

# BISON: MANAGEMENT



## BASICS

### OVERVIEW

- There are two subspecies of bison in North America: plains bison (*Bison bison* spp *bison*) and woods bison (*Bison bison* spp *athabasca*).
- The bison industry has increased in recent years as a result of interest in bison meat which has 25-30% more protein than commercial beef (less marbling), and is lower in calories, fat, and cholesterol than beef, chicken, or pork.
- Management strategies range from intensive management (dehorning, feeding grain, weaning calves, rotational grazing, using only young bulls, and removing bulls from the herd in the fall) to natural management (cows running in family groups using older bulls, bulls remaining in herd, natural weaning, no dehorning, grass feeding). Each producer should decide which management practices match their operation and philosophy.
- Cattle and bison digest high quality forage similarly, but pasture-stocking densities can be higher for bison because adult bison are smaller and their calves grow more slowly than domestic cattle.
- It is recommended to have a herd of no less than 12-15 animals, as they tend to be more uncomfortable in smaller groups and may roam looking for other bison.
- Bison respond less favorably to handling than cattle, and can take several days to return to normal behavior after a stressful handling event. Monitoring programs involving minor handling of sick bison can potentially be unsuitable due to the stress involved.
- Bison tend to effectively mask clinical signs of disease
- Bison are adapted to cold weather, and the lower critical temperature of six month old bison calves is below -30°C, compared to an adult beef cow (-20°C). Bison have an excellent hair coat and they modulate their behavior to be less active.
- Stress can result from management and handling, or from lactation, gestation, or breeding. Stress can increase metabolic rate and production of stress hormones, and in compromised individuals can contribute to death.
- It is not possible to practice classic evidence-based medicine on bison due to the dearth of published information. Comparatively little funding is available for research, and few researchers are interested in studying bison due to the small size of the industry. Peer-reviewed publications of bison diseases are few and mainly consist of case studies or single case reports
- There are no published studies describing risk factors for diseases or published clinical trials testing the efficacy of vaccines or pharmaceuticals in bison. In addition, there are few college-based experts in bison medicine, surgery, or reproduction for veterinarians to access for advice because bison caseloads are sparse or non-existent at most veterinary colleges in North America.
- Most veterinarians interested in bison practice begin by generalizing knowledge of cattle practice to bison. They then increase their knowledge by trial and error or consultation with bison producers and other, more experienced practitioners.
- Opportunities for individual animal medicine are rare. Most diagnoses are made from a necropsy; and disease, production, or reproductive problems are managed on a herd basis.

## MANAGEMENT

### *Pasture Management*

- The number of acres of pasture required for a herd depends on the production capability of the land and grazing season length. Generally, it is based on how many beef cows could efficiently be run on the property.
- A rotational grazing system is often recommended to best utilize pasture. This allows grazed forage plants to regrow and recover during the growing season, and allows the root system to replenish and rebuild between grazing events. If space and pasture quality allow, the best method is to allow certain pastures during summer to have intensive grazing twice per year. A study showed that when vegetation was clipped each time it was 6-8 inches high (roughly 5x per year) simulating a season-long continuous heavy grazing situation, the root systems were shallow and thin, resulting in poorer quality forage.
- It is recommended to graze a pasture only when there is more than 300 lb. /acre of dry matter, equal to a height of about 4 inches.
- Additional land can be used to grow hay for winter stockpiling to supplement winter pasture forages, especially in northern latitudes
- There is no universally ideal grazing system – each bison ranch manager must develop and tailor a plan to the resources of that particular ranch.

