Biosecurity

"The actions taken in preventing the spread of infectious diseases"

Getting Started With Biosecurity

Topics Covered:

What is Biosecurity?

The Importance of Biosecurity

Responsible Parties

Evaluating the Risks and Consequences

Cost of Disease

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Is Biosecurity Important to Your Operation?

Select the number for each answer that applies to your livestock operation and enter the score in the right hand column.

How valuable are your animals?	
Extremely valuable (4) Above average (3) Average (2) Below average (1)	
Are your animals replaceable?	
Yes, easily (1) Yes, difficult (3) No (5)	
Would a disease outbreak affecting 30% of the gross income from your livestock operation be financially devastating?	
Yes (3) No, although it would be a severe setback (2) No (1)	
Is reputation for animal health an important aspect of your business plan?	
Yes, if health is used in marketing livestock (4) No (1)	
Do you think producers are important players in food safety, product quality, and the control of livestock diseases that may also affect people?	
Yes (4) No (1)	
Total Score	

If your score is:

15 or more Biosecurity is critical for your operation. Effective measures need to be incorporated into your routine management plan to deal with the risk of disease exposure to your livestock and in maintaining a safe and wholesome food supply.

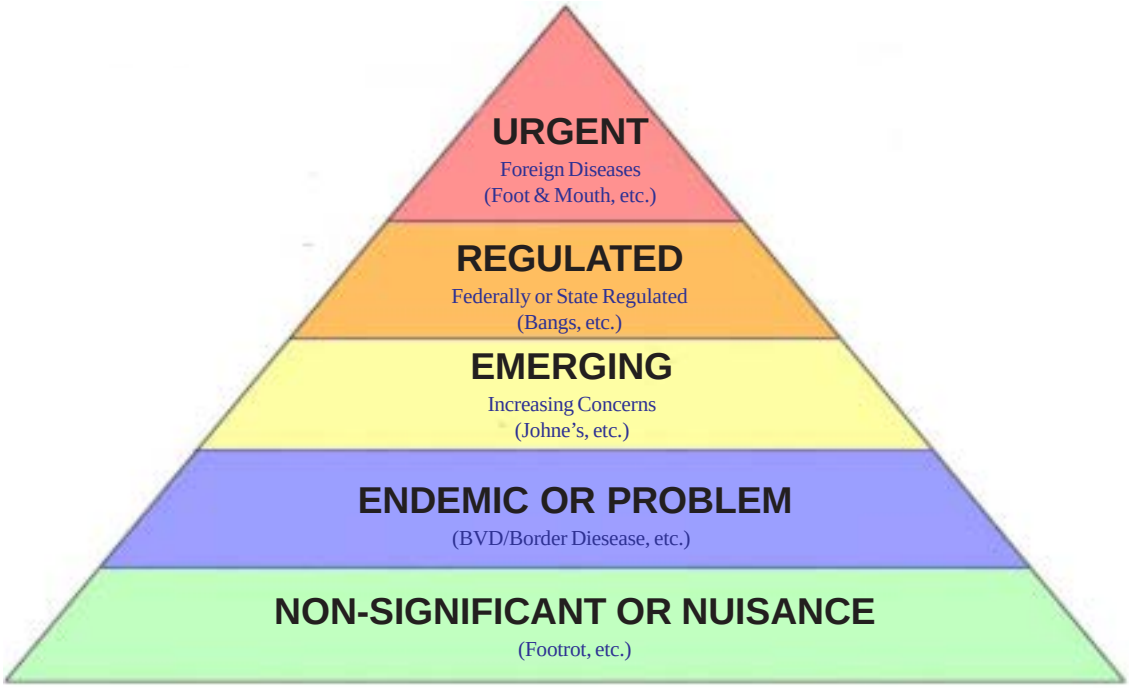
11–15 Biosecurity is important. Your livestock are valuable to you. It is worthwhile to spend some time assessing disease risks and developing a biosecurity plan that will fit into your management plan.

10 Biosecurity is moderately important to you. A disease outbreak would be unpleasant but other livestock could replace them. You don't want the inconvenience of biosecurity interfering with your activities. At the same time, you may want to evaluate your risks and options.

8 or less Biosecurity is not important to you.

