



Bison Health

CHAPTER EIGHT

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Bison health is an expression of many interrelated factors. It is important to remember that disease is more than just a bison and a pathogen. Understanding the exposure to pathogens in your herd is vital. But, minimizing the stress on your animals will be a major factor in the well-being of your bison herd. Stress can be a cumulative involving nutrition, physiology, environment, social order, and management. Your bison health is dependent on the sum total of all of these factors.

Bison are a unique species when raised for production or as a recreational herd.

They have been treated and managed in the past by cattlemen and were often considered to be the “bad ruminant” because of temperament and manageability by those who did not understand their biology. But, we have learned a lot through the years.

First, bison are not cattle. Differences include the age to breeding (2.5 years), nutritional requirements over winter, nutrition for slaughter animals, social structure, and longevity. Bison have a relatively good resistance to many pathogens that affect cattle. Stress, in the form of chronic stress, can lead to decreased immune function and increased susceptibility to disease and death.

This chapter is not intended to address all health issues that you might encounter when raising these amazing animals. The factors important to best management practices

for raising bison are all inter-related and involve the whole operation on your property. Health (absence from disease) is not just based on your vaccination programs but must involve the chapters on nutrition and handling. Diseases discussed are for information and not to be used to diagnose health/disease issues with your animals.



FIGURE 8.1

A regular vaccination program is one element in maintaining optimal herd health.

HISTORY OF THE BISON – THE BISON ADVANTAGE

Bison have an advantage over livestock species. This term has been tossed around for many years by some producers and now has been incorporated into many scientific articles in many journals.

What does this mean for those of us in bison production? It relates directly to our business of raising bison.

Let us go back a few years i.e. the Pliocene era - a period from 5.332 to 1.8 million years ago. Two or three species of bison were lost during that timeframe but the smallest, and probably fittest, of the bison species remained. After this last ice age, North America grew to have the greatest diversity of wild mega-fauna the world has ever known: condors with 15-foot wingspans, ground sloths as big as hippos, three species of elephants, giant armadillos, three species of cheetahs, five other “big” cats, long-legged antelope-like pigs, camels, llamas, deer, horses and several species of antelope. It was indeed a “Super Serengeti.”

Historic records indicate that 11,000 years ago the Paleo-Indians crossed the land bridge and colonized North America. Simultaneously, or because of this crossing, 70 + species, or around 95 percent of the mega-fauna, disappeared. Speculation was that the North American species had not evolved with humans and were easy prey for spears, arrows, and intelligent human as predators. We are very fortunate that bison escaped these pressures possibly due to sheer numbers and their gregarious nature.

Then came the impact of European settlement of North America. These settlers brought domesticated livestock to our North American habitats. Domestication

allowed us to control our food sources by concentrating our animals, but it also allowed pathogens (bacteria, viruses, protozoan, parasites, etc.) easy access to greater numbers of livestock hosts. The oxen, cattle, horses, sheep, pigs, and goats crossing the Atlantic contained many "stow-away" pathogens. Cattle, sheep, goats and oxen were "biological packages" full of organisms never before found in North America. The European settlers themselves were similar biological packages as they carried diseases to an immunologically naïve population of Native Americans. Millions of native South, Central, and North American people suffered the impact of these foreign pathogens. This same foreign pathogen-naïve population syndrome impacted all ungulates (especially bison) in North American.

In the 1850's, the bison population was estimated to be somewhere between 30 and 60 million animals. The domesticated livestock species, along with their biological packages, introduced to the West allowed the pathogens to adapt to these new and different species. BVD, IBR, PI3, BRSV, TB, Johne's, mycoplasma, leptospirosis, clostridia, Staph, Strep, internal and external parasites and probably pasteurella found a plethora of new ways to reproduce and spread their DNA (genes) to the demise of these naïve ungulates.

In the early 1900's populations of deer, elk, pronghorn, and other wild ungulate populations were at historic lows. Military slaughter and market hunting were just final nails in the coffin of large free-ranging bison populations.

Here is one part of the bison advantage. From 30-60 million to less than 1,000 of the bison that survived the introduction of new pathogens and market hunting were those bison that had a genetic resistance to these new pathogens. Testing of wild ungulate species has been undertaken for the past several decades across the western states. All wild populations show exposure to these introduced pathogens without large detrimental effects - yet these same pathogens remain of utmost importance to the livestock industry.

