BIOSECURITY FOR AQUACULTURE OPERATIONS

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MARKETING AND PROCESSING WORKSHOP
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OUTLINE

What is biosecurity?
How do I develop a biosecurity plan?
Summary

GOALS

Gain a better understanding of biosecurity
Critically assess your farm
Begin to think about your biosecurity plan
WHAT IS BIOSECURITY?

Practices that **minimize the risk** of:

- Introducing an infectious agent into the facility
- Bacterial, viral, parasitic, fungal
- Spreading the agent to other fish on the farm
- Allowing the agent to leave the farm

Comprehensive approach

Encompasses different means of prevention and containment
DISEASE

AGENT

HOST

ENVIRONMENT
AGENT
HOST
ENVIRONMENT
DISEASE
DEVELOPING A BIOSECURITY PLAN

THINGS TO REMEMBER BEFORE WE START:

DON’T REINVENT THE WHEEL – MANY GOOD RESOURCES AVAILABLE

HOWEVER, EACH FARM IS DIFFERENT

ECONOMICS MUST BE CONSIDERED – UNLESS THIS IS A HOBBY

PRACTICALITY IS VITAL

NO IMPLEMENTATION = WASTE OF TIME MAKING A PLAN

YOU MUST HAVE A WRITTEN PLAN

IF IT’S NOT WRITTEN IT WON’T GET FOLLOWED

WRITING OUT A PLAN FORCES YOU TO CONSIDER THINGS YOU MIGHT OTHERWISE NOT CONSIDER
FIRST STEP: WHAT DO YOU HAVE NOW?

SCHEMATIC OF YOUR FARM
OVERVIEW OF ENTIRE FARM
SCHEMATICS FOR EACH BUILDING

ARE YOUR PONDS/TANKS/CAGES NUMBERED?
IF I WALKED ON YOUR FARM, WILL I KNOW WHAT IS WHAT?
FIRST STEP: WHAT DO YOU HAVE NOW?

**Water Source**

Deep wells safest

Surface water – increased risk

Reservoir with fish and birds – riskiest

**Define a “unit”**

Pond

Tank or group of tanks

One complete recirculating system

Building
SECOND STEP: COMPLETE A RISK ANALYSIS

1) HAZARD IDENTIFICATION
   WHAT AGENTS SHOULD YOU BE WORRIED ABOUT?

2) RISK ASSESSMENT
   HOW LIKELY ARE THOSE AGENTS?
   WHAT ARE THE CONSEQUENCES?
   POSSIBLE ROUTES OF ENTRY

3) RISK MANAGEMENT
   WHAT CAN I DO TO MITIGATE THE RISKS?
SECOND STEP: COMPLETE A RISK ANALYSIS

HAZARD IDENTIFICATION

WHAT PATHOGENS AFFECT THE ANIMALS ON YOUR FARM?

ANY DISEASE PROBLEMS PREVIOUSLY ENCOUNTERED

COMMON PATHOGENS FOR THE SPECIES YOU RAISE

DIFFERENT LIFE STAGES PRESENT ON THE FARM
  EGGS, FRY, JUVENILE, ADULT, BROODFISH

HOUSING METHODS USED
  PONDS, RACEWAYS, TANKS
  FLOW THROUGH VS RECIRCULATING

COMMON PROBLEMS OTHERS ENCOUNTER
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – HOW LIKELY?

HOST FACTORS
- Species, life stage, level of stress

AGENT FACTORS
- Mode of transmission
  - Vertical
  - Horizontal
- Lifecycle
- Persistence in the environment
- Ability to create a carrier/latent stage

ENVIRONMENTAL FACTORS
In the lifecycle of the parasite, the definitive host ingests eggs containing miracidia. These miracidia then infect the first intermediate host, typically a snail species such as B. damnificus or D. spathans. Upon reaching the second intermediate host, the parasites develop into cercariae. The cercariae then exit the second intermediate host and penetrate fresh water or moist soil, where they transform into metacercariae. The definitive host ingests these metacercariae, and the life cycle completes as the parasites mature within the definitive host.
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – CONSEQUENCES?

- Mean mortality from disease
- Loss of production
- Treatment or culling costs
- Movement restrictions
- Loss of customers
- Product quality
- Zoonotic potential
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – CONSEQUENCES?

- Treatment costs
- Diagnostic charges
- Therapeutants
- Labor
- Withdrawal times
- Culling costs
- Labor
- Disposal
- Zoonotic potential
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – CONSEQUENCES?

- MOVEMENT RESTRICTIONS
- INABILITY TO SHIP SICK FISH
- LOSS OF CUSTOMERS
- REPUTATION IS KEY WHEN SUPPLYING FISH
- PRODUCT QUALITY
SECOND STEP: COMPLETE A RISK ANALYSIS

CATEGORIZE EACH AGENT ON YOUR LIST

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<th>LIKELIHOOD OF AGENT</th>
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<th>CONSEQUENCE IF PRESENT</th>
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Risk Assessment – Possible Routes of Entry

Risk Assessment – Routes of Entry?

Water Source
- Ground Water – Safest
- Surface Water – Increased Risk
- Natural Waterway (Cage Culture) – Very Risky

New Fish Arrivals
- Water in Transport
- Shipping Materials
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – ROUTES OF ENTRY?

