORTALITY 14.8% (RANGE 11.7-18.9%)
TOTAL MORTALITY : 122 (RANGE 24-39 MORTS/TANK)

UNTREATED: MEAN % CUMULATIVE MORTALITY 24.7 % (RANGE 20.9-32.0%)
TOTAL MORTALITY: 200 (RANGE 43-66 MORTS/TANK)

P=0.021!

GREEN FONT DESIGNATES AQUAFLOR TREATED TANKS

AQUAFLOR VS BKD

- AQUAFLOR TREATED TANKS BENEFITED FROM THE TREATMENT
- MINIMUM INHIBITORY CONCENTRATION NEEDS TO BE ESTABLISHED FOR AQUAFLOR AGAINST *RENIBACTERIUM SALMONINARUM*
- THIRD PIVOTAL STUDY INVESTIGATION NEXT YEAR?

ERYTHROMYCIN VS AQUAFLOR VS CONTROL

- EGGS WERE COLLECTED, FERTILIZED, AND WATER HARDENED **WITHOUT** IODOPHOR FROM A FEMALES WITH GROSS SIGNS OF BKD (SOUTH FORK OF THE CLEARWATER RIVER SPRING CHINOOK SALMON)
- THESE FEMALES DID NOT RECEIVE AN INJECTION OF ERYTHROMYCIN
- EGGS WERE INCUBATED AT CLEARWATER HATCHERY
- FRY WERE TRANSPORTED TO EFHL AND HELD UNTIL SIGNS OF BKD WERE NOTICED

CONTINUE

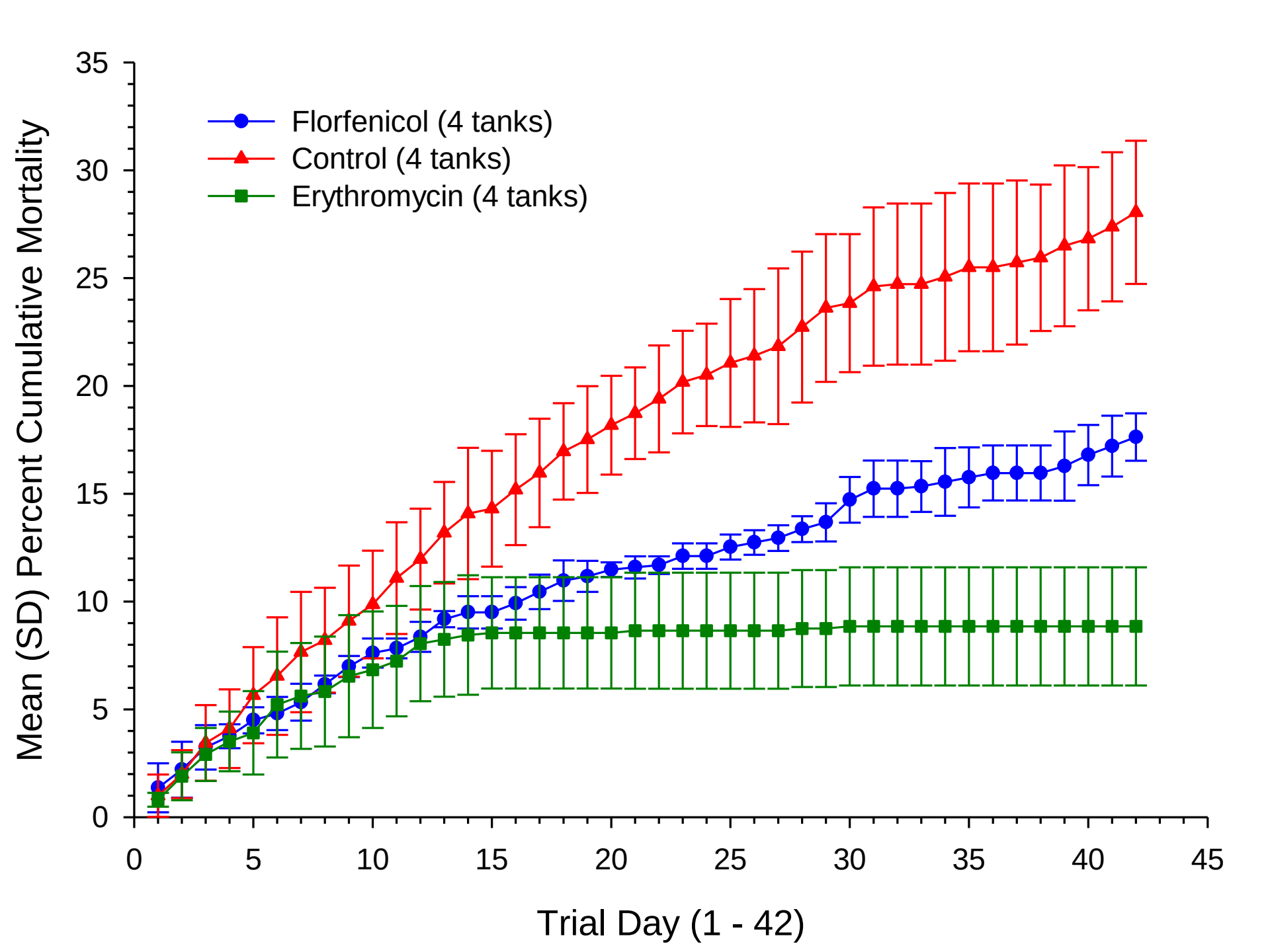
- FISH WERE RANDOMLY PLACED INTO SEMI-CIRCULAR TANKS
- 4 REPLICATES PER TREATMENT
- AQUAFLOR TANKS RECEIVED 15 MG/KG FOR 10 DAYS (TARGET DOSE)
- ERYTHROMYCIN TANKS RECEIVED 100 MG/KG FOR 28 DAYS (TARGET DOSE)
- MORTALITY COMPARISON
  - DATA ANALYSIS by SAS PROC GLIMMIX
  - TUKEY MULTIPLE COMPARISON

