Chapter 28. Herd Health

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Objectives

- Learn how to use commercial beef cow-calf health guidelines (Table 28.1) as a template for designing a herd health plan.
- Point out several vaccinations needed for different parts of the herd during a year.

Geographical locations, climate variations, resource availability, individual animal differences, and human population demographics influence production agriculture throughout the world. Developing a sound and practical commercial beef cow-calf herd health program requires more than just obtaining a recipe from a "cookbook," because production objectives may vary considerably between individual producers, herd health programs must be customized to meet the needs of individual producers.

Historically, herd health programs focused on infectious disease treatment/prevention and parasite control. However, in modern animal agriculture, the focus is on optimizing the health of the herd, efficient production, and maximizing net return to the business unit. Working closely with a veterinarian will allow identification of individual herd needs and development of specific health programs to address these variables. Table 28.1, Commercial Beef Cow-Calf Herd Health Guidelines, has been developed as a template to follow when initially developing herd health programs for commercial beef cow-calf operations. Additionally, this table has been designed as simply as possible to minimize or eliminate many of the confusing issues related to these types of programs. While reading on, refer frequently to Table 28.1 for a more thorough understanding of the points stressed in this chapter.

Table 28.1 – Commercial beef cow-calf herd health guidelines[a,b].

Time	Basic Program Recommendations	Other Considerations to Discuss with Vet
Pre-calving	Evaluate facilities and environment Equipment: sterile, proper function Review protocol Record system	Quality frozen colostrum
Calf born	Individually identify (if possible) Record birth Colostrum	Dip navels Castrate Dehorn (complete)
Branding time 2 to 4 months	Individually identify (if not already performed): brand, ear tag Castrate Dehorn (complete) Clostridial: 7- or 8- way (location dependent) Parasite control program (location and season dependent)[c]	Brucellosis (bangs) - heifers - (marketing decision) (follow age restrictions) Viral respiratory diseases Leptospirosis Pinkeye Tetanus
Weaning 5 to 9 months	Clostridial: 7- or 8- way (location dependent) 4-way viral respiratory diseases (IBRV, BVDV, PI_3V, BRSV) Leptospirosis Parasite control program (location and season dependent)[c]	Brucellosis (bangs) - heifers - (marketing decision) (follow age restrictions) Preweaning/weaning vaccination program Weaning/post - weaning vaccination program Pinkeye
Replacement heifers 13 to 16 months	4-way viral respiratory diseases (IBRV, BVDV, PI_3V, BRSV) Leptospirosis Clostridial ? : 7- or 8- way (location dependent) Parasite control program (location and season dependent)[c]	Make sure individually identified Vibriosis
Process adult cow herd	Viral respiratory diseases (IBRV, BVDV) Parasite control program (location and season dependent)[c] Leptospirosis Evaluate individual animals: udder, eyes, disposition, feet, joints, legs	PI_3V, BRSV Anaplasmosis control Vibriosis
60 days pre-calving all females	If management is adequate, should not need any vaccinations	Scours vaccinations
Bulls	Viral respiratory diseases (IBRV, BVDV) Leptospirosis Parasite control program (location and season dependent)[c] Breeding reproductive examination	PI_3V, BRSV Vibriosis

[a] These are general guidelines and recommendations. Individual herd programs may vary considerably. Consult a veterinarian for specific recommendations.

[b] Follow all label directions and/or your veterinarian's recommendations.

[c] See Chapters 29 and 30.

The table is divided into columns. It is organized so that producers can apply the information and guidelines to their own individual situations. Producers can utilize this table as a checklist to prepare for the events in their individualized production cycle. The left-hand column identifies times in the production cycle when beef cattle are most commonly processed and decisions regarding health and business should be implemented. It is reasoned that recommendations designed around these times are more readily accepted by the producer and have the best potential for optimizing health of the entire herd. The center column presents basic or minimal guidelines for almost any commercial beef cow-calf herd. The right-hand column provides information that certain herds may need to address to optimize health and production. For the specific considerations outlined in this column, it is strongly recommended to consult a veterinarian. Again, it is stressed that these are general guidelines and recommendations. Programs should be customized to meet the needs and objectives of every herd.