### *Nutrition*

- Bison are grazers, with a strong preference for grasses and sedges. However, when grass is limited, bison can supplement their diet up to 20-40% with shrubs.
- Bison do not forage randomly, and selectively choose actively growing plants for higher protein and energy content. Consequently, they spend less time grazing than cattle each day.
- Bison require 1 pound of roughage per 100 pounds of bodyweight for digestion, and 2 pounds of dry matter per 100 pounds of live weight for energy.
- Bison digest low quality forages more completely than cattle, due to higher levels of nitrogen recycling, differences in rumen microflora, and longer rumen retention time (79 hours for bison, 69 hours for cattle).
- Mineral supplements should always be available, ideally in a loose mineral form within a mineral feeder durable enough for bison. Offer mineral blocks/loose mineral with salt, rather than salt alone, as bison may be satisfied consuming only plain salt and may become deficient in essential minerals. The addition of salt within the mineral will encourage consumption. In selenium deficient areas mineral must contain selenium, which is especially important for reproduction.
- Clean, fresh water should be available at all times. Dugouts are not recommended, because they can become contaminated very quickly due to bison having a predisposition to wallow. Water in troughs or clean, naturally filtered lakes are ideal.
- During the rut, there is 12% reduction in grazing time, with activity directed towards breeding or avoiding aggression. The daily activities of bison cow groups are often led by an older cow, so foraging activities of the whole herd may be based on the needs of only a few individuals – therefore bison should have prime nutrition before the rut.
- Bison are well adapted to winter conditions, characterized by cold temperatures and poor feed. They do not need as much supplement feed or hay in winter as beef cattle, due to the fact that they have a lower metabolic rate, especially during winter.
- Bison continue to graze through the winter by rooting under the snow; grasses that retain a high protein percentage in the stems are best for winter pasture. Hay should always be available when the snow is covered in ice, and grain rations can be included during harsh winters or when pasture

conditions are poor. Rather than putting adult bison into yards in winter, producers usually allow bison to graze on pasture, even in deep snow.

- The maintenance energy requirement of a 1000 lb cow in summer is estimated at 22.4 Mcal/day; in winter the requirement drops to 12.5 Mcal/day. This arises due to higher concentrations of melatonin which inhibit secretions of growth hormone and thyroxine. As daylight length increases, melatonin secretion from the pineal gland decreases and metabolic rate increases again.
- Normal bison over 18 months should follow a cycle of winter weight loss followed by summer weight gain. Mature bison females who are in good condition are able to lose 10-15% of body weight in the first six months of the year, which is encouraged to reduce calving problems in overly fat cows. However, if > 20% of the pre-winter weight is lost, there is an increased risk of nutrition related abortions, stillborn calves, and smaller/weaker calves.
- During winter, pregnant free-ranging bison cows are normally thin. Overfeeding to the point where they have significant fat deposits will predispose them to hepatic lipidosis.
- Stress associated with sale barns, transport and introduction into a new herd combined with nutritional changes encountered under new feeding and pasture management programs may be sufficient to precipitate clinical hepatic lipidosis.
- Fatal hepatic lipidosis has been associated with the sale and movement of fat late-pregnant bison cows during February and March and/or sudden reductions in the quantity and quality of feed provided to fat late-pregnant bison cows, and mortality rates may be high.
- Bison producers should provide feed of limited quality to late pregnant bison cows. Overly-fat bison cows should not be sold or transported late in pregnancy, or subjected to reductions in daily energy intake.
- Bloat and rumen overload are rare. Bison fed high-energy rations have lower rumen pH than cattle, suggesting that bison may be less able to tolerate high-energy rations. However, bison are routinely provided free access to grain based rations in feedlots with few related problems, though in one report adult cows provided with an unspecified amount of free choice corn died of mycotic rumenitis secondary to rumen acidosis.
- It is possible that the feeding behavior of bison may provide a protective effect against problems associated with high-energy rations
- Toxicities reported in bison include urea poisoning, abortion from ingesting ponderosa pine needles, copper toxicity and aflatoxin-induced abortion.

