TOTAL PROTECTION STRATEGIES FOR TILAPIA:

THE THREAT OF STREPTOCOCCAL INFECTIONS
IDEAL AQUACULTURE
HEALTH MANAGEMENT

Husbandry

Antibiotics  |  Vaccines

Immunostimulants
STREPTOCOCCOSIS

• One of The Most Serious Diseases of Cultured Aquatic Organisms
• It Has Caused Severe Losses of Aquatic Organisms In Most Regions Of The World
STREPTOCOCCOSIS

• In Intensive Culture, Fish Appear To Be Particularly Susceptible

• ‘Undoubtedly, This Disease Represents A Real Danger To Farmers Engaged In Warm Water Aquaculture’

   (Hubert, 1989)
“THE SYNERGISTIC EFFECT OF MIXED PATHOGENS SHOULD NOT BE OVERLOOKED” (Plumb, 1997)

• MULTIPLE SPECIES OF BACTERIA

• BACTERIA/ PARASITES
TRICHODINA, WHICH IS NOT PATHOGENIC, CAN CAUSE IRRITATION AND INFLAMMATION OF THE SKIN. THIS PRODUCES A PORTAL OF ENTRY FOR BACTERIA.
STREPTOCOCCOSIS

✓ Several Species Of Streptococcus Have Been Implicated In Fish Disease

– S. iniae
– S. faecalis
– S. facium
– S. agalactia
THE TAXONOMY OF FISH PATHOGENIC GRAM-POSITIVE COCCI
STREPTOCOCCOSIS: EXTERNAL SYMPTOMS

- Scale Loss
- Sluggish Behaviour
- Twirling, Spiral Or Erratic Movement
- Darkened Pigment/melanosis
- Exophthalmia (Popeye)
STREPTOCOCCOSIS : EXTERNAL SYMPTOMS

• Haemorrhaging Of The Eye And Mouth
• Haemorrhaging Of The Opercular Region/gills
• Haemorrhaging At The Base Of The Fins And Anus
• Abdominal Distension
STREPTOCOCCOSIS: INTERNAL SYMPTOMS

- Bloody Fluid In Body Cavity
- Haemorrhaging In/On Internal Organs
- Brain Damage (Meningoencephalitis)
- Pale Liver
- Enlarged Spleen (Nearly Black)
STREPTOCOCCOSIS

ANTIBIOTICS ARE NOT ENOUGH

• The Organisms Can Survive Intracellularly
• Fish Cease Eating When Infected
• Antibiotic Treatments Are Not APPLIED Long Enough TO BE EFFECTIVE
STREPTOCOCCOSIS TREATMENTS FAVOUR PRODUCTION OF CARRIERS AND DEVELOPMENT OF RESISTANCE
STREPTOCOCCOSIS

Susceptibility Is Unquestionably Linked To Stress; Injury To Skin, Scale Loss, Etc
Mortalities Can Be As High As 75%
THE ECONOMIC IMPACT OF STREPTOCOCCOSIS

• The Occurrence Of Streptococciosis Has Increased With Intensification Of Fish Culture

• One-third Of All Fish Losses In Japan Are Caused By Streptococciosis
THE ECONOMIC IMPACT OF STREPTOCOCCOSIS

• In Japan In 1989, Attributable Losses Were Valued At USD70 Million (Kusuda and Salati, 1993)
• The Most Seriously Affected Species Are Yellowtail, Eel, Tilapia, Rainbow Trout And Turbot.
STREPTOCOCCOSIS: MODES OF TRANSMISSION

• Horizontal Transmission From Fish To Fish
• Bacteria Released From Dead/dying Fish Into Water Are The Most Important Source Of Infection
STREPTOCOCCOSIS: MODES OF TRANSMISSION

• Fresh Fish in Prepared Diets (Minami, 1979)
• Oral Route (Plumb et al., 1979)
STREPTOCOCCOSIS: MODES OF TRANSMISSION

• Carriers Can Arise From Non-effective Antibiotic Treatments: Streptococcus Within White Blood Cells Are Not Killed by the Antibiotics (Zimmermann Et. Al., 1975) and Grow Once Released Into the Bloodstream
STREPTOCOCCOSIS: MODES OF TRANSMISSION

• Survivors of Disease Outbreaks Act As Carriers (Kitao, 1993)
• Silently Infected Fish or Carriers Are Considered an Important Reservoir of Infection
STREPTOCOCCOSIS