Producers have never bred cattle, sheep, or other domesticated specie for disease resistance. Vaccine manufacturers have curtailed the need for such selection in livestock. But the imposed genetic resistance to these diseases allowed the remaining bison to thrive in a world of novel diseases. You have this genetic resistance to most of these pathogens in your bison. Some pathogens such as MCF, anthrax, and TB were indeed recently introduced into this country and are problematic. But all in all, our bison are hardy and genetically equipped to handle exposure to many of these pathogens.

Additionally, the bison advantage encompasses another trait. North American habitats are said to be deficient in many nutritional areas with low copper,

phosphorus, calcium, magnesium, or low in protein or energy during certain times. But the so-called "gold standard" baseline for these nutrients has been established based upon the nutritional needs of these domesticated euro-Asian species. It has been proven that bison have a strong anabolic/catabolic cycle based on day length (anabolic means build up – catabolic means to tear down). All wildlife species in the northern hemispheres require this cycle for survival. It relies on the animal's ability to have a strong anabolic cycle in spring, summer, and early fall and survive nutritional deficiencies in the winter with the nutrients they stored during the anabolic cycle.

After studying deer for many years, Aldo Leopold wrote in the "bible" of ecosystem management, *Sand County Almanac*, that "*the only thing that keeps deer alive in winter is the thought of spring.*" A female bison can start putting on weight in early spring, have a calf, nurse the calf, teach that calf how to feed, breed back, put on weight, and then over winter lose some of her body condition. The cycle starts over in the spring.

Bison are excellent at digesting fiber and recycling nitrogen (reducing the protein requirements). They also have a slow turnover time in the rumen (greater digestibility). Bison can lose body condition over winter and yet remain highly productive. Preliminary studies show that bison may recycle other nutrients during their catabolic period. The recycling may also include macro and micronutrients. Several universities are now studying cattle to see if they can limit inputs over winter and make cattle "more like bison."

There is one bison non-advantage: Stress. Stress has two components, acute and chronic. Stress causes the adrenal gland to secrete adrenalin and corticosteroids (cortisol) causing the body to shunt blood to heart, muscle, brain and lungs. All of the other body systems are put on hold, including the immune system.

Wild-type bison are great at handling the acute stress. That is the "fight or flight" response to a stimulus. They can fight or run from grizzlies or humans and when all threats are passed, go back to grazing and the adrenalin and steroid levels return to normal.

Chronic stress is hard to quantify. Research has shown that bison during rut can double their cortisol levels for long periods of time. Levels do not return to normal until post-rut. Cortisol depresses the immune responses and can make animals more susceptible to health issues. We can impose multiple chronic stressors on our bison. These multiple stimuli have a compounding effect on cortisol levels of the animals.

In confined situations, during their catabolic period (winter), constant changes in social structure and nutrition may place bison in a situation that overrides the bison

advantage. Unlike other domesticated species we have not, and hopefully will not, breed the wild out of our bison. The more we can let bison be bison the better for both of us.

I am not advocating a non-vaccination or a no winter feeding credo to bison producers. But, it is important to manage bison based upon what they truly need or want from us. When health problems arise, it is always easier to treat the symptom and not the problem. With bison, take a closer look at the reason for ill health. How did we allow the pathogen to prosper at the expense of our bison? My two credos are – first do no harm and secondly, healthy habitats produce healthy bison.

MAJOR DISEASES OF BISON

This chapter is simply an overview. Additional information on common diseases of bison can be found through the National Bison Association. When problems arise, consult with your veterinarian.

Bison are exposed to a wide variety of “natural” pathogens that are part of your landscape. Many will never negatively impact your herd. Several pathogens are important in that they can reduce reproduction, cause nutritional problems, or are **regulatory or economic diseases**. These diseases include bovine TB, brucellosis, Bovine Virus Diarrhea (BVD) and Malignant Catarrhal Fever (MCF). If you suspect any of these diseases in your herd, contact a veterinarian immediately.