RESULTS

- MEAN % CUMULATIVE MORTALITY
  - DAY 24
    - FFC – 12.1% (11.4–12.7%)
    - ERY – 8.7% (4.8–11.0%)
    - CONTR – 20.5% (17.3–22.9%)
  - DAY 42
    - FFC –17.6% (16.7–19.1%)
    - ERY – 8.8% (4.8–11.0%)
    - CONTR – 28.1% (23.6–31.3%)

RESULTS

- SIGNIFICANT DIFFERENCES
  - ERY – CONTROL – DAY 13
    - *P=0.0253*
  - FFC – CONTROL – DAY 15
    - *P=0.0411*
  - ERY – FFC – DAY 28
    - *P=0.0483*


Florfenicol (4 tanks)
Control (4 tanks)
Erythromycin (4 tanks)
Mean (SD) Percent Cumulative Mortality
Trial Day (1 - 42)
0
5
10
15
20
25
30
35
40
45

CONCLUSIONS

- BOTH ANTIBIOTICS EFFECTIVE
  - CONTROLLING MORTALITY DUE TO BKD
- END OF AQUAFLOR®
  - NOT SIGNIFICANTLY DIFFERENT
- END OF ERY
  - DIFFERENCE
- DIFFERENT TREATMENT DURATION
  - 28 d VS 10 d
- DIFFERENT MODE
  - TRANSLOCATION RXN VS PEPTIDE TRANSFERASE RXN
- LIKELY LONGER AQUAFLOR®
  - FLORFENICOL 'TIME-DEPENDENT' MICROBIOCIDAL ANTIBIOTIC