It is beyond the scope of this chapter to discuss details of goal setting; however, the health and viability of any business including commercial beef cow-calf operations must define long- and short-term goals. To determine if goals are being attained, pertinent information must be recorded. Accurate records can be used for measuring goals and determining financial and production parameters of the business. Data that are collected must be reviewed and used to make informed business decisions. In other words, do not collect information just to be collecting information. Record systems for commercial beef cow-calf operations can be as simple as a pocket calendar or as technical as a software computer program. Regardless of system chosen, it is imperative that information is recorded and the system in place prior to calving. For more information about keeping records, refer to Chapter 2.

This chapter will arbitrarily start with pregnant females just prior to calving and designate this occurrence or event as "pre-calving."

PRE-CALVING

The left-hand column of Table 28.1 refers to occurrences in the cow-calf production cycle where business decisions should be made and implemented by producers. Producers should prepare personnel who will be involved in the process and the environment as early as possible, usually 1 to 4 weeks prior to the first anticipated or calculated calving date. One of the first places to begin is in the evaluation of the facilities or the calving environment. If pregnant heifers and cows are to deliver in structural facilities, the facilities must be in good repair to avoid physical injuries to the dam and calf as well as personnel. Most structural facilities for calving purposes are only needed for part of the year; farmers and ranchers frequently store equipment and feedstuffs in the same areas. Therefore, calving areas or pens need to be properly cleaned and ready for use prior to the anticipated delivery of the first calf. Where heifers and cows are to deliver in open pasture or range conditions, the calving areas must be dry or well drained. If many females are anticipated to deliver in a short time-frame, rotation of the calving areas should be practiced. By providing clean areas or rotating pastures, the buildup of potential disease causing agents (pathogens) will be minimized. In certain locations and seasons, shelter may need to be provided for optimal health.

It is not uncommon for cattle to go into labor after "normal" working hours. In certain situations (dystocias or difficult births), physical assistance during the parturition (calving) process is needed. Timely intervention can mean the difference between life and death of the dam and her offspring and hence, potential revenue for the producer. Delivery equipment such as fetal calf extractors (calf pullers), obstetrical (OB) chains and snares, protective sleeves for personnel, lubricant, etc. should be clean or sterile, in good working order, and easily accessible.

Experienced personnel are not always available during delivery; therefore, employees, family members, and neighbors are commonly asked or required to observe and assist during calving. A written protocol outlining normal events during parturition and the criteria indicating the need for intervention during the delivery process will increase the chance for a successful birth. Producers should review and discuss the protocol with all personnel involved in this phase of production to alleviate potential complications or problems.

Calves are born with an innate immunity or protection against common diseases. However, without additional protection against disease-causing agents, the chances of long-term survival or productivity are poor. Short-term passive immunity for the calf is provided by the dam's colostrum. In certain situations, neonatal (newborn) calves will not

receive this protection. Therefore, as listed in the right-hand column of Table 28.1, a source of high quality colostrum should be available to administer to the deficient calf.

Following the approach of this chapter, you should next focus on the event in Table 28.1 titled "calf born" which correlates to the time after the calf is born.

CALF BORN

As stressed in a previous section, records are one of the most important management tools used in evaluating the financial and productive health of commercial beef cattle enterprises. Profitable commercial beef herds need to cull nonproductive animals. Difficulty in delivering a live calf (calving difficulty) should be one of the criteria used in this process. Any assistance given in the delivery of the calf should be recorded for future evaluation of the cow.

Individual records should be started as soon after birth as possible. To create these records, the calf must be individually identified. Individually identifying newborn calves may not always be practical in every commercial operation; however, no matter which record system the producer uses, it is best to start an individual record as early in the animal's life as possible. In several instances, it is fairly easy to catch a calf that is less than 24 hours old and administer a unique identification, such as a bangle tag. This step is frequently not performed at this stage in the animal's life because it is not convenient for the producer.

