Different Methods, Many Reasons

Understanding the Variety of Bison Finishing Protocols

NATIONAL BISON ASSOCIATION, MAY 2018

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Today's shoppers are increasingly seeking more information about the source of their food, and the way it was produced. This is particularly true of bison customers. They tend to be discriminating shoppers, with a strong interest in responsibly raised meat. Because they pay a premium price for bison meat, they expect—and deserve—to know how the animals were raised and finished.

This paper seeks to answer some of those questions.

The Beginning of Natural Meat

In 1980, Mel Coleman Sr. of Colorado navigated the complex bureaucracy of USDA's Food Safety and Inspection Service to gain approval for the first "all natural" label for meat. The approval he finally won was for beef sourced from cattle that were raised without added growth hormones or antibiotics.[1] Other feeding and finishing protocols played no factor in whether products could be labeled as all natural.

A decade later, Congress enacted the National Organic Foods Production Act, which directed the USDA to develop a comprehensive set of regulations to govern the production, handling and labeling of products to be labeled as organic.[2] That law specified only that livestock feed must be organically produced, but did not limit the type of feed or specify the living environment for organic livestock.[3] The initial regulations promulgated in 2002 required that organic livestock be housed in conditions that accommodated the "natural behavior," including "access to pasture," but allowed for confinement during "stages of production," including finishing in feeding facilities.[4]

Meanwhile, more meat companies began to label their products as "natural." The USDA's Food Safety and Inspection Service's labeling policy book defined that term as, "(1) the product does not contain any artificial flavor or flavoring, coloring ingredient, or chemical

[1] Ogle, M (2013) In Meat We Trust, An Unexpected History of Carnivore America, Houghton Mifflin Harcourt, Boston.
[2] PL 101-624, Title XXI (1990) Organic Foods Production Act of 1990
[3] PL 101-624, Title XIII, §2110 (c)(1) (1990)
[4] 7 CFR §205, USDA National Organic Standards (2002) §205.239(a)(2) and §205.239(b)(2)

preservative (as defined in 21 CFR 101.22), or any other artificial or synthetic ingredient; and (2) the product and its ingredients are not more than minimally processed.[5]

Bison have always conformed to the original intent of "natural" that Mel Coleman sought to establish in 1980. Federal regulations prohibit the use of added growth hormones in bison production,[6] and the industry protocols—including the NBA Code of Ethics—prohibit the use of antibiotics as growth promotants.[7]

Growing skepticism over the meaning of "natural" on meat labels helped trigger an increase in public discussion over the way livestock are raised. Some of that discussion was driven by essays, such as *Power Steer*, written by author Michael Pollan and published in the New York Times Magazine in 2002,[8] Pollan's 2006 book, *Omnivore's Dilemma*, and by movies such as *Food Inc*., which had widespread distribution in 2008.

These articles, books and films tended to foster an impression that livestock were either "crammed into feedlots"[9] and "stuffed with grain,"[10] or were produced exclusively on open pastures. The terms "grain-fed" *versus* "grass-fed" began to become shorthand for describing those viewpoints.

It's not that simple.

Animals can be fed a diet classified as grass-fed (grass, forbs, etc.) while in corrals or finishing facilities. Corn is a member of the grass family, so a grass-fed animal can enjoy a diet of corn stalks. The assumption that "grain-fed" includes a diet solely of corn is misleading because nearly all feed rations include a mixture of grains, including barley and oats, along with alfalfa and other roughage.

Feeding and finishing bison is more difficult than for most other ruminants because of the animal's natural biology and its undomesticated nature. Decades ago, bison producers adapted common practices from the cattle industry to finish their animals. Through the years, we have learned that bison are unique, and that—while there are some similarities to cattle—there are many important differences.

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[5] USDA FSIS (2005) Food Standards and Labeling Policy Book
[6] 21 CFR §530.2
[7] National Bison Association (2016) Code of Ethics. https://bisoncentral.com/national-bison-association-code-of-ethics/
[8] Pollan, M (2002) Power Steer, New York Times, March 31, New York, NY. http://www.nytimes.com/2002/03/31/magazine/power-steer.html
[9] Montgomery, D (2017) *Growing a Revolution: Bringing Our Soil Back to Life*. W.W. Norton & Co.
[10] Burros, M (2006) *EATING WELL; There's More to Like About Grass-Fed Beef.* New York Times, August 30. http://query.nytimes.com/gst/fullpage.html?res=9C05EFDA113EF933A0575BC0A9609C8B63&pagewanted=all

Rather than focusing on "*how* my bison was finished," this paper looks at "*why* are my bison finished…" That's because every responsible bison producer makes finishing protocol decisions based upon a complex set of factors, including animal stewardship, climate, soil conditions, land base, drought, customer expectations, and the biology of our animals.