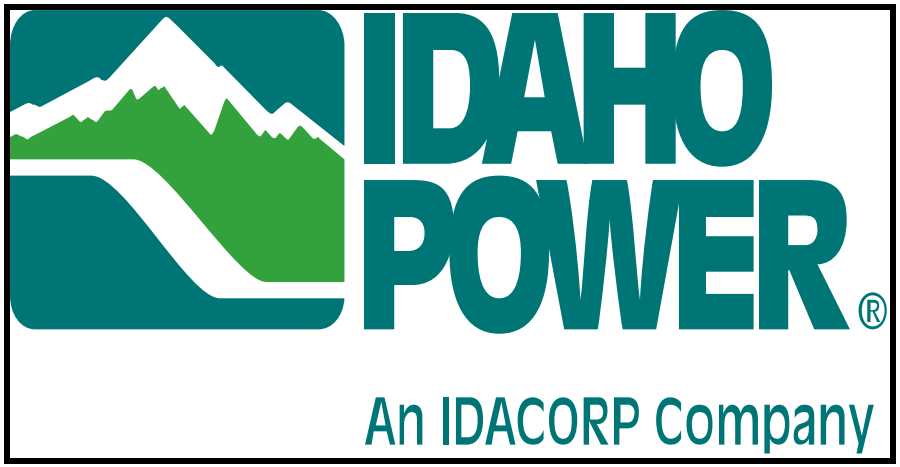
ACKNOWLEDGEMENTS

- USFWS AADAP
  - DAN CARTY – DATA ANALYSIS

- FDA OFFICE OF MINOR USE/MINOR SPECIES

STAFF MEETING

Intervet
Schering-Plough Animal Health

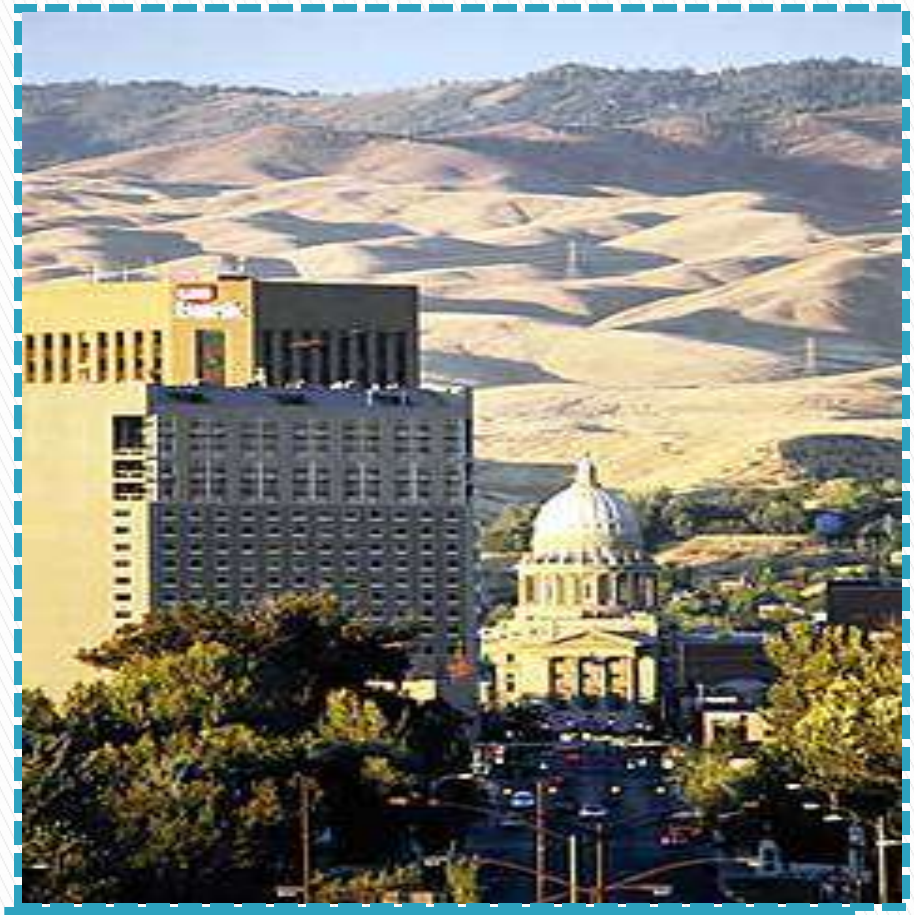


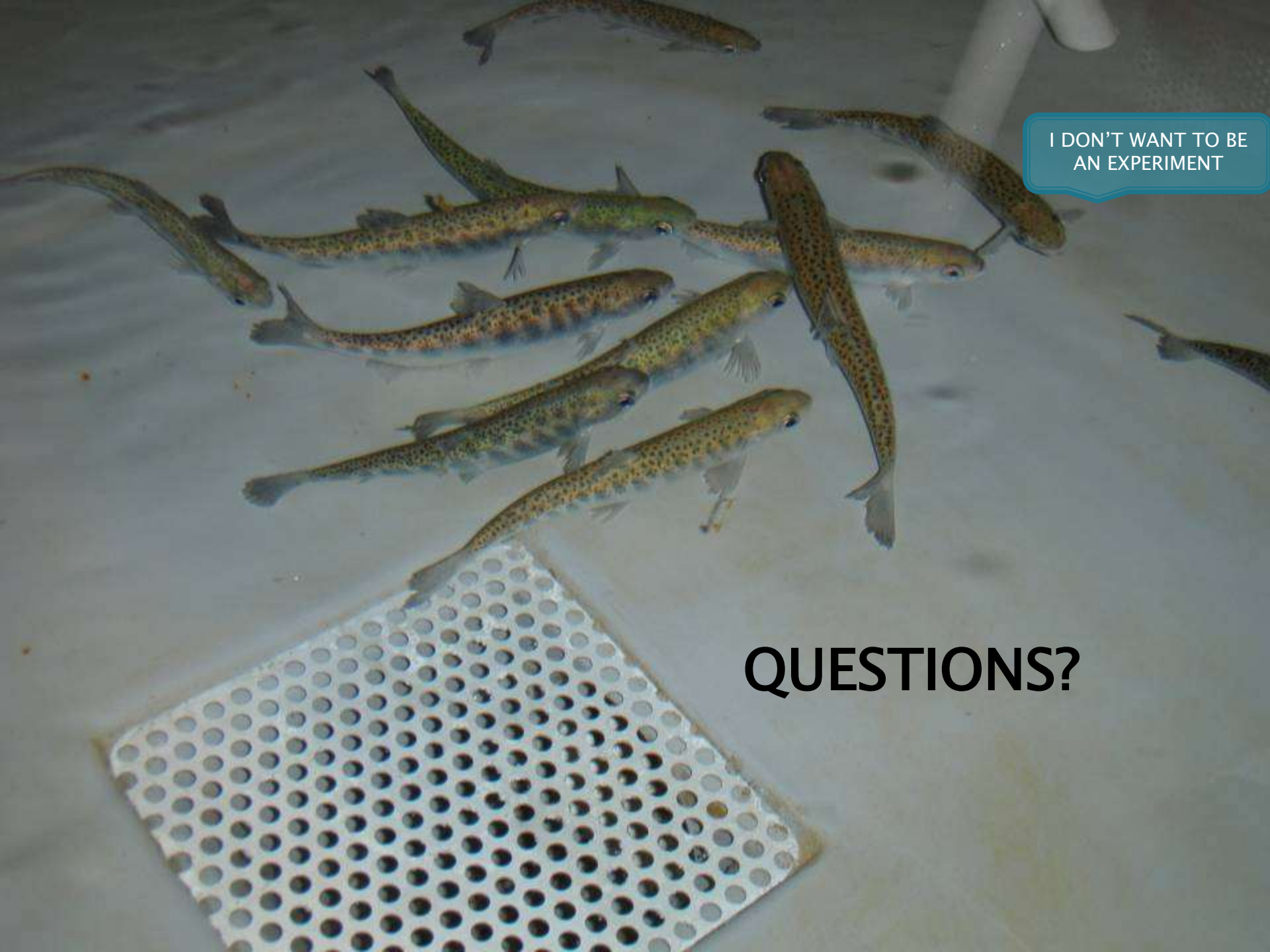
IDFG HATCHERY STAFFS

- CLEARWATER HATCHERY
- McCALL HATCHERY
- EAGLE HATCHERY

WESTERN FISH DISEASE WORKSHOP

- HOSTED BY IDFG
  - BOISE, IDAHO
  - 12 JUNE 2012
  - THE GROVE
- CE: NUTRITION, FEEDS AND FEEDING
  - DR. ANN GANNAM
- RACE CREDITS FOR VETERINARIANS





QUESTIONS?