Handling Health Risk, Preventing Mistakes

Dale M. Grotelueschen, DVM, MS
Managing Veterinarian, Beef Cattle Veterinary Operations, Pfizer Animal Health
Gering, NE

The beef business has evolved tremendously and change seems to accelerate. Risk management is a part of most beef enterprises and management of health risk is no exception. Proactive animal health management decreases likelihood of large economic health associated losses and can accentuate animal health as a positive in beef production systems.

The subject of health is a very broad area. Health is influenced by a broad array of risk factors and encompasses many infectious and noninfectious conditions. This paper focuses on health involving some aspects of the effects of infectious agents. The industry has expanding options for disease control as decisions are made to accomplish financial and production goals. Disease control plans can be designed to address various infectious diseases and optimal levels of health risk in individual operations.

Overview of disease-causing ability and prevalence

Disease-causing capability or virulence of microorganisms ranges from no perceived or known disease at all to disease resulting in death. Examples range from certain rumen bacteria that are actually beneficial to the bovine to diseases such as rabies and anthrax, where infection results in death. Between these two extremes lie most of the agents or pathogens of most interest to the beef industry.

Occurrence of agents also ranges widely. Many pathogens are present normally in herds and only result in negative health and productivity effects under certain conditions or when certain risk factors are present. Examples include Mannheimia (Pasteurella) haemolytica and Mycoplasma bovis that are found normally in the upper respiratory tract of many cattle but are involved in bovine respiratory disease (BRD), especially when they migrate to lung tissues in the lower respiratory tract. Also, calf diarrhea agents such as rotavirus and coronavirus are normally carried and shed by adult animals in many or most herds but cause disease in young calves when immunity is insufficient and/or exposure levels become excessive. In contrast, presence of some agents in herds is synonymous with occurrence of disease. Examples include trichomoniasis, a venereal disease which results in reproductive losses, and bovine viral diarrhea (BVD) virus, which can result in multiple forms of losses ranging from mild to catastrophic in severity.

Internal and external parasites are widespread. Parasite control enhances reproductive performance, immune function and overall herd health and performance.

Biosecurity and biocontainment

Biosecurity and biocontainment become important as producers and veterinarians design plans to reduce health risk and control or eliminate disease from cattle herds. While these

terms frequently are associated with descriptions involving foreign animal disease they are very practically applicable to disease conditions we deal with frequently in our beef operations. Working definitions can be stated as follows:

> Biosecurity: the outcome of all actions used to prevent disease agent entry into a unit of interest. In this case the unit of interest, such as the beef cow/calf enterprise.
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> Biocontainment: the outcome of actions resulting in control of a disease agent in a unit of interest, such as the beef cow/calf enterprise. The outcomes of actions for control of disease agents already present.

Using these concepts, the industry can design plans the focus on biosecurity or biocontainment depending on status, or in some cases perceived or assumed status of individual herds. There are 3 fundamentals involved with these concepts:

1) increase immunity of the animal/herd,
2) eliminate the disease agent and
3) prevent transmission due to animal contact.

These plans must not only be highly effective but also result in predictable economic returns to the enterprise.

<u>Increase immunity of the animal/herd</u>

Vaccination is used most commonly to increase immunity in individual animals as well as populations of animals. Natural immunity induced by exposure to disease agents is the most common mechanism resulting in specific immunity from field exposure. This practice must be justified economically as well as its contribution to disease risk reduction.

Vaccination can be an extremely effective disease prevention practice. However, in some cases, vaccination itself may not be sufficient to provide the levels biosecurity or biocontainment desired. An example is BVD virus. The primary goal for BVD vaccination in breeding aged cattle is preventing birth of PI BVD calves. Even though certain vaccines have demonstrated ability to prevent gestational infections and birth of persistently infected (PI) calves, research also shows that some PI BVD calves are still born to vaccinated cattle, when exposure occurs during the high risk time interval of 45-120 gestation, for various reasons. Hence, other options must be implemented if higher levels of BVD control are expected. Vaccination generally reduces both the ability of an animal to spread disease as well the susceptibility of the animal to that particular disease. Herd health programs utilize vaccinations in populations of animals to reduce effects of the pathogen in question when it is present in the herd. Vaccinations also to serve to reduce disease risk to agents that are not present in a herd but could cause losses in production if introduced and cattle are exposed. Hence, herd-based approaches to vaccination are just as important as are other approaches to herd health and production management.