The importance of colostrum and its role in the future of the calf's life from both a health standpoint and an end product standpoint was discussed in the pre-calving section. A newborn calf vigorously nursing its dam shortly after birth will usually correlate to an adequate intake of colostrum. With first calf heifers, the quality of colostrum is usually not as high as that of an older adult cow. Therefore, in cases where a partial failure of passive immunity transfer occurs, supplementing the newborn with high quality colostrum may be necessary. Management changes may be needed to avoid the need for supplementation in the future.

Factors Affecting Passive Immunity

A successful cow-calf operation requires that a large percentage of cows wean a live calf every year. A live calf at weaning time requires survival of the offspring from birth to weaning. Cattle that are healthy as calves, healthy as weaned stockers, and remain healthy throughout finishing are more productive and much more cost efficient. In addition, healthy cattle that are not repeatedly treated with antibiotics or other therapeutic products will have a higher likelihood of producing a wholesome, high quality carcass with fewer injection-site blemishes and no antibiotic or drug residue. As the percentage of cattle needing antibiotics for disease control or prevention dwindles, consumer confidence in the wholesomeness of beef should increase. As vertically integrated alliances become more popular, healthy calves that have strong natural or acquired disease immunity will be in greater demand.

Resistance to disease is greatly dependent on antibodies or immunoglobulins and can be either active or passive in origin. In active immunity, the body produces antibodies in response to infection or vaccination. Passive immunity gives temporary protection by transfer of certain immune substances from resistant individuals. An example of passive immunity is passing of antibodies from dam to calf via the colostrum (or first milk after calving). This transfer only occurs during the first 24 hours following birth.

Drs. Tom Wittum and Louis Perino while with the USDA experiment station at Clay Center, Nebraska monitored health events and growth performance in a population of range beef calves to identify associations of these factors with passive immune status. Blood samples were collected at 24 hours postpartum from 263 crossbreed calves to determine the amount of passive maternal immunity that had been obtained from colostrum. Growth performance and health events in the study population were monitored from birth to weaning, and after weaning throughout the feeding period. The lowest levels of passive immunity were observed among calves that were sick or died prior to weaning. Calves with inadequate passive immunity had a 5.4 times greater risk of death prior to weaning, 6.4 times greater risk of being sick during the first 28 days of life, and 3.2 times greater risk of being sick any time prior to weaning when compared to calves with adequate passive transfer. The risk of being sick in the feedlot was also three times greater for inadequate compared to adequate calves.

Passive immune status was indirectly associated with growth rates through its effects on calf health. Sickness during the first 28 days of life was associated with a 35 pound lower expected weaning weight. Respiratory disease in the feedlot resulted in

a 0.09 pound lower expected average daily gain. Thus, passive immunity obtained from colostrum was an important factor determining the health of calves both pre- and post-weaning, and indirectly influenced calf growth rate during the same periods.

Several factors influence the amount of immunoglobulin that is absorbed by the baby calf. Some of these factors are directly related to the amount of colostrum available from the mother. These factors include

- Genetic composition of the dam
- Age of the dam
- Nutritional status of the dam

Certainly it is clear that dairy-influence or high milking beef cows should have a larger volume of colostrum. It is less certain whether the concentration of antibody molecules is the same. In some cases, smaller amounts of colostrum may have higher concentrations of immunoglobulins, helping to offset the difference in total volume. Mature cows consistently give more colostrum than two-year olds of similar genetic makeup. Therefore it is no mystery that calves from two-year old cows are more prone to diseases such as scours than calves from older cows. Cows in better body condition at calving have been shown to impart more passive immunity to their calves. This is most apparent in young cows. Research in Colorado found that calves from thin cows (less than 5 body condition score) had lower amounts of circulating antibodies at 24 hours of age than did calves from heifers that were in adequate to good body condition score (body condition score 5 or 6) at calving (Odde, Abernathy, and Greathouse).