What is Biosecurity?

Keeping our livestock industry healthy and free from exposure to infectious diseases is a serious full time job. The United States Department of Agriculture (USDA), through the Animal and Plant Health Inspection Service (APHIS), cooperates with other countries around the world and is on alert to prevent foreign animal diseases from crossing our borders. These veterinary officials also work closely with each state veterinarian to maintain a constant animal health vigilance to identify, control, and eradicate specific diseases in the U.S. and monitor animal movement. Local practicing veterinarians and extension specialists are a primary resource in disease surveillance and reporting. They also work with and provide information directly to livestock producers related to the prevention and control of livestock diseases.



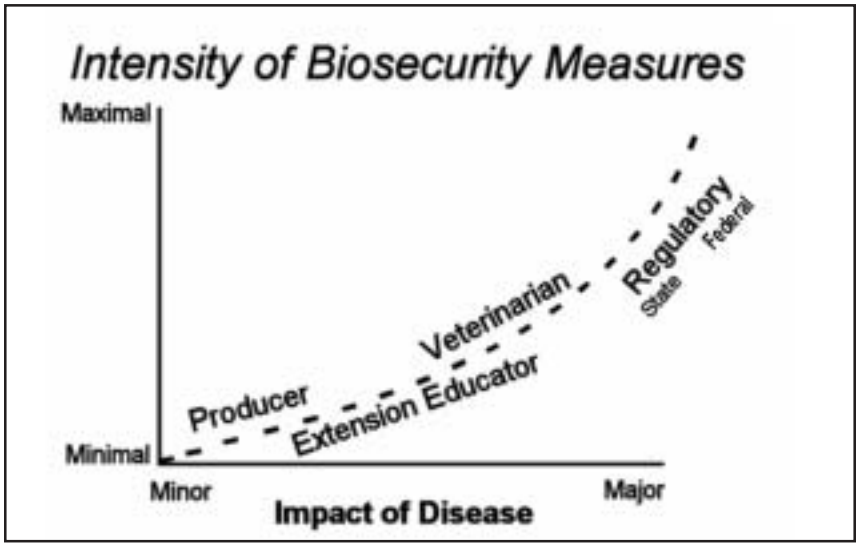
Infectious Disease Pyramid

Because of these unified efforts to establish and maintain effective animal disease barriers, U.S. livestock operations have been spared many devastating diseases. Complacency, however, is the dreaded enemy of successful programs, and producers and veterinarians must strive for vigilance to maintain a high level of biosecurity. As world travel increases and global agriculture evolves, the potential for spreading infectious disease amplifies, ratcheting up the importance of biosecurity to new levels.

Who is Responsible for Biosecurity?

Every herd owner and manager has the ultimate responsibility to protect the health of animals under their care and should seriously consider the development of a biosecurity program for their herds and livestock operation. This can be accomplished by working in close cooperation with private veterinarians and extension specialists, as well as state and federal animal health officers available in each region. The time and difficulty required to diagnose certain infectious diseases, loss in production, and expense of eradicating disease can all be financially devastating and emotionally exhausting.