Vaccination protocols should be designed to augment both individual and herd immunity. Goals should include production of protective immunity by the time of breeding in the case of open replacements. Infectious agents addressed in vaccination programs should be based

on risk and need in biosecurity and biocontainment plans. Bovine viral diarrhea (BVD) vaccinations at about 30-60 days prebreeding should target prevention of PI BVD calves. Vaccinations for other important pathogens, including campylobacter (vibrio), Leptospirosis, clostridial organisms, IBR (infectious bovine rhinotracheitis, BRSV (bovine respiratory syncytial virus), and PI3 (parainfluenza 3 virus) should also be done prebreeding for best herd immunity. When animals are already pregnant, such as when purchased replacements are introduced, these same agents should be incorporated. However, there are label differences for vaccine use in pregnant versus non-pregnant females that must be observed that alter vaccine selection. When these are completed, revaccinations and required boosters may than be administered to augment herd immunity.

Control or elimination of the disease agent

Effective control of disease agents is possible when risk factors are examined and appropriate interventions implemented. Since many/most infectious agents tend to be common in cattle populations elimination of agents is often not practical, possible, or necessary.

Elimination of disease agents is becoming more practical as better understanding is gained about some diseases and as better tools, such as diagnostic tests, are developed. An example is elimination of trichomoniasis from herds, an important economic necessity in infected herds. Pseudorabies and hog cholera, important production diseases of swine have been eradicated or nearly eradicated from the North American continent. Brucellosis and tuberculosis are other bovine examples. There is increasing evidence that elimination of Johnes disease from cattle populations maybe of importance. Elimination of BVD virus from herds is possible. Eradication programs are well underway in some European countries.

It is clear at this point that elimination or eradication or certain disease agents must be prioritized within herds and within the beef industry. However, this option should not be overlooked when designing disease control plans.

Prevent transmission due to animal contact

Preventing animal-to-animal transmission is the third important fundamental for biosecurity and biocontainment. Included here also is contamination of premises and equipment, as stock trailers, where shedding from infected cattle results in exposure to subsequent animals coming in contact even though direct contact may not have occurred. This is a very important consideration both within a herd and as new cattle are introduced into the resident herd. Animal shedding to herdmates increases exposure levels and unless adequate immunity is present, infection and potential disease may occur. Herd immunity levels are important in these situations to prevent rapid spread of pathogens in some cases, such as BVD and IBR (rednose, infectious bovine rhinotracheitis virus).

Introduction of new cattle into herds can introduce new infectious agents as well as new strains of existing agents. Examples include animals infected with trichomoniasis, which, if transmitted venereally to new herdmates, will result in reproductive loss. Introduction of one or more PI BVD animals results in heavy BVD virus exposure and resulting losses even

though the vaccination program may be optimal. Simply put, use of all tools available for improvement of health can reduce risk for losses and accomplish higher levels of productivity and financial return. Producers and veterinarians have a number of options that can be implemented depending on established goals in the operation. Planning and sound decision-making, using research-based information whenever possible, are keys to economically and scientifically sound disease control plans.

Implementing sound health programs

It is clear that beef animal health is a lifetime event as it associates with productivity. For example, calves that absorb less than adequate colostrum are at increased risk for adverse health events later in life. Cattle with lungs lesions perform less optimally than those that do not. Health management early in life is an important component of health programs.