GOOD HEALTH MANAGEMENT IS ESSENTIAL AGAINST STREPTOCOCCOSIS

- QUARANTINE OF ANIMALS
- CLEANLINESS OF FACILITIES
- REMOVAL OF DEAD FISH
- GOOD NUTRITION
- USE OF IMMUNOSTIMULANTS
- USE OF VACCINES
STREPTOCOCCOSIS

DEVELOPMENT OF VACCINES

• A TOXOID ENRICHED WHOLE CELL ENTEROCOCCUS VACCINE IMPARTED 2 YEARS OF PROTECTION IN TURBOT (Romalde, et. al., 1996)
IDEAL AQUACULTURE
HEALTH MANAGEMENT

Husbandry

Antibiotics  Vaccines

Immunostimulants
DISEASE MANAGEMENT AND CONTROL

- Fish Health Management Is A Pro-active Approach To Disease Control In Aquaculture
- A Reactive Approach, I.E. Using Chemicals/drugs When Disease Occurs, Is Not Recommended
TOTAL PROTECTION STRATEGIES FOR TILAPIA AGAINST STREPTOCOCCOSIS
TYPICAL DAILY MORTALITY PATTERNS IN STOCKED TILAPIA FRY IN LAKE TAAL PHILIPPINES
50,000 FISH STOCKED OCTOBER 1999.
TYPICAL DAILY MORTALITY PATTERN

[Graph showing daily mortality pattern with two peaks labeled 1 and 2.]
MORTALITY PATTERN 1
Mortality Due to Transportation and Acclimation Stress
MORTALITY PATTERN 2
Mortality Due to Onset of Bacterial Infection
TOTAL MORTALITY DUE TO PATTERNS 1 & 2

47.6% In One Month
COMMERCIAL MORTALITY DURING ONE MONTH NURSERY STAGE IS CLOSE TO 50%
APPROXIMATELY 50% OF TILAPIA LOSSES TAKE PLACE DURING THE FIRST MONTH OF CULTURE.
THE CAUSATIVE ORGANISMS ARE TWO SPECIES OF STREPTOCOCCUS.
GROWOUT STAGE MORTALITY DURING SUMMER AND WINTER
% SURVIVAL OF TILAPIA DURING WINTER AND SUMMER 1998-1999

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VACCINATION OF TILAPIA AGAINST STREPTOCOCCOSIS: PHILIPPINES
VACCINATION TECHNOLOGY

IMMERSION

ORAL

INJECTION

IMMUNE STIMULANT
VACCINATION BY IMMERSION (DIP)
% MORTALITY IN 1 g TILAPIA VACCINATED AGAINST STREPTOCOCCOSIS: LAKE TAAL (NOVEMBER 1999)
% MORTALITY IN 1g (BATCH 2) TILAPIA VACCINATED AGAINST STREPTOCOCCOSIS: LAKE TAAL (DECEMBER 1999)
% MORTALITY IN 2 g TILAPIA VACCINATED AGAINST STREPTOCOCCOSIS: LAKE TAAL (NOVEMBER 1999)
VACCINATION BY ORAL ROUTE
% MORTALITY IN 7 to 8 g TILAPIA VACCINATED AGAINST STREPTOCOCCOSIS: LAKE TAAL (NOVEMBER 1999)
THE IMPACT OF VACCINATION AGAINST STREPTOCOCCUS DURING GROWOUT OF TILAPIA
VACCINE AND IMMUNE STIMULANT SYNERGY: POSITIVE IMPACT ON % SURVIVAL DURING STRESS OF TILAPIA FRY
## VACCINATION COST FOR TILAPIA

<table>
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<tr>
<th>Fry Size</th>
<th>Fry Weight (g)</th>
<th>Total Vaccinated/ L</th>
<th>Fry Cost (centavos)</th>
<th>Cost/ Fish (centavos)</th>
<th>Vaccination Cost as % of Fry Cost</th>
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OTHER ASIAN COUNTRIES

• Isolates Of Gram-Positive Cocci Have Been Taken From Moribund Tilapia in Thailand.

• A Vaccine Against These Infections Will Be Field Tested in Thailand in April 2000.

• A Similar Programme is Underway in Indonesia. Field Testing is Scheduled for June-July 2000.
FISH DISEASES

Streptococcosis