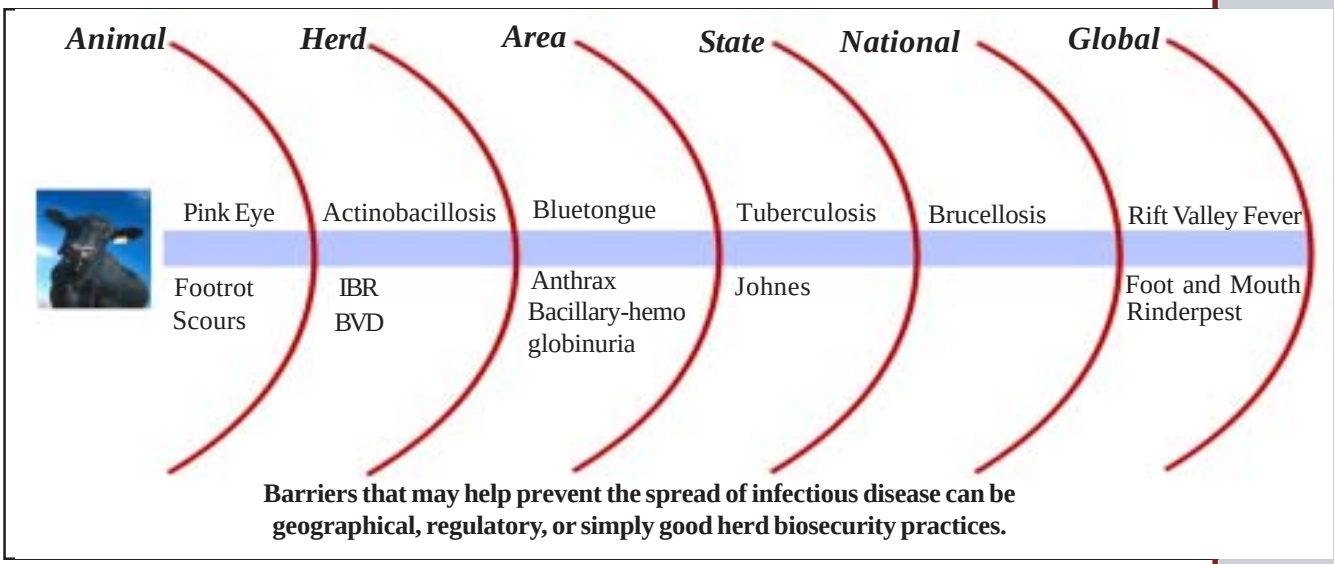
A proactive approach utilizing management practices to prevent introduction of disease into the herd, rather than reacting to an outbreak, is the safest and least costly method of herd protection. Each farm or ranch operator should consult with their animal health professional to carefully evaluate their management practices in order to identify specific practices that could present potential risks in their production unit, and they should incorporate common sense biosecurity practices necessary to reduce those risks.



Who is Responsible for Biosecurity?

- Owner/Manager/Employee
- On-Farm Service Providers
  - Veterinarians
  - Extension Specialists
  - Delivery
  - Feed
  - Maintenance Personnel
  - Suppliers and Salespersons
- Other Providers
  - Auction Markets
  - Packing Plants
  - Breeding Stock
  - Livestock Exhibitions
  - Veterinary Clinics
  - Working Facilities
  - Livestock Transporters
- Government Agencies
  - Local
  - State
  - Federal
- Educators

Barriers to Infectious Disease of Livestock



Barriers that may help prevent the spread of infectious disease can be geographical, regulatory, or simply good herd biosecurity practices.

Evaluating the Risks and Consequences

Risk Management

Risk is the likelihood of an uncertain event or hazard occurring. Factors that influence the likelihood of an event occuring are called **risk factors**. If we blindly walk through a given intersection we risk being hit by a car. But, looking both ways before crossing can reduce the risk. Not looking both ways before crossing the intersection is a risk factor, one that increases risk. Risk factors are not absolute predictors of the outcome because it is still possible to get hit by an automobile even if you look both ways, but in the long run fewer people will be hit by cars if they look both ways before crossing.

Some factors increase risk while others decrease it. For example, co–mingling young calves may increase the risk of disease; colostrum feeding may decrease the risk of disease. In a biosecurity management plan we try to minimize the factors that increase the risk of disease transmission into and within our herd and maximize the factors that decrease disease. We can control some factors, others we cannot. Bad weather may increase the risk of pneumonia but we cannot control the weather. We can change other factors such as providing shelter for livestock during adverse weather. The risk factors such as available shelters or wind breaks that we can influence are called **control points**. The primary goal of risk management is to find control points that can be changed to reduce the risk that something bad will occur. Above all, it is important to develop control points that are reasonable for daily management operations so they will be routinely implemented.

