Introduction to Biological Risk Management

Biological Risk Management (BRM)
- Overall process of awareness education, evaluation, and management
- Designed to improve disease control
  - Foreign and domestic diseases
- Provide tools to minimize risk
Biological Risk Management (BRM)

- Disease risk cannot be totally eliminated
  - Animal, its environment
  - Decrease exposure to disease agents
- Minimize threat to animals and humans
- No one-size-fits-all answer

Importance of BRM

- Importance of agriculture
- Changing food production practices
- Rise in emerging and re-emerging infectious disease
- Increasing globalization
- Increased interaction with animals
Agriculture and Economics

- 1 in 6 U.S. jobs are ag-related
- Our economy dependent upon agriculture
  - Animal production industry
  - Affects everyone in U.S. in some way

Agriculture and Economics

- Dairy industry
  - 900,000+ jobs
  - $29 billion household
  - $140 billion overall
Need more convincing?

- Herd expansion from 250 up to 500 cows
  - Purchased 60 springing heifers in May, 1995
  - By October, 1995, 52 of the heifers and 2 cows had died of BVD
- Southwestern Dairy had high level of severe diarrhea
  - Within one year 1,000 calves, heifers and some cows died of salmonellosis
  
  Could your farm withstand those losses?

Agriculture and BRM

- Realize the impact on the industry
- Provide
  - Income
  - Lifestyle
- Mitigate economic consequences of a disease outbreak
Food Production Changes

- Number of farms decreasing
- Animal numbers rising on some farms
- Opportunities
  - Increasing intensity/specialization
  - Efficient food source: U.S. and world
- Challenges
  - Disease control and eradication
  - Devastating economic effects

Dairy Production

- Lactating cow and farm numbers decreasing
  - 2001: 9.16 mil cows
  - 97,560 operations
- Increased production
  - Cows and U.S.
  - Increased intensity
- Opportunities and challenges

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The Rise in Emerging and Re-Emerging Infectious Diseases

Partial list of infectious diseases commonly found on U.S. dairy farms:

- Bovine Leukemia Virus/Leukosis -- BLV
- Bovine Respiratory Syncytial Virus -- BRSV
- bovine Viral Diarrhea Virus -- BVDV
- chlamydiosis
- Clostridial Diseases -- Hemorrhagic Bowel, Black Leg, Enterotoxemia, etc.
- Contagious Mastitis -- Staphy aureus, Strep agalactiae and Mycoplasma bovis
- Haemophilus somnus
- Infectious Bovine Rhinotracheitis -- IBR
- Papillomatous Digital Dermatitis -- "Hairy heel warts"
- Leptospirosis
- Listeriosis
- Mycobacterium paratuberculosis -- Johne's Disease
- Mycoplasmosis -- Respiratory form
- Neosporosis
- Parainfluenza-3 Virus -- Pi3
- Pasteurellosis
- Rota/Corona Virus -- calf diarrheal agents
- Salmonellosis
- Winter Dysentery -- bovine corona virus?
Conducting a BRM
Livestock Facility Assessment

Components of BRM

- Risk perception
- Risk assessment
  - Routes of transmission
- Risk management
- Risk communication
What is your level of risk?

1. Closed herd and all bio-traffic strictly monitored
2. No entry or re-entry of cattle
3. No entry of new cattle but re-entry of existing cattle allowed (show cattle)
4. Entry of new cattle with known medical records and isolation/quarantine
5. Entry of new cattle with known medical records and no isolation/quarantine
6. Entry of new cattle without known medical records and no isolation/quarantine

Risk Perception

- Different perceptions of risk
  - First identify what is viewed as a threat
- Factors influencing perception
  - Previous experience
  - Media
  - Environment
- Acceptance and tolerance varies
Risk Perception

- **Common beliefs**
  - “We have always done it this way”
  - “I’ve had most everything on this farm”
  - “It’s too expensive”

- **New beliefs**
  - Disease outbreaks can and do happen
  - Prevention is less costly than treatment
  - Too much is financially invested to lose
  - Prevention through awareness and management

Risk Assessment

- **Objective evaluation**
- Identify strengths, weaknesses
  - Change over time

- **Disease prediction is complicated**
  - Underlying disease risks are not
  - Cattle’s vulnerability is influenced by:
    - Cleanliness, stress, nutrition
    - Things that can be managed
Routes of Transmission

- Apply to all infectious agents
- Animal must be exposed to develop disease
- Understand different routes of transmission = Gain control
- Risk areas must be identified
  - Design protocols to minimize exposure

Routes of Transmission

- Spread of disease agents
  - Animal to animal
  - Animal to human
- Different routes of transmission
  - Aerosol
  - Direct contact
  - Fomite
  - Oral
  - Vector-borne
  - Zoonotic
Aerosol Transmission

- Disease agents contained in droplets
  - Pass through air
- Most agents not stable in droplets
  - Close proximity required
  - Infected and susceptible animals

Selected Diseases Spread by Aerosol

Foreign diseases
- Foot and mouth disease

Present in U.S.
- Anthrax
- BRSV
- BVD
- IBR
- M. hemolytica
- Mycoplasma
- Tuberculosis
Isolation/Quarantine

- Distance is important
- Do not share air space between sick and healthy animals