Bovine Tuberculosis (TB)

Bovine Tuberculosis (TB) is a slow, progressive bacterial disease that is difficult to diagnose in the early stages. As the disease progresses, animals may exhibit emaciation, lethargy, weakness, anorexia, low-grade fever, and pneumonia with a chronic, moist cough. It usually is transmitted through contact with respiratory secretions from an infected animal. TB is a zoonotic disease meaning it can be transferred to other species, including man.

Free-ranging and privately owned bison in the U.S. have been free of TB for several decades. TB testing in bison has proven to be effective in diagnosing infected animals. If you are buying animals to start or augment your herd, have the bison over 12 months old tested. Many states are TB free and testing is not required, but as a precautionary measure require TB testing before purchasing.

Brucellosis

Brucellosis is a disease that has strong regulatory and economic guidelines for all states. A majority of states have been brucellosis free in livestock for many years.

The notable exceptions are the states that border Yellowstone National Park. State and federal regulatory agencies consider the Greater Yellowstone Area (GYA) an

area of interaction with these wildlife species the last nidus of infection in the U.S. Brucellosis was introduced into bison and elk in the early 20th century. Once the organism was in these wildlife populations it became problematic to control. To this day 20 to 40 percent of the bison and elk in the GYA have been proven to harbor titers from exposure or infection.

Abortion is the most obvious indication of the disease in a herd. Brucellosis is a disease not spread from cow to cow, but from a birthing or abortive event where the abortive event including the aborted, stillborn, newborn calf and afterbirth are exposed to other animals. There are several tests to determine if bison are infected or exposed. These tests are, for the most part, accurate. There are cross-reactions with other organisms that can create suspects in your bison. Regulators are working on being able to identify these other organisms and incorporate them in the battery of tests for brucellosis "suspect" bison.

Calfhood vaccination for brucellosis (Bang's vaccinations) is not mandatory in many states. The vaccine (RB51) is safe for use in bison. It is not as protective against abortion or infection as in cattle, but does offer limited protection. Brucellosis is also a zoonotic disease and can be transmitted to other species including man.

Bovine Virus Diarrhea (BVD)

Anywhere in the world there are cattle, there is Bovine Virus Diarrhea (BVD). This worldwide distribution makes this disease important to cattle producers. BVD is a complicated disease to discuss as it can result in a wide variety of disease problems from very mild to very severe. BVD can be one of the most devastating diseases cattle encounter and one of the hardest to get rid of when it attacks a herd. The viruses that cause BVD have been grouped into two genotypes, Type I and Type II. The disease syndrome caused by the two genotypes is basically the same. However, disease caused by Type II infection is often more severe in cattle. The various disease syndromes noted in cattle infected with BVD virus are mainly attributed to the age of the animal when it became infected and to certain characteristics of the virus involved.

As mentioned earlier, bison appear to be resistant to clinical manifestations from exposure. BVD has been incriminated in losses of bison placed in feedlots in conjunction with cattle. Vaccinations for BVD Type I and Type II are effective in preventing the disease in bison. I have never seen the disease in free-ranging or any captive herd.

Malignant Catarrhal Fever (MCF)

Malignant Catarrhal Fever (MCF) is a generally fatal disease of cattle, bison, true buffalo species, and deer. It is caused by viruses belonging to the Herpesvirus family. MCF occurs worldwide and is a serious problem, particularly for bison in the United States and Canada.

MCF in bison is caused by a virus called ovine herpesvirus-2 (OvHV-2). Most infections are characterized by depression, separation from the rest of the herd, loss of appetite, and in many bloody diarrhea. Unlike MCF in cattle, discharge from the eyes and nasal passages of affected bison is minimal. Animals develop a fever and may pass bloody urine. The clinical course is generally 1-7 days. Most animals die within three days of developing clinical signs. There is no effective treatment for MCF in bison. Bison older than six months, particularly if stressed by bad weather, transportation and handling are the most susceptible to infection. Large outbreaks occur in feedlots, where stress due to crowding is likely.

Studies of field outbreaks strongly suggest that sheep infected with OvHV-2 are the principal source of MCF outbreaks in bison. A strong association between outbreaks in bison and recent exposure to sheep has been documented repeatedly since 1929. In some outbreaks, however, no sheep were in the vicinity immediately prior to the first case being identified. There is no evidence that transmission occurs horizontally from one bison to another. Currently there is a study supported in part by the National Bison Association to establish whether bison-to-bison transmission is a factor in natural outbreaks.