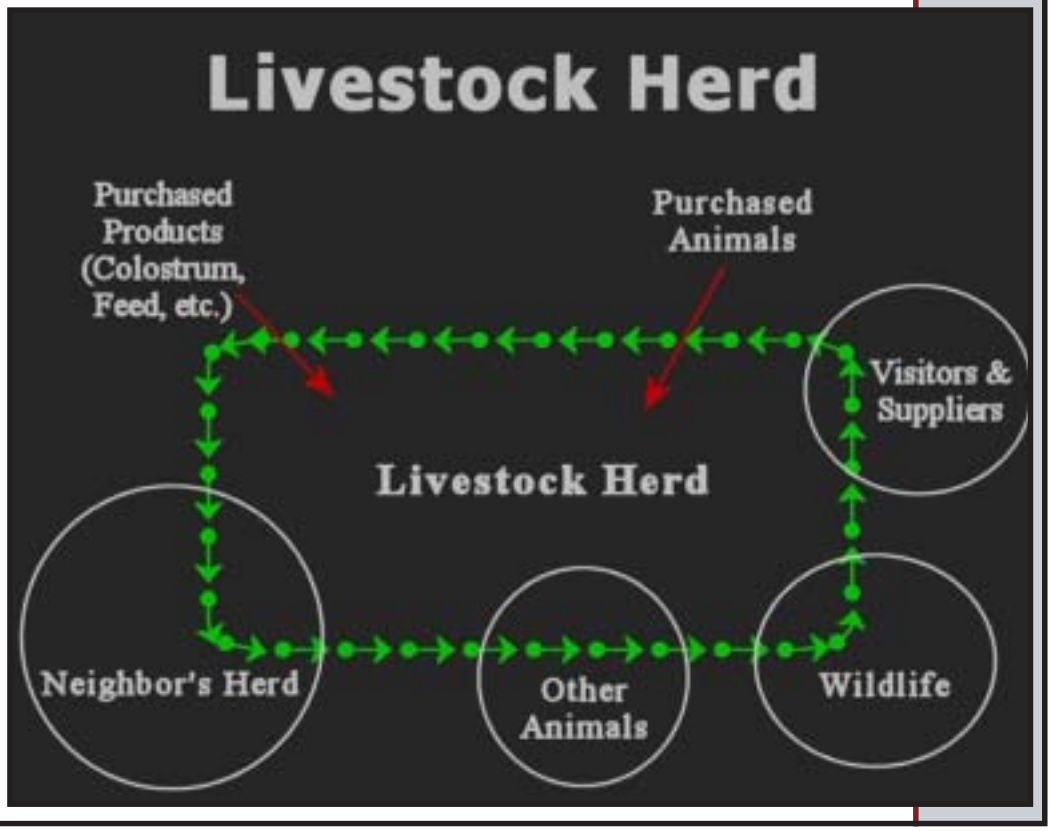
Evaluating the Risks and Consequences

Risk Management (cont.)

Food industry processors provide safer food using the principles known as Hazard Analysis Critical Control Points (HACCP, the acronym pronounced HAS–sip). HACCP principles are simply risk management principles. A well–designed biosecurity management plan is just like HACCP. For example, a health management plan for your herd identifies the health risks associated with the life stages of your livestock (hazard analysis) and identifies important interventions (critical control points) that you can use to reduce the risk of disease.

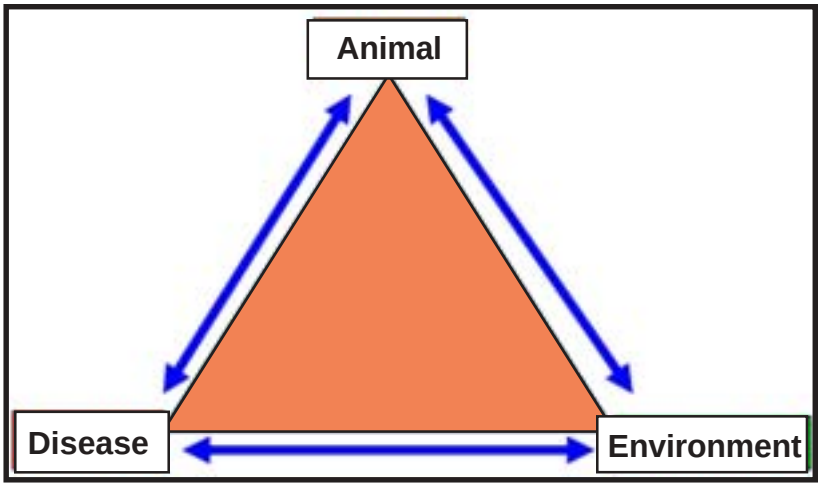
The Farm or Ranch is an Ecosystem

Forests aren't just trees, they are entire ecosystems; and livestock operations are not just cows, they are also ecosystems. Calves share their pen with a multitude of microorganisms – some are beneficial, others may cause disease. The microbes are there because the conditions are right for their survival. The farm ecosystem is determined by the unique combination of factors (management, weather, geology, location, soil, animals, microbes, personnel) that are the production system of that farm. Some of these factors are manageable. When we evaluate the risks of disease transmission in replacement heifers we must understand the ecosystem and the factors that influence it.