The timing of colostrum intake by the calf can have a role in the transfer of passive immunity. Research has clearly shown that absorption of the very large antibody molecules must take place in the first 24 hours of life (Besser and Gay). The intestinal lining of the baby calf undergoes changes (called intestinal closure) that reduce the ability of the gut to absorb the immunoglobulins. In fact, most absorption takes place in the first 12 hours. By the time the calf is 6 hours old, only 66% of the antibodies consumed can be absorbed. When the calf is 12 hours old, less than half of the available antibodies will be absorbed into the blood, and when the calf is 24 hours of age, intestinal closure is nearly complete. Sluggish or weak calves may take a long time to stand, and therefore a long time before looking for the teat to nurse. Any thing that comprises the vigor of the baby calf can have an adverse effect on passive immunity. Another factor shown to influence the transfer of passive immunity includes the shape and size of the udder of the dam. Cows with large pendulous teats and/or with very low udder attachments may be difficult for the calf to locate and get the teat in its mouth to nurse.

Calves that were subjected to a long, difficult delivery often are weakened and slow to rise. In addition, the respiratory acidosis that results from the difficult birth can have an additional negative impact on the gut lining and its ability to absorb. This combination of advancing time and acidosis often means greatly reduced antibody absorption. Colorado State scientists found greater concentrations of antibodies in the blood of calves born to quick easy deliveries, compared to those born after a long difficult labor and delivery process (Odde, Abernathy, and Greathouse).

Calves born in very severe weather stress as well as those that have not "bonded" with the mother have both been shown to have reduced absorption capability even if colostrum was available.

The development of lifetime identification, vertically integrated alliances, and niche markets will heighten the need for calves with highly developed disease immunity. Management factors that enhance the development of the passive immunity include

- Provide proper replacement heifer development programs and adequate prepartum nutrition for the cow herd to ensure heifers are in a body condition score of 6 and cows are at least in a 5 body condition score at calving.
- Breed heifers to bulls that sire low birth weight calves and cows to bulls that sire moderate birth weight calves to reduce the incidence of difficult births.
- Offer early obstetrical assistance to heifers or cows observed in labor so that the baby calf is not allowed to become extremely acidotic, weakened, and therefore unable to nurse the colostrum or have inhibited immunoglobulin absorption.
- Give at least 2 quarts of fresh or thawed frozen colostrum within the first 6 hours of life and another 2 quarts within another 12 hours to baby calves that are born to first calf heifers that have very little first milk or baby calves too weak to nurse naturally.

Other Baby Calf Procedures

During the birthing process, the umbilical cord from which the fetus has been receiving its needed life support during gestation is open for a short time.

During this short time, bacteria can enter into the blood stream of the newborn. Most of the time, the passive immunity transfer that the calf receives through its intake of colostrum will eliminate the infection. In some situations however, the infection will overwhelm the system, causing complications. In situations with overwhelming infection challenges, disinfectant such as iodine or chlorhexidine should be applied to the navels of newborn calves. Dipping navel cords should be a short-term solution. Management needs to be evaluated and appropriate actions taken to avoid or eliminate the need to perform this procedure.

If management is progressive and can proactively determine the future purpose of individual animals, castration and dehorning can be performed at this time. It is frequently more practical and efficient to perform these two procedures at "branding time" rather than shortly after birth. These procedures and justifications will be covered in much more detail in the next section.

BRANDING TIME

Historically, the term "branding time" designated the time when young cattle were processed and a mark was made using a hot iron brand to identify the owner. Cattle producers and veterinarians still use this term to indicate the time after all calves have been born and they are worked together as a group. Calves are usually 2 to 4 months of age, but the range can vary considerably between operations and even seasons. From a health standpoint, this is an opportune time to prepare the calf for where it is going, not where it is coming from.

