BIOSECURITY FOR AQUACULTURE OPERATIONS

Stephen Reichley, DVM

Aquaculture Boot Camp
Columbus, OH
November 8, 2014
OUTLINE

WHAT IS BIOSECURITY?

HOW DO I DEVELOP A BIOSECURITY PLAN?

SUMMARY

PRACTICAL APPLICATIONS

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 the other fish on the farm
- Allowing the agent to leave the farm

COMPREHENSIVE APPROACH

Encumbrance different means of prevention and containment
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
VERTICAL TRANSMISSION

HORIZONTAL TRANSMISSION
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

LIKELIHOOD OF AGENT

Low
Moderate
High

CONSEQUENCE IF PRESENT

Minor
Moderate
Major
<table>
<thead>
<tr>
<th>LIKELIHOOD</th>
<th>MINOR</th>
<th>MODERATE</th>
<th>MAJOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>LOW RISK</td>
<td>LOW RISK</td>
<td>MODERATE RISK</td>
</tr>
<tr>
<td>MODERATE</td>
<td>LOW RISK</td>
<td>MODERATE RISK</td>
<td>HIGH RISK</td>
</tr>
<tr>
<td>HIGH</td>
<td>MODERATE RISK</td>
<td>HIGH RISK</td>
<td>HIGH RISK</td>
</tr>
</tbody>
</table>
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?
   DO THEY HAVE ANY DISEASE PROBLEMS?

HEALTH INSPECTIONS
   HELP SIGNIFICANTLY DECREASE RISK FOR 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

From SRAC Publication No. 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 EARLY MORNING OR LATE EVENING
SECOND STEP: COMPLETE A RISK ANALYSIS

RISK MANAGEMENT

PEOPLE

FOOT BATHS?
- Keeps shoes and floor clean
- Can prevent pathogen entrance to 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

Source: ILVO
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 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

DON’T OVERUSE

INCLUDE EMPLOYEES (AND FAMILY) IN PLAN DEVELOPMENT

INCREASES BUY-IN

RAISES AWARENESS ON THE IMPORTANCE
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?
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
CONTACT INFORMATION

DR. STEPHEN REICHLEY
STEPHEN.REICHLEY@MSSTATE.EDU
662-469-6096