PEOPLE
  EMPLOYEES
  FAMILY/VISITORS
  DELIVERY

BOOTS
CLOTHES

NO FISHING ALLOWED
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – ROUTES OF ENTRY?

EQUIPMENT

VEHICLES

EMPLOYEE, VISITOR, FEED DELIVERY, ETC.

NETS

SEINES

DISSOLVED OXYGEN METERS
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK ASSESSMENT – ROUTES OF ENTRY?

OTHER ANIMALS

- BIRDS
- PREDATORS
- TURTLES
- SNAKES

FEED

- LIVE
- FROZEN
- COMMERCIAL
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

WHERE DO YOU GET YOUR FISH?
FISH CAN LOOK HEALTHY BUT STILL CARRY PATHOGENS

TRUSTED SUPPLIER
TALK TO OTHERS RAISING THE SAME SPECIES
WHERE DO THEY BUY FISH?
DO THEY HAVE ANY DISEASE PROBLEMS?

HEALTH INSPECTIONS
HELP SIGNIFICANTLY DECREASE RISK FOR THE PATHOGENS ASSESSED
NOT A GUARANTEE
ONLY SPECIFIC PATHOGENS
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

WHERE DO NEW ARRIVALS GO?

QUARANTINE

IDEALLY SEPARATE BUILDING
MUST BE SEPARATE UNIT
DEDICATED EQUIPMENT
PHYSICAL SEPARATION TO PREVENT SPLASHING
TYPICALLY A MINIMUM OF 3 WEEKS
PATHOGENS OF CONCERN
WATER TEMPERATURE
STRESS?
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

HOW DO YOU RAISE YOUR FISH?

PONDS
RACEWAYS
CAGES
INDOOR TANKS

WATER TREATMENTS

DEGASSING TOWERS

OZONE
ULTRAVIOLET LIGHT

SRAC Publication #4707
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

PEOPLE

HANDWASHING STATIONS

ORDER OF DAILY OPERATIONS

MOST SUSCEPTIBLE FIRST

LEAST SUSCEPTIBLE LAST

TIME OF DAY

HANDLE FISH IN THE EARLY MORNING OR LATE EVENING
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

PEOPLE

FOOT BATHS?

- Keeps shoes and floor clean
- Can prevent pathogen entry into building
- Visual reminder of biosecurity

CHALLENGES

- Must be maintained
- Check effectiveness of disinfectant
- Treat floor as dirty anyway?
1. dirty boots
2. rinsed with water
3. disinfected
SECOND STEP: COMPLETE A RISK ANALYSIS

EQUIPMENT

DEDICATED EQUIPMENT FOR EACH “UNIT”

IF NOT POSSIBLE, PROPER CONTACT TIME FOR DISINFECTION

CLEANED AFTER EACH USE

APPROPRIATE DISINFECTANT

SEPARATE SET OF EQUIPMENT FOR NEW FISH ARRIVALS
WHAT DO YOU FEED YOUR FISH?

LIVE FEED
   HIGHEST RISK OF PATHOGEN ENTRY

FROZEN FEED
   MODERATE RISK OF PATHOGEN ENTRY

COMMERCIAL FEED
   LOW RISK OF PATHOGEN ENTRY FOR EXTRUDED FEED

PROPER STORAGE
   COOL, DRY AREA
   SEALED CONTAINER IS BEST

APPROPRIATE AMOUNT
   TOO MUCH CAN DECREASE WATER QUALITY

SECOND STEP: COMPLETE A RISK ANALYSIS
WHICH MITIGATION STEPS ARE ECONOMICAL?

Review your list of possible mitigation steps for identified risks

How much will each cost?

Direct costs – disinfectants, foot baths, extra equipment, etc.

Indirect costs – labor, wear on equipment, etc.

Costs vs benefits

Which mitigation steps will you implement?
COMMUNICATION OF PLAN

SIGNAGE THROUGHOUT FARM

KEEP UPDATED

REPLACE WHEN HARD TO READ

DO NOT OVERUSE

INCLUDE EMPLOYEES (AND FAMILY) IN PLAN DEVELOPMENT

INCREASES BUY-IN

RAISES AWARENESS OF THE IMPORTANCE OF BIOSECURITY
COMMUNICATION OF PLAN

EMPLOYEE TRAINING

DO YOUR EMPLOYEES KNOW WHAT THEY SHOULD DO?

- WRITTEN PROTOCOLS
- NEW EMPLOYEE TRAINING
- PERIODIC TRAINING

ARE THEY PROVIDED WHAT THEY NEED TO DO IT?

- EQUIPMENT IN GOOD WORKING ORDER
- TIME TO DO THINGS CORRECTLY

ARE THEY DOING IT?

- IS THERE ACCOUNTABILITY FOR EVERYONE? INCLUDING YOURSELF?
- CHECKLISTS FOR OPERATIONAL TASKS – INITIALED WHEN COMPLETE
SUMMARY

YOU NEED A WRITTEN BIOSECURITY PLAN

EACH FARM IS DIFFERENT

PRACTICALITY IS KEY

WHAT DO YOU HAVE NOW?

RISK ANALYSIS

ECONOMIC CONSIDERATIONS

SELECT MEASURES TO IMPLEMENT

COMMUNICATION AND IMPLEMENTATION OF PLAN
QUESTIONS?

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