OTHER DISEASES - VIRAL

Parainfluenza-3 (PI-3) and Bovine Respiratory Syncytial Virus (BRSV) are viruses that infect the upper airways. They are usually mild infections and can cause fever, depression, increased respiratory rate, cough, and nasal discharge. The young are more susceptible to infection. Secondary bacterial infections are the main concern for these viral infections as they can lead to pneumonia from *pasteurella* and *mycoplasma*. The treatment for these diseases is based on the secondary infectious processes. Without secondary infections, recovery from these viruses occurs in 4-7 days.

Bovine Herpesvirus-I (Infectious Bovine Rhinotracheitis or IBR) also infects the upper airways, but can have more serious consequences. It can cause the same signs as PI-3 and BRSV but also cause small lesions on the membranes of the mouth, nose and conjunctiva and create corneal opacities. Like the other upper respiratory viruses, secondary infections are the major concern.

Bluetongue (BT) and Epizootic Hemorrhagic Disease (EHD)

Both viruses are Orbiviruses and are very similar in modes of spread and signs of disease seen in bison. Both diseases are spread around water sources by arthropods called "no-see-ums" (*Culicoides* sp.). The viruses do infect bison with minimal signs of ill health. Once infected, bison can run a high fever for 18-36 hours, present with signs of temporary lameness and show swelling of the mucus membranes of the gums and tongue. Infections usually occur in late summer when water sources are visited

by deer, elk, and bison. If infection with one of these viruses occurs after breeding, the fever from the infection can cause damage to a fetus in the first trimester.

OTHER DISEASES – BACTERIAL

Johne's Disease

Johne's disease in bison has been well documented in several free-ranging and captive bison herds, but the tools for testing for Johne's disease in bison are not always reliable.

Johne's disease is caused by a bacteria, *Mycobacterium avian subsp. Paratuberculosis*, and is an infection primarily of ruminants. Currently it has been documented in a majority of hoofstock species, including bison. It is likely that all ruminants are susceptible to infection. It is believed that the vast majority of Johne's infections in non-domestic hoofstock species occur in the first few months of life. As bison mature, it is thought that their resistance to infection increases although complete resistance is unlikely. Adult animals can also become infected if given a sufficient dose of *M. avian subsp. paratuberculosis* at a period of immune insufficiency. In most cases, adults serve as the source of infection to young animals, shedding the organism in manure, if not milk and colostrum as well. It is a direct fecal-oral cycle.

Most bison calves acquire the organism by suckling from manure-soiled teats, by licking contaminated flooring/fencing/feed bunks or by eating off of ground contaminated by manure from an infected animal. They also can take up the organism by drinking water contaminated by manure from infected animals.

A second method of exposure is through drinking contaminated milk. The Johne's organism is thought to be excreted in the milk of infected animals, as has been shown to be the case in cattle. Thus, clinically affected bison (as shown by weight loss and perhaps diarrhea) are more likely to infect their offspring than dams still in good condition.

The third, but believed least common, route of exposure occurs in utero. Again during the later stages of infection, the organism can spread beyond the gastrointestinal tract. At that time, if the cow is pregnant, the fetus can also become infected. This infected fetus appears completely healthy at birth, although spontaneous abortion of fetuses with this infection has been reported in cattle.

While different strains of the organism have been described ("bovine" and "sheep") strains, it is likely that a least a majority if not all strains can infect any ruminant.

Clostridia

There are several species of Clostridia that cause disease in bison and other ruminants. These organisms are ubiquitous throughout North America. *Clostridium chauvoei*

(Blackleg), *C. perfringens* (Enterotoxemia or Overeating Disease), *C. septicum* (Malignant Edema), and *C. tetani* (Tetanus) are all non-contagious (spread from animal to animal) infections with organisms normally found in the soil or intestine of normal animals. Several of the diseases caused by this group of organisms are through wounds i.e. dehorning, castration, poor vaccination techniques, and handling trauma. Enterotoxemia or overeating disease is caused by one of several exotoxins of *C. perfringens*. This is induced by humans through rich diets during feeding operations or placing bison on “hot” pastures with rapidly growing alfalfa.

