Biosecurity in the Beef Cattle Operation

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Biosecurity is used to describe programs for preventing the introduction of pathogens considered potentially harmful to the health and well-being of the herd. A pathogen is defined as any infectious agent that causes disease. Examples of various pathogens are viruses (foot and mouth disease; bovine viral diarrhea virus - BVDV), bacteria (*Brucella abortus* – brucellosis; *Mycobacterium paratuberculosis* - Johne's Disease), and prions (bovine spongiform encephalopathy - BSE; scrapie in sheep). Biosecurity on a national level consists of foreign animal disease surveillance performed by the Animal and Plant Health Inspection Service Laboratory (APHIS) at Plum Island, New York and the United States Department of Agriculture (USDA) Harry S. Truman Animal Import Center, Fleming Key, Florida. APHIS veterinarians and support personnel across the nation provide constant vigilance to keep our livestock free of foreign animal diseases that could cost the industry and consumers billions of dollars. Biosecurity at the herd level is up to the individual producer and their veterinarian to design strategies to prevent costly diseases from entering the individual cattle herd(s).

"The common disease prevention and control practices employed by the majority of beef herds today are inadequate to meet the future demands. They rely on visual observation, regulatory compliance, vaccination, and limited attention to biosecurity of the herds making animal additions."[1]

Why is Biosecurity Important?

Infectious diseases introduced into an operation can have a devastating effect on cash flow and equity. We commonly think of the adverse effect of disease to be decreased reproductive efficiency (decreased pregnancy rates, early embryonic deaths, abortions, congenital defects, weak calves), decreased production (weaning weights, daily gain, decreased feed efficiency), and increased morbidity (sickness) and mortality (death) rates. Just as important can be the loss of marketing options. With increased scientific information available on the pathogenesis, transmission, and diagnosis of diseases such as BVD, Johne's, and others, the liability associated with selling infected animals will increase. A "slaughter-only" option to a seed stock producer can be devastating. Similarly, as other countries embark on programs to control or eliminate specific pathogens, these issues may become the focus of future trade negotiations. With the stakes so high, biosecurity should be a very high priority in day-to-day management decisions.

Pathogens considered in biosecurity programs include *Anaplasma marginale*, bluetongue virus (BTV), BVDV, infectious bovine rhinotracheitis (IBR), bovine leukosis virus (BLV), Johne's, *Mycobacterium bovis* (TB), brucellosis or bangs, *Salmonella* sp., *Moraxella bovis* (pinkeye), vesicular stomatitis virus, parasites (coccidiosis, cryptosporidiosis, lice), fungal infections, and genetic diseases. Producers involved with international trade and needing advice concerning diseases that will limit their access to markets should have their veterinarian obtain that information from the APHIS Area Veterinarian in Charge (AVIC).

Level of Biosecurity

Producers must make a decision on the level of risk they are willing to accept. When estimating the potential impact of a disease on a unit, consideration must be given to the level of risk incurred, and the economic consequences of that disease. It is obvious that unit biosecurity levels will differ with marketing strategies. The commercial cow/calf producer that retains ownership to slaughter will not have the same concerns as the seed stock operator or the person marketing in international trade channels. It is helpful to have a basis to work from when determining the level of biosecurity in use or to be implemented (Table 1). The necessity of a qualified veterinarian as a component of the development and implementation of a herd health and biosecurity program cannot be overemphasized.

Table 1. Levels of Biosecurity.[1]

1. Closed herd [specific pathogen free (SPF)].
2. No entry or reentry of animals.
3. No entry of new animals, but reentry allowed.
4. Entry of new animals, known medical records, and isolation.
5. Entry of new animals, known medical records, and no isolation.
6. Entry of new animals, no medical records, and no isolation.

Components of a Biosecurity Program

Often we mistakenly consider only the replacement animal. Special biosecurity issues will differ with the age, sex, and reproductive status [open, pregnant (natural pregnancy or embryo recipient), nursing]. Also to be considered, as herd additions are semen and embryos, which will require the same origin scrutiny as the live animal.

Other common sources of some pathogens are:

1. Feed concentrates (corn, barley, cottonseed, canola, soybeans, etc.) can be sources of *Salmonella* sp.
2. Forages (corn silage, alfalfa, hay, etc.) can serve as sources of *Salmonella* sp. when irrigated with contaminated water. Improper harvesting and storage can lead to clostridial infections.
3. Ruminants fed feedstuffs containing specific mammalian proteins prohibited for use in ruminant diets may serve as means of amplification and spread of BSE.
4. Water sources contaminated with *Salmonella* sp., *E. coli*, or Cryptosporidium.
5. Fence line contact, shows, fairs, and stray animals.
6. Wildlife.
   a. Birds - salmonellosis.
   b. Deer - brucellosis.
   c. Coyotes - salmonellosis, leptospirosis.
   d. Rodent feces that can serve as a source of *Salmonella* sp. and *E. coli*.
7. Ticks and blood sucking insects that transfer anaplasmosis and other blood borne diseases.
8. Transport vehicles (livestock, feed, rendering trucks, etc.).
9. Human visitors and workers.
10. Pets - feces from dogs infected with *Neospora caninum* can serve as a source of this parasitic organism. When cattle consume feedstuffs contaminated with infected dog feces, abortions may occur.