Biosecurity Plan Principles

The goal of a biosecurity plan is to reduce the risk of disease exposure and transmission. This goal can best be accomplished using the **infectious disease triad** to consider various intervention methods to reduce the risk of disease. Disease occurs when animals are exposed to an infection and the environmental conditions and animal's resistance are at a certain level. We can influence the occurrence of disease by developing critical control points or changing risk factors between these points. For example, we can limit the exposure to disease through animal movement, maintain a healthy environment by providing proper nutrition and shelter, and finally increase animal resistance by immunizing against certain diseases.



Biosecurity Program Principles

We can institute a successful herd biosecurity program by utilizing the three important factors discussed above: increase the animal's ability to resist disease; minimize the number of contacts that result in disease; and eliminate the sources of the infectious agent.

Increase the animal's ability to resist disease

Resistance may mean being resistant to infection with the agent, or resistant to becoming sick after infection. The distinction between infection and disease is important. In some circumstances we are most concerned with disease; infection without disease may not be important.

Other times we worry about animals that are infected, but not sick, because these sub–clinically infected animals may spread the agent to other animals or may become sick themselves at another time. Resistance to disease may be non–specific, meaning that the animal is in good enough health to generally fight infection; or specifically, because its' immune system is prepared to defend against a particular disease agent.

Biosecurity Plan Principles

We use vaccines to increase an animal's specific resistance to disease. Vaccination is the act of administering a vaccine; immunization is the protective response to the vaccine we hope to stimulate within the animal. Immunity means the animal has immune system components on the alert for specific pathogens. Immunity may reduce the likelihood of clinical signs of disease, but may not prevent infection.

Unfortunately, some producers and veterinarians place their faith in vaccination and do little to manage other important risk factors. Vaccinated animals may still get sick because pathogens different from those included in the vaccine were involved; because the immune system was overwhelmed by the infection; or because the vaccinated animal failed to mount a protective immune response. Vaccination programs supplement other disease control procedures, but do not replace them.

Minimize the number of contacts that result in disease

Not every animal exposed to a disease agent becomes infected or diseased. Sufficient exposure to result in infection or disease is called an **effective contact**. Effective contacts may depend on the length of contact time or the number of agents transferred. The number of effective contacts can be reduced by physically separating animals, or reducing the number of organisms transmitted during contact. Methods of physical separation include quarantine of animals; segregation, often by age or class of animal; isolation of individuals; or dilution of the number of animals over a large geographical area.

Evaluating the Risks and Consequences

Eliminate sources of the infectious agent

Reservoirs of infection for livestock are other animals or objects that the agent depends on for survival; including, but not limited to, other cattle, people, birds, insects, rodents, manure, soil, surface water, water tanks, feed, and feeding equipment. Infectious agents may reside in carrier animals that are infected but show no clinical illness or they may survive in the environment waiting to be transmitted to the host animal by direct or indirect contact.

It is often difficult to recognize and eliminate reservoirs of many infectious agents. It is important to know where the agent survives and how it makes contact with the host. The ecology of the production system must be understood to know where the potential reservoirs exist on a farm or ranch. Test and cull strategies are commonly used to remove carrier animals from a herd. It must be possible to accurately determine an animal's infection status for this method to be effective.

Many times we will not be able to identify the carriers of many of the diseases that concern livestock producers by testing individuals as they arrive on the farm. The infection status of a herd can often be determined more accurately than the infection status of any single individual. Therefore, for many diseases it is more effective to acquire animals only from source herds that are known to be free of infected animals. Herd records or herd–level diagnostic testing may help to identify herds with a low infection risk.