Stress occurs any time cattle are handled. Too much stress can affect performance. Processing young calves at branding time has a major advantage of allowing the calf to return to its familiar environment, including nursing its dam after the procedures have been completed. It is thought that returning the calf to its familiar environment minimizes some of the stress of handling, allowing the calf to perform more closely to its genetic potential and hence, increase production.

If individual identification has not already been performed, it must be done at this time. Even if this is the first opportunity to individually identify animals, records should have already been initiated on each calf through the dam's records. Individual records should be started or updated, depending on previous identification.

Bull calves that are to be harvested for meat can be castrated at this time. From both a production and an economic standpoint, performing this health procedure makes sense. From the production side of this equation, studies have demonstrated that implanted steers nursing cows can gain the same as bull calves nursing cows (Baker, Lents). From the economic side of this equation, steers are more valuable commercially at marketing times than are bulls of equal quality.

There are four issues that will be commented on regarding horned cattle in this section. Commercial producers should be aware of all four issues and the effect each has on production. The first two issues involve behavioral characteristics of cattle. Horned cattle use their horns offensively in feedlot situations to gain advantages at the feed bunks and in establishing social order. When cattle use their horns to butt other cattle, muscle bruising occurs. Bruises have to be trimmed out at harvest, thus decreasing the value of the carcass. In the Beef Quality Audit, bruises accounted for $4.03 decrease in value for every fed animal in the United States. Realistically, bruises cannot be totally eliminated, however, dehorning can eliminate bruises caused by horns.

Another issue concerns animal welfare. Cowboy heritage has been that nobody can tell a cattleman what to do and they do the things they do because of tradition. Modern operations are evolving from this type of philosophy because of the influence of the consumer. Consumers view animals as conscious beings and thus should be treated and cared for as such. The consumers want to be assured that the product they consume has been produced with the welfare of the animal considered. Therefore, producers must be aware of these concerns and produce a product that meets the demand. Consumers view that the welfare of animals without horns that are housed with horned cattle may be compromised.

The third issue regarding horns pertains to safety of personnel handling and caring for the cattle. Injuries to producers, family members, and employees can be serious and thus, affect the efficiency of the operation. While dehorning will not eliminate all potential injuries, it will remove one of the causes of injury.

Frequently, cattle with horns are tipped or completely dehorned upon arrival at feedlots for the reasons mentioned above. In some situations, the sinus cavity extends into the base of the horn. When the animal is dehorned or closely tipped, the sinus

cavity is exposed. Infection can develop in this open cavity. Successful treatment is very time consuming and expensive. Cattle with sinus infections are less productive, thus decreasing the potential return to the producer.

Horns have no economic value commercially in the production of beef, so all horned animals should be dehorned at branding time when there are fewer complications and less stress.

Veterinarians commonly recommend that producers take advantage of the opportunity at branding time to start priming the animal's immune system against common diseases, for example, clostridial disease. *Clostridial* spp. are bacteria that are found in protective spores in the environment and can cause disease and death in cattle. *Clostridial* spp. have different predilection sites in the body of the animal. The most familiar of these clostridial diseases is blackleg, which causes severe muscle damage and death of tissue. The products available on the market are in the form of bacterin/toxoids (vaccines) and include ingredients against 7 or 8 different clostridial diseases. Hence, the vaccines are commonly referred to as a 7-way or 8-way clostridial or blackleg shots. The choice of a 7-way or 8-way vaccination will depend upon the geographic location of the herd and the amount and type of risk in the population. A local veterinarian will be most familiar with the needs in specific geographical locations.

Internal and/or external parasite control may be needed at branding time. A sound and economical control program depends upon many factors, including the life cycle, source of nutrition, and management. Recommended parasite control programs also vary depending on location and season. Please refer to Chapters 29 and 30 of this manual for specific guidelines.

The prevalence of disease will vary from one herd to another. In a recent national survey, respiratory disease was a common known cause of loss of unweaned beef calves, second only to weather related loss (USDA NAHMS). The most common viruses involved in the bovine respiratory disease (BRD) complex include infectious bovine rhinotracheitis virus (IBRV, "Red Nose" virus). bovine viral diarrhea virus (BVDV), parainfluenza type 3 virus (PI_3V), and bovine respiratory syncytial virus (BRSV). Several vaccines are available on the market for these diseases. In herds that experience a high incidence of BRD with an underlying viral component or herds at high risk of acquiring BRD, vaccination at this time may be beneficial.