Example Program for Non-pregnant Replacement Beef Heifers

As with many herd additions, one should first answer the question - would I purchase replacement heifers from a herd that had a genetic base inferior to my own? The answer is obvious. Likewise, a similar question about purchasing animals from a herd with a higher disease incidence and a less stringent vaccination program should elicit the same answer. The following is an example of a stepwise procedure to assist in preventing the introduction of pathogens onto the premises.

A. Preshipment.
   1. Become knowledgeable about the health, vaccination, and parasite control programs of the source herd.
   2. Special testing should be done within 30 days of shipment.
      a. Isolate BVDV by serum, blood, or virus identification using special stains (immunohistochemistry) on formalin fixed skin retrieved from ear notching.
         1) Animals that test positive for BVDV will need to be retested in 30 days to verify whether they are persistently infected.
         2) A serum BVDV antibody titer is not useful information for identification of animals persistently infected with BVDV.
         3) Calves from any replacements that are pregnant at purchase should be tested as soon after birth as possible using whole blood virus isolation or immunohistochemistry testing of skin samples.
      b. Johne's disease.
         1) Present tests for this age group of cattle (replacement beef heifers) are less reliable than for older animals. Therefore, it is advisable to purchase replacements from herds that are above the level of your herd in the voluntary Johne's certification program (if that is an option in your area).
      c. Fulfilling the brucellosis, tuberculosis, and other regulatory requirements for shipment should be performed within 30 days of shipment.
         1) Current information can be obtained from the Oklahoma Department of Agriculture Import & Export Division-405.524.6404 or contact the State Veterinarian's office in the state of destination.

B. Isolation and quarantine management.
   1. Minimum 30-day isolation period.
   2. Strict control of contact with other animals and/or other traffic.
   3. Herd identification (herd of origin and as an individual in the herd).
   4. Serum bank for retesting or future testing if needed.
   5. Vaccinate with IBR, BVDV vaccine, 5-way lepto bacterin, campylobacter (vibrio) bacterin, and 7-way clostridial bacterin/toxoid.
      a. Modified live virus IBR and BVDV vaccine should be administered at least 30 days prior to breeding.
   6. Internal and external parasite treatments should be administered.
   7. Add a coccidiostat (amprolium, decoquinate, or ionophore) to the ration for the entire quarantine period.

C. Post-isolation/quarantine period.
   1. Following the isolation / quarantine period, turn the heifers out with virgin bulls or bulls that tested negative for trichomoniasis. Bulls should have tested negative for the same diseases and received the same vaccines and treatments as the purchased replacement heifers.

Biosecurity Summary

Biosecurity - a term used to describe programs for preventing the introduction of pathogens (infectious agents - viruses, bacteria, prions) considered potentially harmful to the health and well being of the herd.

Biosecurity goals - occurs at the national, state, and herd level to protect animal and human health and economic well-being of the citizens of our nation at an individual and national level.

Biosecurity adequacy today - Common disease prevention and control practices employed by the majority of beef herds today are inadequate to meet future demands.

Biosecurity areas of importance - should include herd replacements, fence-line contact animals, embryos, recipient cows, semen, feedstuffs, water, livestock shows, livestock auctions, wildlife populations, rodents, pets, insects, vehicles, and humans.

Effects of introduced diseases - in a beef cow-calf operation are:

1. Decreased reproduction efficiency.
2. Decreased productivity.
3. Increased morbidity (illness).
4. Increased mortality (death).
5. Decreased cash flow and equity.
6. Loss of marketing options - international, interstate, and intrastate between farms and ranches.

Biosecurity levels - range from a closed herd (SPF) to free entry with no pre-entry testing, no herd of origin medical records, or no quarantine/isolation period.

Disease risk level accepted - is each individual's decision.

Biosecurity program requires - veterinarians to be an integral part of any biosecurity program. They are an important source of information concerning diseases, diagnostic testing, vaccination needs, and other informational sources.

Replacement animal programs - include pre-shipment herd of origin information, pre-shipment testing, isolation, postshipment testing, and commingled herd monitoring.

A biosecurity program is like an insurance policy for the health and productivity of the herd. Producers, with the help of a qualified veterinarian, must make decisions about the risk tolerance level they will accept based on the chances of a disease occurring and the expected economic losses from the disease. When the risk tolerance level is determined, then appropriate risk management measures can be initiated.

There is no "one size fits all" program for biosecurity; there are tools available to control many of the infectious diseases jeopardizing cattle operations. These tools can be adapted to the individual objectives for each herd and can be implemented successfully. However, there must be planning, commitment, and education of all personnel throughout the operation to attain the goals set for an effective infectious disease control (biosecurity) program.[2]

References

1. Thompson, J.U. Implementing biosecurity in beef and dairy herds. Proceedings, American Association of Bovine Practitioners 30: 8-14, 1997.

2. An introduction to infectious disease control on farms (Biosecurity), A BAMN Publication, 2000. For copies contact: AFIA, Dorann Towery, 1501 Wilson Blvd., Suite 1100, Arlington, Virginia, 22209, or phone 703.524.1921.

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