### ***Behavior/Handling***

- Bison are fast, agile, and strong, with an instinct to group together and be mobile.
- Solitary animals are often fearful and aggressive, consequently, it is recommended to never isolate a bison from its group.
- Bison held in close proximity to, but separate from other bison should be held with bison of the same age and gender – sick animals separated from healthy, males from females, juveniles from adults.
- Bison have strong herd instincts, and will react to danger as a group, first fleeing and then returning in curiosity. They have a strong sense of self-preservation, and will flee or fight.
- Bison relate to each other through strict hierarchy. The strongest bull will be dominant in the herd, and will protect and breed; the dominant cow will be the herd leader. Bison can outrun a horse and turn quickly– they are good jumpers, can kick swiftly, and are great swimmers. They are about four times stronger than beef cows, and untamed.
- Establishing a bison operation with calves versus adults, acclimating them to personnel with positive reinforcement, and training them to change their perception of a stressful experience to a neutral or even positive experience can help later to reduce stress when dealing with management issues. This will not make bison tame or domesticated, but will condition them to respond to a particular situation more calmly, making them easier to handle.

### ***Facilities***

- Proper fencing is crucial in raising bison on pasture. Fencing should be strong and at least 6 feet high. Electric fencing works well with bison trained to recognize it. Barbed wire should never be electrified to avoid potential entrapment and electrocution. Fences with 6-8 high tensile wires and 2-4 electrified strands are a good option. However, only the strongest facilities can hold spooked bison, and having a plan for getting them back is crucial.
- There has been little or no selection of bison breeding stock based on temperament. Although handling facilities have improved, it remains difficult and sometimes impossible to capture and restrain sick bison for examination or treatment. Chemical restraint may be used but has risk even for healthy bison.
- Handling facilities must have solid 7 foot sides on all fences, chutes, gates, and pens, and must be designed so that the handlers can operate gates without being among bison.
- Fences and chutes should have toe holds and grab bars to provide easy escape routes for handlers
- Crowd pens should be no more than 1/3 full at any given time during handling.
- Bison tend to fan out and walk beside one another; queuing in single file is unnatural and can result in bison climbing over each other – they are calmest if held as a group and individually moved from crowd pen to squeeze chute. Bison cow and calf can be worked together
- Bison must, however, be sorted single file, not in a wide lane – use a round forcing pen to direct bison into single file. Bison move easily through the round pen into single file because as they circle around they think they are going back to where they came from. Bison will remain calmer if brought up individually to the solid sided, solid topped squeeze chute from the crowd pen.
- Bison often become agitated if left waiting in a single file chute. They remain calmer if left in the crowd pen with their herd mates and brought to the squeeze chute one at a time. If bison have to be held in a single file chute, they must be held in separate compartments between solid sliding gates.

### ***Breeding***

- Bison cows reach peak physical maturity between 8-10 years of age (but can be used for breeding earlier); bulls are often used for breeding as early as 2 years of age.
- Bison can live beyond 30 years.
- Normal gestation is 280-285 days.
- The longevity of females allows for a low culling rate of  $\leq 5\%$  of breeding females per year.
- Bison breeding season is very seasonal. It begins around August and continues into October, while the calving season is very defined, beginning around April and continuing into early July in the USA. However, it is not uncommon for calves to be born any month of the year.
- Calves are born with a reddish brown coat, which changes to adult color during the first autumn. Calves born out of calving season often do poorly and retain their neonatal coat color long after their cohort has changed color.
- Natural breeding methods are much safer than artificial insemination
- To prevent inbreeding and to improve the herd, new young bulls should be brought into the herd every 2 or 3 years. No bull should be kept in the herd longer than 3 years. Keeping accurate health and reproduction records will serve the producer well in monitoring genetics and producing virile, healthy stock.
- Cows that have not conceived 2 years in a row, gain weight slowly, or are slow to recover from sickness may be culled.
- Yearling males should be chosen for sale each year if the main focus is a cow-calf operation.