Figure 28.1 – Herd vaccination.

Leptospirosis (commonly referred to as Lepto) is a spirochete organism that can cause anemia and death loss in calves. The incidence of this disease can vary greatly from herd to herd as well as within even a small geographic area. There are different serovars or species of *Leptospira* that infect calves. The veterinarian will be most familiar with which serovar(s) is/are important and the specific program that best benefits each herd.

Pinkeye is classically caused by a bacterium called *Moraxella bovis*. Recent findings and veterinarians' experiences suggest there are multiple causes of the pinkeye condition. Experience and field reports pertaining to the efficacy of including a pinkeye vaccination as part of a herd health program are ambiguous. If pinkeye is included in a vaccination program, producers must have a thorough understanding of the underlying cause(s).

Another consideration at branding time is tetanus prevention. The causative organism of tetanus is *Clostridium tetani*. Tetanus is not a common entity in cattle. The disease may manifest itself in situations with devitalized tissue, contaminated wounds or surgical sites, and/or an overwhelming dose of the organism from the environment or contaminated equipment. Administration of tetanus prevention may be needed in these situations.

The above herd health recommendations are by no means all inclusive of the diseases that cattle can acquire. This information has been compiled to give a solid starting point for producers and veterinarians in developing a commercial beef herd health program. Producers will need to refer to this information during the discussion of preventive health procedures outlined in remaining sections.

WEANING

Weaning refers to the time when the calves are removed from their dams. Management of commercial beef cow-calf operations is extremely variable. The age a beef calf is weaned depends upon several factors including the producer's goals, financial aspects of the business, available feedstuffs, labor, and facilities. In the United States, beef calves are commonly weaned between 5 and 9 months of age. The majority of weaned beef calves will be commingled into larger groups for stocker (grazing) and finishing phases of production.

Weaning and commingling can be very stressful events in a calf's life, both psychologically and physically. These stressors can increase the animals' susceptibility to disease. Exposure to disease causing agents, called pathogens, occurs with commingling of cattle. The source of this exposure to infectious agents comes from normal appearing animals that are carriers of disease or from animals incubating the agents that have not had enough time to exhibit any clinical signs of illness.

Experience and university studies have concluded that healthy animals perform better than animals that have been ill. Producers must realize that just because an animal has been vaccinated against certain infectious agents, does not mean it will not get sick. When used as a management tool, vaccines, bacterins, and toxoids can improve the health of the animal and thus allow the individual to perform more closely to its genetic potential. Vaccination will not take the place of sound management. Fortunately, there are several good quality products available on the market. Veterinarians and producers should use these products as a management tool when designing individual preventive health programs.

Prior to weaning, producers should determine which marketing option will work best for the individual business. Recently, there has been an increase in producer interest and participation in source-verified and/or process-verified special marketing sales. Several state associations and individual livestock auction markets provide producers with marketing options by sponsoring special sales. Health guidelines have been developed for each program and should be followed accordingly. These special sales provide buyers with cattle of known health background, thus allowing buyers to better manage risk in their operations. Producers should develop the mindset of preparing the animal for where it is going, not from where it is coming.

More in-depth information about the specific diseases and reasons for vaccinating cattle has been provided in the previous section. At weaning, calves should be vaccinated against the clostridial diseases, respiratory viruses (IBRV, BVDV, PI_3V, BRSV), and leptospirosis. Questions may be, "which is the best brand of vaccine to use" and "should I be using a killed or a modified live viral (MLV) vaccine." There are so many variables in the environment, management, and resource availability that there is no medical or scientific basis for a blanket recommendation for weaned beef calves. The best and most sound advice that can be given is to consult with a veterinarian as to the brands and types of products to be used.

