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Herd Health Programs and Reproductive Efficiency of Beef Cattle

An excellent herd health program is an important component of overall management for reproductive efficiency, as health can significantly impact the reproductive performance of cattle as well as the value of the calf crop. Failure to protect against disease and detrimental environmental factors can result in reduced pregnancy rates, stunted calf growth, or costly treatment in a given year. Long term effects, such as permanent infertility or inadequate immune development in replacement animals, are also a threat. Veterinarians should be consulted to develop protocols specific to the needs and goals of each operation based on the management goals, geographic location, and individual risk factors of the operation.

Some of these risk factors specifically target the reproductive soundness of the cow herd. Non-infectious concerns may have significant effects yet are often overlooked as a part of herd health programs. Inadequate nutrition, excessive heat, or parasite load can indirectly harm reproductive performance by reducing body condition or increasing stress. Infectious diseases, such as vibriosis, brucellosis, infectious bovine rhinotracheitis, bovine diarrheal virus, trichomoniasis, leptospirosis, can directly reduce fertility or cause abortion and may rapidly spread through inadequately protected herds. Comprehensive herd health programs will mitigate these risks through consistent monitoring and proactive management.

Preventing disease exposure

Introducing new animals

Biosecurity practices are essential to reducing exposure to diseases capable of causing abortion or infertility. The introduction of new animals to the breeding herd is one of the primary sources of disease transfer. This is particularly relevant for several reproductive pathogens, such as *Leptospira*, BVDV or *Trichomonas*, which commonly establish persistent or unobservable infections in some classes of animals. When possible, purchase animals with a known source and vaccination history. Additionally, it is strongly recommended to test for high-risk diseases or conditions, prior to mixing animals from outside sources or separate cohorts. Consider quarantining newly purchased animals, especially those with an unknown vaccination and disease history, to monitor for undetected illness. A period of 21 to 30 days of surveillance is generally recommended.

Disease exposure can also occur through fence-line contact of animals on neighboring operations. Caution must be taken to avoid a interaction of animals from different herds if possible and practical, as contact between animals with differing management programs inherently presents a risk of for disease transfer. Coordination and cooperation between neighboring operations is often in the interest of both parties. Planning distribution of animals so as to limit fence line exposure is always recommended if possible. Likewise, cooperative planning is encouraged whenever multiple operations graze cattle on shared-use areas (e.g., public lands). Finally, even operations that are relatively isolated from adjacent livestock should be aware that wildlife are also a source of potential disease introduction.

Proof of vaccination or testing[1] may be situationally required for some diseases based on severity and location. In Missouri, trichomoniasis testing is legally required prior to the sale or lease of all non-virgin bulls and all bulls over 24 months of age. All herd health programs should consider testing calves for bovine viral diarrhea virus persistent infection (BVD-PI) status at a minimum. Proof of vaccination against brucellosis (Bangs) in replacement heifers should be considered when shipping between states is a possibility. Additional testing against diseases like bovine leukemia virus (BLV), Johne's disease, or anaplasmosis may be warranted based on animal source and disease prevalence in a location. Consult a veterinarian for guidance on appropriate regional tests.

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Sanitation

Maintaining sanitary conditions is inherently challenging for any beef operation, but striving to reduce excessive exposure to waste, mud, and other environmental sources of disease can reduce rates of infection. Sanitary handling of products and equipment is of high importance in protecting against reproductively significant infections. Risk of infection can be reduced by practices such as regularly changing needles when giving injections or thoroughly cleaning the vulva prior to CIDR insertion or insemination in estrus synchronization protocols.

Sanitation should be prioritized during periods of suppressed immunity in cows and calves, such as during calving. Good management of calving pens and/or pastures may be effective in reducing calf exposure to diseases and parasites prior to vaccination. One example is the Sandhills Calving System[2], in which cows that have not yet calved are advanced through a series of pastures over the course of the calving season, while smaller groups of pairs with similar calving dates remind behind. This system protects newborn animals by segregating them from older calves and reducing the load of pathogens in the environment.

Parasite control

The impact of internal and external parasites on total animal health can reduce the reproductive capacity of an animal. Even subclinical infections can result in diminished immunity and nutritional deficits capable of reducing fertility. Parasite presence will vary in intensity based on location, season, and even weather conditions. The key to responsible and effective parasite control is to modulate strategies and products to address the needs of the herd at any given point in time. The most important part of a parasite control plan is effective surveillance. While external parasites are typically visibly detectable, monitoring internal parasite load may require additional assessment. Egg counts may be performed during late spring at the time when shedding is expected to be highest to provide initial indication of burden. Subsequent fecal egg count reduction tests allow evaluation of the efficacy of the control strategies and products selected.