- If a producer notices a lower than normal conception or calving rate, factors that must be evaluated include infectious and nutritional causes – poor summer forages have been implicated in reproductive hiatuses. Reproductive problems that cause a prolonged calving season may be identified by the proportion of off-colored calves present in a group of weaned bison calves.
- Producers calve their cows in large calving pens or out on pasture, depending on their management strategy.
- Most calves weigh between 40-75 pounds at birth, and can gain 1.2-2 pounds per day until weaning at ~7 months of age. At weaning, an average of 400 lbs. for heifer calves and 500 lbs. for bull calves is expected under normal feed management conditions. Weaning traditionally occurs from December to March, although some producers may begin as early as October.
- The rut occurs from mid to late summer. Unlike cattle, bison bulls are rarely removed from groups of breeding females following breeding. Often bulls remain with the herd until late fall, winter or even throughout the year, and are allowed to wander away on their own as they choose.

### ***Disease Control***

- Bison are generally disease resistant but can be susceptible to some cattle diseases.
- Commercially available anthelmintic pellets are not recommended due to the hierarchical structure of bison herds and inability to ensure proper dosing of all individuals. Non-therapeutic anthelmintic exposure to most individuals in the herd can promote anthelmintic resistance problems.
- Delaying spring grazing of infested pastures until over-wintered larvae have died is highly recommended. Pasture rotation and management is crucial.
- In general, it is thought that bison respond to antibiotics similarly to cattle, however, no pharmacological studies have been performed in bison. Care should be taken when dosages and meat withdrawal times are recommended for antibiotic use in bison.
- If dosing bison with drugs, it is often best to use a long acting preparation since daily handling of sick bison increases the risk of injury and stress. Bison quickly become refractory to handling, and can become incredibly difficult and dangerous to work with. They have a very strong herd instinct, so it is ideal to include a couple of healthy bison in the pen with a sick one to provide comfort and keep the animal calmer.
- Any bison in proximity to domestic or wild sheep are at risk of contracting malignant catarrhal fever. Bison have contracted this disease when sheep are grazed as far as 3 km away. Bison should not be raised in exposure to sheep.

### ***Finish Programs***

- Males are more commonly finished than females, and bull calves/yearling bison bulls are more adaptable to the feedlot environment than older animals
- Bison are usually finished for slaughter before the age of 30 months when they reach weights of 400 to 450 Kg. They may be finished on pasture but are more often finished in feedlots. Bison do well in feedlot environments.
- Feedlot morbidity and mortality rates are lower for bison than for beef cattle. However, bison gain weight at a considerably slower rate than feedlot cattle.
- Mixing genders in a feedlot pen is not recommended due to behavioral problems as the animals mature, differences in nutrient requirements, and differences in times to finish before market in males and females.
- Heifer calves may be selected for finishing and slaughter when the market demand for meat is high and supply is low. Bison heifers can be fed for slaughter in a similar fashion as bison bulls, but they should be managed differently as they are more prone to excess fat when fed under the same conditions as bulls.

- Heifers exhibit less average daily gain than bulls, but arrive at finished weight and begin fat deposition earlier time in the feeding period than bulls when fed similar rations. Meat quality is very similar.
- The bison industry uses two methods in finishing bison: grass finishing and grain finishing. Grass finishing involves feeding bison on forages from weaning to target weight, with the last 100 days feeding a high level of grain in the diet. Grain finishing involves feeding high levels of grains from weaning to target weight.
- Queuing behavior that develops from dominance relationships must be considered when managing penned weaned calves or adults in feedlots. If bunk space is restricted, dominant animals may consume all available feed while less dominant animals patiently wait their turn.
- Pen size is also important. Even with adequate bunk space, if the pen is too large, calves or adults may revert to queuing and less dominant animals will wait while dominant ones eat. A balance must be struck, often by trial and error, between the number of animals, bunk space and pen size.



## MISCELLANEOUS

### SEE ALSO

- Bison: Management
- Bison: Parasitic Diseases
- Bison: Viral Diseases

### SUGGESTED READING

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