Internal and/or external parasite control may be needed at this time. A sound and economical control program depends upon many factors. Please refer to Chapters 29 and 30 for specific guidelines.

Brucellosis, also commonly known as bangs, is less prevalent than it was a couple of decades ago. Many states have attained brucellosis-free status under the Federal Brucellosis Eradication Program. Even though the program has been very successful, there are still a few cases of the disease in the country. Therefore, heifers vaccinated against brucellosis (official calfhood vaccination, OCV) may have a significant marketing advantage compared to females that have not been vaccinated. Producers should evaluate their marketing options and replacement stock requirements to decide if vaccinating heifers against bangs has advantages. Currently in the state of Oklahoma, heifers may be vaccinated against brucellosis between 4 and 10 months of age. Age restrictions for official calfhood vaccinations vary between states. The vaccine must also be administered by a veterinarian; therefore, it is recommended to work with the veterinarian on an appropriate time to vaccinate heifers.

In some commercial beef cow-calf operations, the best business decision for replacement heifers is to include a brucellosis (bangs) vaccination. An opportune time to vaccinate for bangs is at weaning time when most heifers will be between 5 and 9 months of age. Age restrictions vary between states and this particular vaccination is regulated and must be administered by a veterinarian.

Pinkeye vaccinations may be warranted in certain herds or situations. Again, the underlying

cause of eye problems needs to be identified prior to implementing a pinkeye vaccination program.

REPLACEMENT HEIFERS

Replacement heifers refers to the time prior to breeding when females chosen as replacement animals receive their final processing. The future productivity of any commercial beef cow-calf herd depends on the quality of its replacements. Producers must view these replacements as contributors to the overall genetic improvement or betterment of the herd. These animals have tremendous impact, both from a production standpoint as well as an economic one, on the future of the business. As such, these animals should be given the best chance from a health standpoint to start their productive careers in the herd.

The following pre-breeding recommendations are for replacement heifers ranging in age from 13 to 16 months. Individual identification should have already been performed and records started.

In most situations, the heifers should have been well vaccinated against the common clostridial diseases. However, in instances where heifers have not received appropriate vaccinations against clostridial diseases (7-way or 8-way) or in situations where an overwhelming challenge of these agents will likely occur, then a booster vaccination is recommended.

As discussed above, it is impossible to make a blanket recommendation for a specific brand or type of vaccine. However, most professionals recommend a MLV vaccine including IBRV, PI_3V, BVDV, BRSV be administered to replacement heifers at this time. The vaccinations should be administered at least 30 days prior to breeding.

As a replacement animal, the ability to cycle, conceive, and carry a viable calf to term is important. Campylobacteriosis, also known as vibriosis, is a bacteria that causes infertility. Vibriosis is spread venereally and causes death of the developing fetus (early embryonic death). The first hint that animals may be suffering from vibriosis is females coming back into estrus (heat) at abnormal times, such as cycling at 33 to 38 days, instead of the normal 21-day intervals. Vibriosis is not a universal problem. The incidence of the disease can vary within a few miles. Therefore, in problem areas, vaccination prior to breeding is another important management tool.

Leptospirosis was mentioned earlier in the branding time section as causing anemia and death loss in calves. It causes these problems as well as reproductive problems in replacement heifers. The disease generally causes abortions and infertility later in gestation. Herds that experience a leptospirosis reproductive outbreak frequently report an unusual number of open cows after the calving season has been completed. At the normal time of processing the adult herd, the cows are pregnant but do not deliver a calf. In areas that experience a lot of reproductive problems caused by leptospirosis, vaccinations every 6 months or so may be needed to minimize the loss due to this bacteria. It is generally recommended to include the leptospirosis vaccinations in the pre-breeding program.

Replacement heifers that have been managed following the general recommendations outlined above should have a good healthy start to their reproductive careers.