Parasite control[3] is most effective when multiple strategies are combined. Effective strategies include moving animals to clean pastures, ensuring adequate rest periods for pastures under rotational grazing, eliminating sources of infestation (waste, standing water, etc.), selectively deworming young and vulnerable animals, or timing product administration to seasonal fluctuations in parasite presence. If the parasite load in the herd warrants the use of deworming products, veterinarians should be consulted to select products that safely target the parasites present. Rotating the class of pharmaceutical used and the routes of administration may allow products to retain their efficacy and reduce the development of parasite resistance over time. Always follow all label instructions for product storage, dosing, and methods of administration.

Vaccination

Vaccination is a pillar of herd health. Protocols should protect against all diseases that pose a significant threat to the herd, either due to a high risk of infection or the severity of the disease itself. Some vaccinations must be administered annually to entire herd. Others, like the vaccination against Brucellosis, require only a single dose early in life. Developing a protocol to produce effective herd immunity in all ages requires careful consideration of factors such as vaccine type, cost, stage of production, and timing of administration.

Modified live versus killed vaccines

Vaccine type determines the characteristics and strength of immunity produced. Modified live virus (MLV) vaccines often provide superior immunity but may not be appropriate for all animals due to the possibility for developing active disease, risk of abortion, or the physiological demand required to mobilize a stronger immune response. Potential risk is highest at initial vaccination, allowing the use of MLV products in previously vaccinated animal without significant concern. For this reason, excellent calfhood vaccination programs maximize the likelihood of adequate protection throughout life.

While killed vaccines could be regarded as having lower risks in some cases, they do not elicit the immune response and protection comparable to that elicited by MLV products. Therefore, use of killed vaccines is most commonly recommended only in situations where the use of MLV products may involve too much risk. Animals in this category include those not previously exposed to MLV vaccines or for which history of vaccination is unknown.

Some debate exists as to the safety of administering MLV versus killed vaccines near the start of the breeding period. Risks from pre-breeding booster vaccinations are relatively minimal when used among previously vaccinated animals[4]. In general, use of MLV booster vaccinations are encouraged whenever possible in order to provide the highest level of protection.

Handling and administration

Product efficacy depends on appropriate handling and administration[5]. Carefully follow all label directions

for storage, route of administration, and expiration as instructions will vary between vaccine types. Poor compliance with recommended handling practices, such as failure to keep vaccinations at the appropriate temperature, syringe contamination, exposure to sunlight, or inaccurate dosing may decrease vaccine efficacy and diminish protection of the herd.

Calves

Development of immunity in calves depends on both vaccination and adequate colostrum. Protection of neonatal calves from conditions like scours is often achieved by vaccinating dams prior to calving and relying on the transfer of maternal antibodies in colostrum. Prior to weaning, calves should be vaccinated against infectious bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD), parainfluenza-3 (PI3), bovine respiratory syncytial virus (BRSV), and clostridial disease via a 7-way clostridial vaccine (Blackleg, etc). At weaning, all calves should receive a second vaccination against IBR, BVD, PI3, BRSV, and a 7-way clostridial vaccine. Vaccination of potential replacement heifer calves against Brucellosis (Bangs) may be performed by an accredited veterinarian in accordance with state and federal regulations at this time.

Cows and heifers

Pre-breeding vaccinations should be administered to cows and heifers entering the breeding herd 30 to 60 days prior to breeding. This will allow an adequate window of time for immunity to develop and mitigate any risk to reproductive performance caused associated with the increased stress of a systemic response required to develop immunity. Administering vaccines well