Development of replacement heifers and their entry into the breeding herd represents steps that have significant impact on herd productivity and profitability. Heifers that breed early in the breeding season have higher lifetime levels of production. Also, longevity in the breeding herd contributes significantly to profitability. The importance of sound heifer replacement development cannot be overemphasized. Health and health programs are part of that program. All factors related to success of heifer development programs are closely intertwined. Animal handling and husbandry processes that are critically important. Effects on productivity parameters, such as weaned calf percentage, calving distribution and unit cost of production can be applied in similar manner as other replacement heifer development management factors, such as cyclicity, EPDs, etc..

Herd biosecurity and biocontainment plans can be used to reduce health risk Exposure to disease agents can be prevented or controlled with sound plans. Herd immunity begins with sound vaccination programs in young animals. They need to be incorporated into these.

Price differentiation for cattle in health programs

Marketing systems are differentiating value of animals based on health and potential health by rewarding sellers with added monetary gains. Additionally, producers retaining ownership are able to capitalize on added value health not only in the cow-calf enterprise but through the beef production cycle. Thus, addition of production value to the beef industry is achievable and economically measurable. It remains to be seen how the market may respond to health programs going beyond vaccinations and weaning, including management practices associated with weaning. The ability to market animals with added value gained through effective biosecurity and biocontainment at the cow-calf level can augment the returns obtained at that level in both commercial and seedstock operations.

Reducing health risks of new animal introductions in beef herds

Well-designed herd health programs take into account both exposure and immunity aspects of infectious disease control. Cow/calf operations should identify goals and set priorities for

prevention and control of infectious diseases. These goals include control of entry of disease agents into herds that potentially could threaten health and productivity.

Introducing new animals into cow-calf herds has potential for bringing disease-causing agents into the resident herd. Additionally, the resident herd can easily be a source for disease agents spreading to newly introduced cattle. Commingling, or mixing cattle from more than one herd, is known to increase risk for a number of diseases. This management practice, although often unavoidable, increases risk for adverse animal health. Managing this risk to reduce or eliminate its effects should be a goal of beef producers.

Following are some considerations for decreasing health risk when introducing new cattle into your cow-calf enterprise.

- Do not commingle for at least 3 illness free weeks. Movement of cattle often induces immune suppression that can result in illness. Sick cattle often shed infectious agents such as viruses and bacteria in high numbers. If animals become ill a longer period may be indicated.
- Do not introduce or commingle animals from other herds during calving season.
    - Herds where animals are introduced are known to be at increased risk for calf scours as well as a number of other health risks.
    - If pregnant animals are purchased they should be calved separate from the resident herd and not commingled until calves are at least a month of age.
- Follow a recommended vaccination program from your veterinarian for both newly arrived cattle as well as the resident herd to minimize risk. This addresses the immunity fundamental for disease control. Vaccination attempts to reduce the effects of a disease agent if exposure occurs.
- Set herd health goals that include tests for new arrivals (prior to or on arrival) at the ranch or farm.
    - Test for BVD-PI (Bovine viral diarrhea-persistent infection) status. BVD- PI cattle shed high amounts of BVD virus and will expose your herd. Test offspring of pregnant females before introduction into the resident herd.
    - Complete all regulatory testing required on purchased animals.
    - Know the Johne's disease status of your replacement purchases. Testing of young animals is most often not indicative of status so knowledge about the herd of origin is important.
    - Tests for disease agents such as bovine leukemia virus, leptospirosis and others may also be important for you to reduce herd health risk. Consult your veterinarian to assist in designing a plan that fits your herd.
- Introduce only virgin bulls to eliminate risk for venereal disease such as vibriosis (campylobacter) and trichomoniasis, or, if introducing non-virgin animals, introduce only tested negative bulls.
- These assume good management, animal handling and husbandry practices as well as a sound nutritional program.

Plans to reduce health risk posed by new herd introductions are a important parts of a herd biosecurity and biocontainment plan. Biosecurity is simply the prevention of disease entry into a herd while biocontainment is the sum of actions to control a disease when it is already

present in a herd. Application of disease control fundamentals, including elimination of disease agents when practical, prevention of disease transmission when appropriate, and increasing immunity to disease-causing agents all need to be considered when introducing new animals into herds. Consult your veterinarian to design plans that best fit your herd.