Leptospirosis

There are again several species of Leptospirosis that cause diseases in bison, livestock, and other free-ranging and captive ruminants. This is a group of organisms that infect many of the body's systems and spread through the urine. Contaminated feed by rodents or infected animals urinating next to water sources is the most common means of spread.

Pasteurella and Mannheimia

These two bacteria (*Pasteurella multocida* and *Mannheimia haemolytica*) are considered as part of the normal bacterial flora found in the upper respiratory tract of most bison and other ruminant species but are not considered as normal flora of the upper respiratory tract. As long as these two organisms only inhabit the pharynx or upper respiratory tract, clinical respiratory disease associated with them is uncommon. These secondary bacterial invaders are commonly found in the environment and are associated with healthy animals. Under normal conditions, they cause no problems.

Bison respiratory disease (BRD) associated with either *Mannheimia haemolytica* or *Pasteurella multocida* is often due to secondary bacterial invasion by these organisms. Secondary bacterial invasions are infections caused by bacteria that invade tissue after an initiating event, such as a previous viral infection, which has established conditions that allow these secondary bacteria to invade tissue and cause disease. Under normal conditions, they cause no problems.

Pneumonia associated with either *Mannheimia haemolytica* or *Pasteurella multocida* often occurs when the animal's normal defenses are compromised. Examples of compromised defense mechanisms include damage to the cells lining the upper respiratory tract by viruses such as infectious bovine rhinotracheitis virus (IBR), parainfluenza virus (PI-3), or bovine respiratory syncytial virus (BRSV). Damage to the tracheal lining could also occur due to inhaled irritants such as exhaust fumes or dust.

Older literature describes losses from “shipping fever complex.” It was based on three factors, stress, PI-3, and pasteurella. The stress and upper respiratory virus allowed

the pasteurella to cause disease and death. The same factors allow pasteurella to create problems today.

Anthrax

Anthrax, caused by the bacteria *Bacillus anthracis*, occurs naturally in many locations worldwide. As a part of their life cycle, the bacteria can enter a spore phase and remain viable, although dormant, for multiple decades in soil. Later, under certain circumstances, the bacteria emerge from the spore phase and cause disease.

Anthrax outbreaks generally follow a “perfect storm” of conditions. That refers to a very wet episode followed by extremely high temperatures. These factors allow the spores to surface and attach to plants or flow into water catchments. Animals typically get the disease from eating activated spores in soil as they graze, or ingesting them in water. The disease kills quickly, typically within 24 or 48 hours.

Natural anthrax outbreaks are not uncommon in the western U.S. If anthrax is suspected in your area, call your veterinarian immediately. The vaccine for anthrax is available and does offer protection to bison. Do not try to sample or dispose of the bison without veterinary assistance. Anthrax is another zoonotic disease, meaning it can infect many other species and can be spread from animals to humans. Human infection is usually the result of occupational exposure involving direct contact with infected animals or animal products such as wool, hides, and horns.

Mycoplasma

Mycoplasma bovis is a relatively common respiratory bacterium in bison, cattle, and particularly in dairy herds. Many herds have frequently found the organism in the nose and upper throat of bison of all ages and in the reproductive tracts of both females and bulls. Once the organism is allowed to inhabit the cells of the lower respiratory tract, the bison's immune system is compromised. Normal, healthy bison are able to fight off infection by most organisms invading lung tissue. But, if the opportunity arises during times of stress or concurrent illness, *Mycoplasma* will move from the upper airways to the lungs and create pneumonia.

At times of stress, such as drought, dust and viral diseases such as infectious bovine rhinotracheitis virus (IBR), parainfluenza virus (PI-3), bovine respiratory syncytial virus (BRSV) or other disease processes or handling, the bacteria can move into the lower respiratory tract, where it causes chronic pneumonia, or it can become systemic and cause severe lameness.

Bison fed for market can be affected and display swollen joints, exhibit lameness and a reluctance to move. Changes observed in dead and clinically ill bison from a feedlot can be similar to what has been described in the literature as chronic

pneumonia and polyarthritis syndrome in feedlot cattle caused by *M. bovis*. Based on the severity of the lesions, and the number of dead and affected animals, bison in a feedlot setting appear to exhibit sensitivity to infection with *M. bovis* due to the chronic stress of confinement.