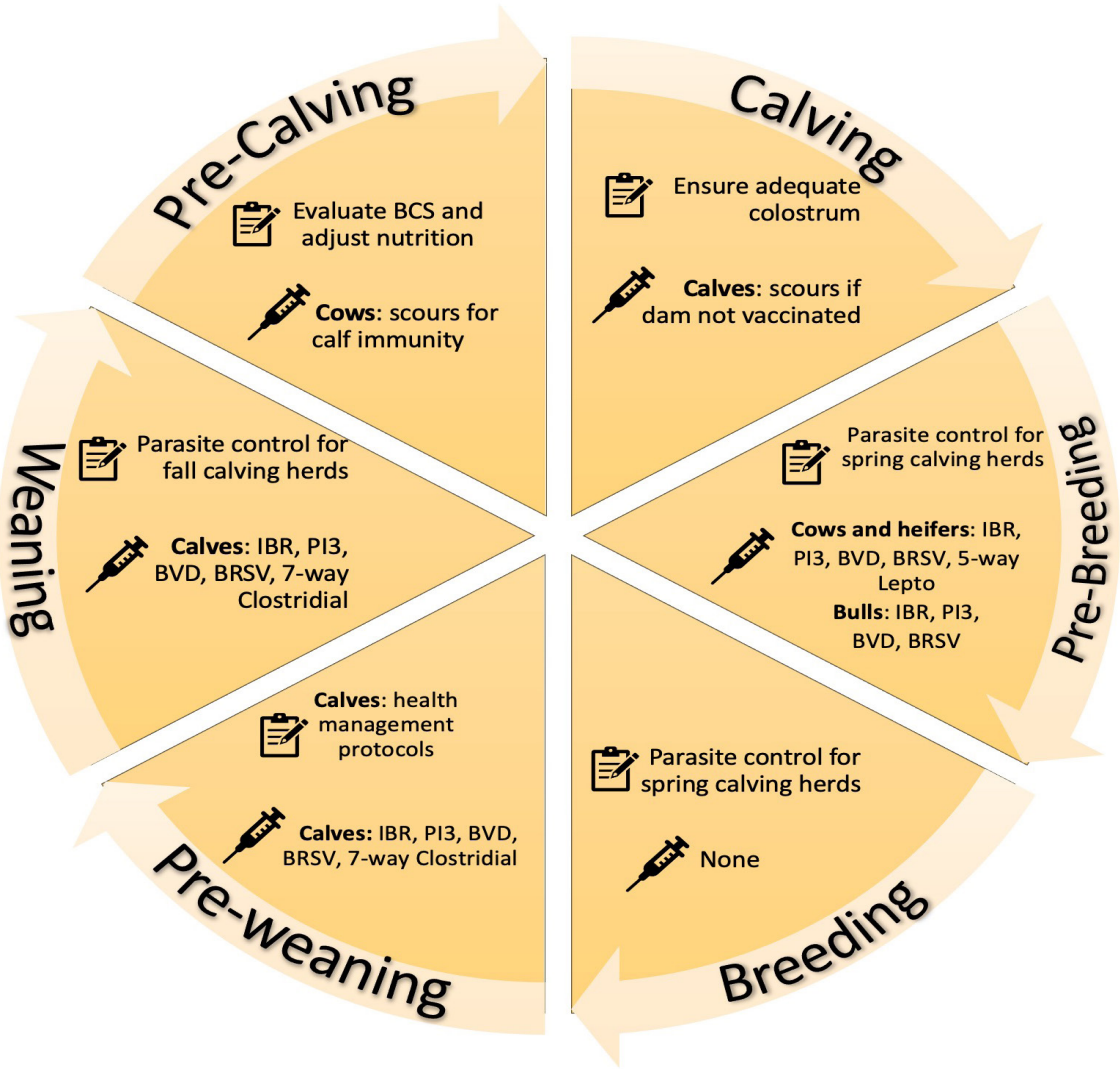

Figure 1. Key management events throughout the year provide convenient opportunities for carrying out herd health protocols like vaccination. Aligning herd health practices with events such as weaning, pre-breeding evaluation, or pregnancy examination reduces the number of times cattle must be handled and increases efficiency in management.

before the breeding season ensures adequate protection is achieved by the time-period of greatest reproductive concern surrounding conception and the first few months of gestation. This is especially important for diseases that may cause abortion, such as IBR, or those capable of infecting the fetus and producing persistent infection, such as BVD. Vaccinations for IBR, PI3, BVD, BRSV, and 5-way leptospirosis should be administered to all females with an additional leptospirosis booster approximately 4 to 5 months after breeding at the time of pregnancy examination.

Bulls

Breeding soundness exams prior to bull turnout present an ideal opportunity for vaccination of bulls. Evaluation of semen quality, scrotal circumference, condition, and overall physical structure of all herd bulls should be conducted during the pre-breeding period. Testing for trichomoniasis and annual vaccinations against IBR, BVD, PI3, BRSV, and leptospirosis may be most convenient at this time.

Additional vaccinations

A number of other vaccinations may be incorporated into a program based on risk, location, or presence of infection within the herd. For example, producers may wish to discuss additional protection with vaccinations such as anthrax, pinkeye, *Mannheimia haemolytica*, or anaplasmosis with their veterinarian.

Program schedule

Key management events throughout the year (Figure 1) provide convenient opportunities for carrying out herd health protocols like vaccination. Aligning herd health practices with events such as weaning, pre-breeding evaluation, or pregnancy examination reduces the number of times cattle must be handled and increases efficiency in management.

This schedule is provided as an example of a basic herd health program. It assumes a 12-month calving interval, 60-day breeding season, and weaning at 8 months of age. The best herd health program is one that is customized to the risks, herd characteristics, and management goals of the operation. Working closely with a veterinarian is vital to both creating and adapting protocols to address variable factors. Program efficacy should be monitored based on measurable goals and adjusted in response to constant changes in the environment and herd status.

For this reason, keeping excellent records for individual animals is a requirement. Adhering to the established herd health program at every level will enable the herd to reach its potential for animal performance and reproductive efficiency.

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