Cost of Disease in Animal Health

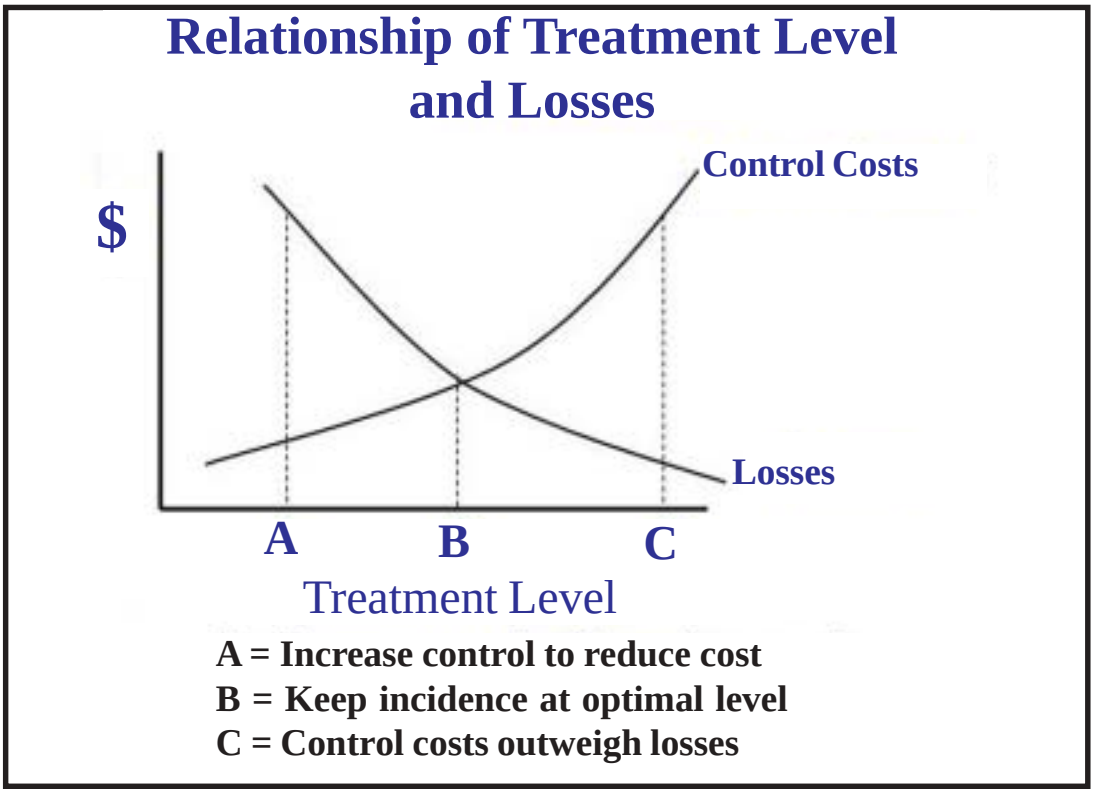
Diseases inflict serious losses in livestock production. Although loss is usually thought of in terms of monetary value, it can be incurred in other ways such as the loss of reputation, consumer confidence and reduced market share, or valuable genetic material from certain animals. From a production standpoint, financial losses can also occur in the following areas:

- Death loss
- Irreversible tissue damage (resulting in chronic sickness)
- Reduced productivity such as growth, milk, or wool production
- Decreased feed efficiency
- Reproductive failure such as an unsuccessful pregnancy due to infertility, early embryonal loss, abortion, weak or stillborn animals.
- Increased culling of herd or flock
- Reduction in value of final product such as carcass grade
- Treatment, labor, and management costs

The final result of the majority of losses is reduced revenue and increased costs. Even though it is possible for certain costs to decrease due to fewer animals or reduced feed intake, the end result is negative.

Cost of Disease in Animal Health

A marginal analysis should be considered relative to each disease. There is an optimal point in which the treatment, or in some cases the prevention of a disease fails to return more than the cost of the disease itself. This theoretical point where inputs (treatment/prevention) would intersect with losses from the disease, is demonstrated in the figure below.