Anaplasmosis

Anaplasmosis is caused by an intracellular organism that parasitizes red blood cells. There are several strains or species of *Anaplasma* and the one usually found in bison is *Anaplasma marginale*. Titers to this organism are found in bison throughout the western U.S. Younger animals appear to be resistant to infection, whereas older bison are less resistant. The disease can range from subclinical (no noticeable illness) in young adults to fatal in very old bison. The organism is treatable if the disease is found early. Many bison show titers, meaning they have been exposed but no organisms are found in the red blood cells.

MEDICAL PROCEDURES

How to identify sick bison:

Many of the diseases of bison produce a fever episode. Typical signs of fever include animals spending additional time at water sources, more frequent trips to the water source, drooping ears, mouth breathing and time spent away from the herd. Bison that lag behind when bison move to graze new pastures are suspect, as it might encompass either problems with locomotion or rejection from other herd animals. Bison have a very strong social order and behavior.

Bison are tough. Many times bison that appear sick from a distance are hard to assess due to their strong predator avoidance behavior when you try to get a “closer look.” A sick bison can run with the herd when aroused. Many times it is best to maintain your distance or assess the animals when performing normal management procedures (feeding, checking water, putting out supplement, etc.). Spend extra time in observing your bison. At times the only thing you will see in bison is a moribund or dead animal.

Several key points:

- Spend time with your herd – observe daily
- Have a veterinarian that has worked with bison and understands that bison respond differently to ill health than cattle
- Share all information with the veterinarian
- Recent change in diet
- Recently acquired animals
- Past history of health issues
- Changes in pasture rotations

- Climate factors – moisture, drought
- Stressors on bison
- Other species on property (please no goats or sheep)
- BISON ARE DANGEROUS when sick or cornered for exam
- Have a good working facility or do not commercially raise bison

As mentioned earlier in the chapter, historically, bison have a genetic ability to handle many of the common disease pathogens. But, do not have a false sense of security when health issues arise in your herd. Many, if not all, of the diseases in bison involve inadequate management of these beasts. When issues arise or you identify the signs of disease, look closer at the disease. Ask the who, what, when, why and how issues. Do not just treat the signs, treat the problem.

MEDICATIONS

Several medicines approved for cattle have been used extensively with no ill effects reported in bison or cattle. **REMEMBER** - Most medications and vaccinations used in bison are not listed on the label. Therefore, when medicating and vaccinating bison it is considered an “off label” use of the product and the responsibility is on the veterinarian or the owner. The company will accept no responsibility if issues arise from use of their product.

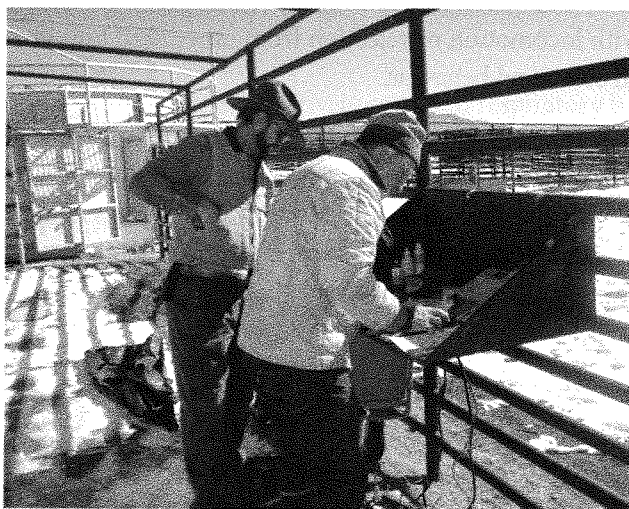


FIGURE 8.2

Large animal veterinarians are becoming scarce, particularly those with expertise in handling bison. Developing a good working relationship with a veterinarian is very useful in managing the health of a bison herd.

There are three basic ways to give medications--orally, topically or by injection. Oral medications can be given as a bolus (pill) or drench (with or without a stomach tube), or in the feed or water. Topically, they can be sprayed on, rubbed on (salve), or poured on (such as wormers, grub, and lice preparations). Injections can be given subcutaneously under the skin (SQ), in the muscle (IM) or intravenous (IV), depending on the drug

you are using. If the animals are going to the meat market, all injections should be in the neck. Any residue or abscess in the rump, leg or back can create a loss of income from those cuts. Subcutaneous injections are given along the side of the neck. Intramuscular injections are given in the muscled portion of the neck.