Direct Contact Transmission

- Disease agent in animal or environment
  - Open wounds, mucous membranes, skin
  - Blood, saliva, nose to nose, rubbing, biting
- Reproductive transmission
  - Breeding
  - Dam to offspring
Direct Contact, Fomite

- Basic prevention steps involve:
  - Isolating sick animals
  - Keeping environment clean, dry
  - Keeping equipment clean
  - Establishing a reproductive program using reputable semen sources, test negative bulls

Farm Vehicles

- Designate a vehicle parking area
  - Away from primary animal traffic
- Minimize vehicle traffic on farm
  - Load/unload, rendering at perimeter
  - Have separate vehicles for “on-farm” and “off-farm” use
Farm Vehicles

- Do not share equipment with other farms
  - Tractors, livestock trailers
- If shared, completely rinse, wash with soap, scrub, rinse and disinfect before contacting animals
- Do not allow milk/feed truck drivers to cross animal paths

Farm Visitors

- Require prior authorization before entering the premises
- Sign in and disclose recent cattle contact
- Require clean clothes, clean footwear
  - Provide if necessary
Farm Visitors

- Make sure all visitors know BRM plan
  - Post signs, employee meetings, discuss with visitors
- Limit access to those who traveled to foreign countries
  - Previous 7-10 days should have NO animal contact

Animal Housing

- Provide clean, dry housing
- Slope outside lot 2-4% for drainage
- Provide mounds outside
  - 4-6 ft high, 1-5 inch slopes
- Clean alleyways inside
  - Scrape or flush daily
- Groom stalls at least daily
**Milking**

- Milk isolation animals separately
  - Hospital parlor, end of milking healthy
- Establish SOPs for milking routine
  - Milkers should wear gloves
  - Monitor for mastitis
  - Wash gloved hands between diseased cows
- Milk clean, dry udder/teats

**Breeding/Repro**

- Establish a disease free breeding program
  - AI- obtain semen from reputable source that tests bulls for diseases
  - Natural- all bulls must be tested for repro and other diseases; quarantine upon arrival
- Investigate abortions
  - Work with veterinarian to establish protocol
Summary on Fomites

- Direct contact, fomite transmission occurs everyday on farms
  - Mastitis, leptospirosis, BVD
- Foreign animal diseases can also be spread via direct contact
  - FMD
- Prevention steps as described here can help minimize your risk

Oral Transmission

- Consumption of contaminated feed, water
  - Feces, urine, saliva
  - Other contaminants (ruminant protein)
- Licking/chewing contaminated environment
Vector-borne Transmission

- Insect
- Acquires pathogen from one animal
- Transmits to another animal
  - Biological vectors
    - Fleas, ticks, mosquitoes
  - Mechanical vectors
    - Flies, cockroaches

Environmental Contamination

- Disease organism in environment
  - Survive in soil, organic material
- Animals and humans can acquire agent(s) through:
  - Inhalation
  - Direct contact
  - Fomites
  - Oral consumption
  - Vectors
Disease Transmission

- Animals may not exhibit obvious signs of disease
- Awareness of all routes of transmission is essential
  - Develop strategy to minimize disease risk for livestock operation

The Risk Management Plan
Risk Management

- Facility/operation evaluated
  - Challenges identified
- Tailored management plan
- Prioritize
  - Easy to implement
  - Inexpensive yet yield rewards
- No common formula

General Prevention Steps

Overview
- Farm perimeter
- Animal identification
- Animal health
- Sick/dead animals
- Isolation/quarantine
- Supply handling
- Neonatal management
General Prevention Steps

- Limit contact with animals
  - Neighbor’s livestock
  - Wildlife, birds
  - Roaming cats, dogs
- Maintain fences
- Establish biosecurity protocols for delivery vehicles, personnel
- Lock gates

General Prevention

- Identify individual animals
- Important for:
  - Communicating health status
  - Treatment needs
  - Location on farm
  - Record keeping
General Prevention Steps

- Keep health records on every animal
- Review vaccination and treatment programs
  - Annually, bi-annually
  - Protocol versus actual
- Investigate unusual signs, unresponsive cases
  - Neurologic, downers, sudden death

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General Prevention Steps

- Train farm personnel to report sick animals
  - Inspect animals daily
  - Clean equipment, boots, clothing
- Euthanize terminally ill animals promptly and appropriately
  - Removed or rendered
- Necropsy animals that died from unknown causes
General Prevention Steps

- Isolate ill animals immediately
  - No shared ventilation, direct contact with other animals
- Quarantine newly introduced animals
  - New purchases, returning animals
- Time determined with veterinarian
- Test for key diseases before placing with rest of herd

Key Learning Objectives

- Biological risk management is important
- All diseases are transmitted by a few common routes
- Disease risk can be managed
- Awareness education is essential
- You play a critical role!
- No two farms are identical
Take Home Messages

- Farm biosecurity management is very similar to financial risk management
  - Determine your risk level –
    - What is your risk tolerance or intolerance to loss from disease?
    - Create a farm specific biosecurity program.
    - Safeguard your assets – protect the resident herd!
  - Expanding herds have greater challenges, but also rewards can be worth it--
    - 5% drop in production due to disease can be the difference between profit or loss on the farm

Wallace, Univ. of Illinois, CVM

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Acknowledgments

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Operation/Client Description:  null
Assessment By:  Mr. Chuck Schwarting
Assessment Date:  5/28/07

General Section

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