There are other important economic considerations in disease prevention and the implementation of a biosecurity program, including the following:

- Investment in facilities, equipment, or space for biosecurity procedures
- Expenses in testing and vaccinating new herd additions
- Costs related to labor, isolation, health records, monitoring animals
- Disease control may reduce or restrict productivity in some areas
- Selection for disease conscious suppliers when purchasing new animals reduces the number of choices in the marketplace

Cost of Disease in Animal Health

Economic Examples

Serious losses frequently occur with outbreaks of Bovine Virus Diarrhea (BVD) during critical periods of gestation in breeding herds and even greater losses can occur with reproductive diseases associated with failure of conception and late term abortions. Losses from trichomoniasis (trich) and campylobacteriosis (vibrio) have reduced calving rates by 30 to 50% before detection and have resulted in average losses over $150 per beef cow unit.

A Montana study of 3,637 calves from inbred and crossbred lines found scours ranged from a low of 13% to a high of 64% over a 14 year period and resulted in 24 pounds less weight per calf at weaning due to gain and death loss. They further analyzed the records of 2400 calves post–weaning over a 12 year study and found that calves with respiratory illness were 27 pounds lighter at yearling age.

An Oklahoma study monitored 204 calves during the finishing stage. The calves with lung lesions or those treated during the feeding period demonstrated reduced gain and carcass weights with lower quality grades.

A Nebraska study demonstrated the importance of getting each calf off to a healthy start at birth with adequate passive immunity. Calves with low levels of colostral immunoglobulins were three times more likely to experience sickness later in life.

Healthy Calves	**$61.23**
Sick Calves	**$-31.97**
Difference	**$93.20**

A five year Texas A&M Ranch to Rail Summary Report on 12,595 head found similar adverse effects on performance due to health which resulted in a $93.20 lower net return from animals that were sick during feeding. Death loss in the sick group was nearly seven times higher than the healthy group, resulting in an economic loss of $298,426.

Operations Security

Security

The security goal is to prevent intentional introduction of disease causing organisms into an operation. Security can be compromised by:

- Intruders
- Disgruntled employees sabotaging an operation

Livestock operations will have different levels of security risks. Developing a security management strategy involves evaluating potential risks, outlining steps to manage the identified risks and instituting a security plan based on the risk assessment. At the very least, posting security signs, establishing a buffer zone or perimeter fence to separate livestock from the public, securing all access gates (preferably with a master keyed system) and establishing a visitor policy.

Three areas should be addressed:

- What to look for
- Who to contact
- Procedures to enforce

Three actions should be taken:

- Notify authorities
- Secure the area
- Quarantine involved area

Assess the situation:

- Is it a disease concern?
- Is it a contamination concern?
- Is it an intruder concern?

Enforce sanitation and traffic control:

- Restrict traffic control onto and within the operation
- Provide sanitation stations at each area throughout the operation

Security:

- An employee or owner should be on the operation at all times
- Keep perimeter gates locked
- Monitor all activities closely
- You should know all visitors on your operation

Operations Security

Establish goals and objectives for the security program

Premise Security

-Check all locks
-Evaluate perimeter buffer zone effectiveness
-Check posted security signs
-Segregate parking areas for visitors and personnel
-Check/validate visitor log with personnel assigned to visitors
-Intruder prevention / control procedures and training in place

Isolation Security

-Protect water, feed, pesticides, medications and other supplies
-Require valid health papers for all incoming animals that provide seller, source and trucker info
-Inspect incoming feedstuffs before receiving

Traffic Control Procedures

-Use only operation vehicles for all visitors, customers, and support professionals
-Monitor all shipments and deliveries
-Control dead animal removal traffic pattern to prevent cross contamination
-Control traffic around livestock handling and housing areas
-Specifically control traffic of hospitalized cattle to prevent cross contamination
-Control traffic around feedstuffs processing, storage areas, medication and pesticide storage
-Control traffic around truck scales
-Restrict personnel and visitor movement to prevent cross contamination
-Pest control (Rodents, Birds, Dogs, Cats, Coyotes, Raccons, Deer, etc.)

Establish a Security / Biosecurity Rapid Response Plan

-Establish a written rapid response plan for biosecurity threats
-Outline specific security procedures to enforce
-Enforce specific disease contaminent procedures
-Provide easily accessible emergency contact information to personnel
-Regularly review the plan with all personnel

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