PARASITES

Internal Parasites

Internal parasites are a manageable problem in bison. Producers should check for and address parasites a minimum of twice a year.

Fecal exams usually look for the eggs of the parasites in the feces. Time of year and diet are important for the internal parasites to produce eggs. One negative fecal exam is not 100% effective in addressing internal parasites. Many internal parasites can become problematic because of inadequate pasture or paddock management.

All of the parasites listed below have a specific life cycle. Many can complete life cycles quickly and re-infect the bison within days. Bison with parasite problems can often have poor, dull, or excessive old hair that often is a result of internal parasites. If the problem persists, poor condition and calving percentages will follow. If your veterinarian identifies these parasites in your herd, ask to address the lifecycles and management changes that will minimize future infestation.

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
Nematodes or Round Worms		Cestodes or Tapeworms	
Haemonchus	Large stomach worm Barberpole worm	Moniezia	Tapeworm
Ostertagia	Brown stomach worm	Trematodes or Flatworms	
Cooperia	Cooper's worm Small stomach or intestine	Fasciola hepatica	Liver fluke
Trichostrongylus	Intestinal worm Stomach hairworm	Coccidiosis	
Oesophagostomum	Nodular worm		
Nematodirus	Thread-necked		
Bunostomum	Hookworm		
Dictyocaulus	Lungworm		

External Parasites

Ticks and lice have been identified on bison and could potentially be detrimental. Bison have a thicker hair coat and identification of lice in bison is rare. Ticks have been found on bison around the tail head. In many areas where elk and deer are

infested with ticks, bison sharing the same habitat are tick free. When working your animal check for these external parasites.

Treatment for Parasites

There are many different ways to deliver worming medications to bison. Depending on what parasites are found and their individual lifecycles, there are several ways to control infestation and spread to the herd. Each parasite's life cycle is different and many cycles can be interrupted by changes in management. Sometimes small changes in the way you pasture or feed bison may slow or stop the future spread of the parasite based on the facilities you have available. You can worm bison by drench, paste, bolus, feed, water, salt, or injection. All of these treatment regimens can be beneficial to a certain degree, but follow-up treatment may be required. Not one of the anti-parasitical agents is 100 percent effective in all situations for all types of parasites.

PURCHASING AND BUYING NEW STOCK

When going to a ranch to purchase bison, ask to see the whole herd, not just the ones being offered for sale. Look at the condition of every animal in the herd and make mental notes of the calf crop, yearlings, etc. Ask about management techniques regarding vaccination and worming, and if health problems were identified in the herd over the past several years.

After your purchase of new stock, the first thing to do is process them with your worming and vaccination protocol and apply your permanent identification. Quarantine, if possible, from your main herd for three weeks.

Your bison should be vaccinated only for the diseases of concern in your area. Many states require calfhood vaccination for brucellosis.

CONCLUSION

The only constant in this world is change. We must do all we can in this industry to better understand this amazing creature under our care and not be afraid to implement those changes that benefit both the bison and us.

Please read the chapters on handling, managing, and nutrition in this handbook. The secret to understanding your bison's health is to understand all the aspects of how the animals are managed. Small changes in rotations, time of year and time of day when working your bison, calving pastures, breeding pastures, and supplementation can make big changes in costs and the health of your herd.

Never place just one bison in a corral or pasture for extended periods. Solitary bison are problematic, as bison are a very social species with strong matriarchal divisions. Bulls will separate from the herds after breeding and only young bulls are allowed

to stay with the cows and calves. Post-breeding, the bulls have been nutritionally and physically stressed and should be checked for wounds or other forms of trauma.

You have many allies who are learning how to properly raise bison in North America — so do not be afraid to ask questions. The National Bison Association and its members are a great resource. Question everything when issues arise. Many producers and veterinarians treat the symptoms of disease and not the problem. If you have disease issues in your herd ask what, when and why, but also ask **HOW** to prevent this from happening again.

Dr. Dave Hunter has served as the veterinarian for Turner Enterprises, Inc. and the Turner Endangered Species Fund since October 1998. He initiated his undergraduate work at New Mexico State University and received his B.Sc. in 1974 and Doctor of Veterinary Medicine degree from Washington State University in 1976.