Summary

Producers and veterinarians have increasing options to reduce risk for losses associated with disease. Control of disease including and beyond vaccination can and should be accomplished by using biosecurity and biocontainment fundamentals to economically address disease risk. Health mistakes can be proactively addressed.

References

Albertson, K, Beef cowherd BVDV management – a practitioner's perspective, Proceedings, American Association of Bovine Practitioners 36 (2003) 56-60.
Cortese, VS, Grooms, DL, Ellis JA, Bolin, SR, Ridpath, JF, Brock, KV, Protection of pregnant cattle and their fetuses against infection with bovine viral diarrhea virus type I by use of modified live virus vaccine, Am J Vet Res 59:11 (1999) 1409-1413.
Dargatz, DA, Garry, FB, Traub-Dargatrz, JL, An introduction to biosecurity of cattle operations, Vet Clin Food Anim 18 (2002) 1-5.
DeJong, MCM, Bouma, A, Herd immunity after vaccination: how to quantify it and how to use it to halt disease, Vaccine 19 (2001) 2722-2728.
Dewell, RD, Hungerford, LL, Keen, JE, Laegreid, WW, Griffin, DD, Rupp, GP, Grotelueschen DM, 2006.Association of neonatal serum immunoglobulin G1 concentration with health and performance in beef calves, JAVMA 2006;228:9:914-921.
Griffin DD, Biosecurity basics for cattle operations, Nebraska Cattleman, pp 18-19, Sept. 1999.
Hermel, S, Stop bugs at the gate: managing your herd to reduce disease introduction isn't as difficult as it sounds, Beef (April, 1996) 26-30.
King, ME, Salman, MD, Wittum, TE, Odde, KG, Seeger, JT, Grotelueschen, DM, Rogers, GM, Quakenbush, GA.Effect of certified health programs on the sale price of beef calves marketed through a livestock videotape auction service from 1995 through 2005, JAVMA 2006;229:1389-1400.
Larson, R, Grotelueschen, D, Brock, K, Dargatz, D, Ellis, J, Hunsaker, B, Lewis, S, MacGregor, DS, Smith, R Sprows, R, Traffas, V, BVD Decision/Management Guidelines for Beef Veterinarians 38:1 (2004) 103-112.b
Martinez, GE, Koch, RM, Cundiff, LV, Gregory, KE, Van Vleck, LD, Number of calves born, number of calves weaned, and cumulative weaning weight as measures of lifetime production for Hereford cows, J Ani Sci 82 (2004) 1903-1911.
NCBA, Johne's disease, should you be concerned? National Cattlemen's Beef Association circular 12-401.
Perino, L, Rupp, G, Immunization of the beef cow and its influence on fetal and neonatal calf health, Vet Clin Food Anim 10 (1994) 15-33.
Sanderson MW, Dargatz DA, Garry FB, Biosecurity practices of beef cow-calf producers, J Am Vet Med Assoc 217:185-189, 2000.
Smith, DR, Epidemiologic tools for biosecurity and biocontainment, Vet Clin Food Anim 18 (2002) 157-175.
Smith, DR, Grotelueschen, DM, Biosecurity and biocontainment of BVD virus, Vet Clin Food Anim 20 (2004) 131-149.
Spire, M, Managing replacement heifers from weaning to breeding, Vet Med (1997) 182-191.
Sprott, LR, Reproductive performance in replacement heifers has long-term consequences on the cow herd, ASWeb-100, http://animalscience.tamu.edu/ans/index.htm (2002).
Thomson, JU, Implementing biosecurity in beef and dairy herds, Proceedings, American Association of Bovine Practitioners 30 (1997) 8-13.
USDA Bulletin, Getting started with biosecurity, USDA-CSREES Higher Education Grant 2002-38411-12089, pp 1-16.

Contact information:
Dale Grotelueschen
2520 Valencia Drive
Gering, NE 69341
(308) 436-4491
dale.m.grotelueschen@pfizer.com