ADULT COW HERD AND BULLS

Herd sires and the adult cow herd have similar needs from a health standpoint. The adult cow herd is generally processed once, or maybe twice, per year. Under normal conditions, adult beef cows rarely experience clinical respiratory disease or any of the disease syndromes caused by clostridial pathogens. The primary health concern for the adult beef cow is reproductive diseases. Viral diseases that can cause reproductive problems include IBR and BVD. Therefore, adult beef cows should be vaccinated against these diseases annually. Again questions may be "which is the best brand of vaccine to use" and "should I be using a killed or a modified live viral (MLV) vaccine." The best recommendation for producers is to work closely with their veterinarian.

Leptospirosis is another agent that can cause abortion and infertility. Adult cows should be vaccinated against this pathogen also. As discussed in the replacement heifer section, in some situations cows may need to be vaccinated against leptospirosis every 6 months.

Adult cattle rarely exhibit problems with the respiratory viruses PI_3V and BRSV. And in most cases, annual revaccination against these two agents is not necessary. However, in rare instances where herds may suffer from these viruses, including them in annual revaccination programs may be beneficial.

Anaplasmosis is a blood parasite. The parasite attaches to the animal's red blood cells (RBC). The animal's immune system recognizes the RBC with anaplasma parasites as abnormal and removes the red cells. This can cause significant anemia. Clinical

signs associated with anaplasmosis are age related and include fever, loss of appetite, depression, weight loss, abortion, and death. Young animals less than one year of age do not exhibit clinical signs because they have a very efficient bone marrow system to replace the damaged red cells. Animals between 1 and 2 years of age may show clinical signs; however, death loss is very rare. Cattle over 2 years of age that have not been previously immunized against the disease may exhibit severe clinical signs and may die. Transfer of blood during routine health management procedures, such as through contaminated vaccination needles or dehorning equipment, must be avoided. As of spring 2004, the only preventive options for the control of anaplasmosis are equipment hygiene and tetracycline antibiotics. (There are no fully licensed USDA vaccines available at this time.)

The incidence of vibriosis is very location dependent. In herds that experience outbreaks of vibriosis, booster vaccination prior to breeding will be necessary. The vaccination should be administered 30 days prior to turning the bull into the herd.

The parasite control program for the adult cow herd is based upon the type of parasites, challenges, and goals of strategic deworming programs. Please refer to Chapters 29 and 30 for more complete details.

Many producers believe that herd sires do not need to be included in any type of health program. Neglecting the herd sire can be a very costly mistake. Bulls should receive basically the same vaccination program as the cow, which includes IBRV, BVDV, and leptospirosis vaccinations. For the same reasons discussed with the adult cows, in rare instances, a PI_3V, BRSV, and vibriosis vaccination may be included.

Another important aspect of a sound health program is a breeding soundness examination on the bull prior to exposing him to the females (see Chapter 20). The breeding soundness examination should include examination of the reproductive anatomy, sperm motility, sperm morphology (physical characteristics), locomotion, eyesight, and body condition score (see Chapter 15, "Body Condition Scoring" for information). A bull that passes the breeding soundness examination appears to be sound for breeding purposes as best as science can determine at that point in time. This is pointed out because it is recommended that the exam be performed prior to turning the animal in with the females. If a bull fails the exam, producers need enough time to replace the animal with a sound bull for the breeding season.

SIXTY DAYS PRE-CALVING, ALL FEMALES

The last segment focuses on pregnant females prior to calving. The segment will be called "60 days pre-calving, all females" and a recommendation for the producer is easily made. If management is adequate throughout the year, females should **not** need any vaccinations within 60 days before the calving season begins. In some instances, pregnant females may need a scours vaccination in the hopes of being able to pass on some protection through their colostrum to their newborn calf. If a scours vaccination is needed as part of the herd health program, producers should investigate the management of that herd very closely. In most instances, changes in management (calving environment, nutrition, etc.) will correct any deficiencies, making vaccination unnecessary.

CONCLUSION

It is hoped that this chapter can be used as a template for producers and veterinarians when designing a commercial beef cow-calf herd health plan.

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