Ted Turner's 15 bison ranches today operate with a mission "*to manage Turner lands in an economically sustainable and ecologically sensitive manner while promoting the conservation of native species.*"[11] That commitment to being both economically sustainable and ecologically sensitive is shared by bison ranchers of all sizes across North America.

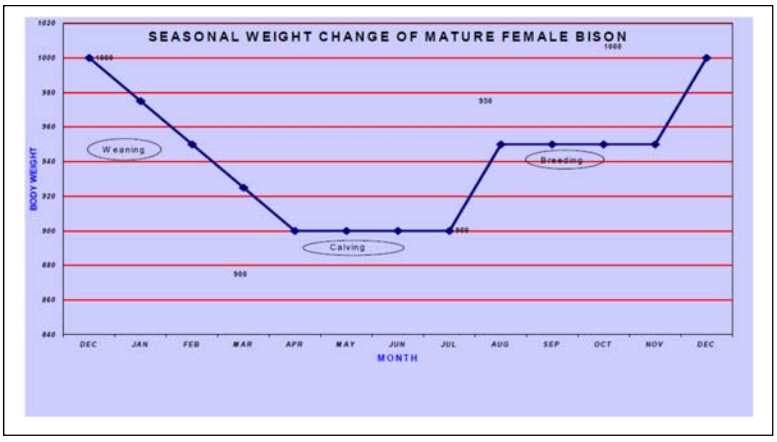
The Basics of Bison Production

It all begins with grass.

Bison evolved over thousands of years in North America and helped shape the very ecosystem of our continent. The species of grasses native to North America evolved under continuous grazing from ungulates, with bison serving as the keystone species. The hoof action of bison stirred the soil and buried seeds, urine and manure provided natural fertilizer. The intensive grazing—followed by long rest periods—helped foster healthy plant growth in the brittle environments that dominated nearly half of the North American land mass.

The natural life cycle of bison evolved to fit within nature's natural cycle.

Bison have a strong anabolic/catabolic cycle based on day length (anabolic means to build up – catabolic means to tear down). All wildlife species in the northern hemispheres require this cycle for survival. They have a strong anabolic cycle in spring, summer, and early fall to gain weight and store fat. Then, they utilize that stored energy to survive the winter season.



Source: USDA NRCS Grazing Lands Technology Institute

This natural life cycle is a major factor in commercial bison production.

[11] Turner Enterprises, Inc. (2017) Turner Ranches FAQ http://www.tedturner.com/turner-ranches/turner-ranches-faq/

The fertility of bison is impacted significantly by the health and condition of the animals. There's a saying in the bison business that animals should be "on the gain" in order to breed. In other words, the animals should be gaining weight during breeding season. This is nature's way of knowing that the female is healthy enough to nurture a viable calf.

Breeding season for bison occurs from mid-July through September, when pastures and rangelands are typically at the peak growing season. With a smorgasbord of fresh, growing grass, bison cows will be on the gain, and at maximum fertility. Summer grazing usually meets most bison nutrient requirements as long as carrying capacity is not exceeded and minerals are supplemented. If pasture quality and quantity is low, supplementation with hay or grains may be necessary. This cycle of breeding and calving varies from southern to northern climates; reflecting the animals' natural adaptation to survive within variable climatic conditions.

Bison typically reach peak weight in the fall each season. Pregnant females in particular will put on additional fat, aided by a diet of grass and forbs. Also provides for some natural grain feeding, with the seed heads on the grasses helping to fatten the animals in preparation for the winter months. This provides mom with a storehouse of nutrition that will carry her—and her unborn calf—through the winter. Then, in large part, the female will live off that storehouse of nutrition through the long winter months.

It is not uncommon for bison older than 18 months of age to lose 10 to 15% of pre-winter body weight from December to April. Dry matter intake during the winter period tends to range from 1.4 to 1.8% of body weight depending on forage quality, fiber levels, metabolism and total tract retention time. In the spring to autumn, dry matter intake can be expected to range from 2.0 to 3.0% of body weight.

Bison ranchers haven't tinkered with this natural life cycle through artificial insemination or a push to add fall calving in the mix. We understand that an animal raised within nature's cycle will be healthier and require less handling.

Virtually all bison today begin their lives on open pastures, just as they have for thousands of years. Nearly all bison calves are born between mid-April and Mid-June, as the grass is starting to green.

This aspect of the business is known as cow-calf production. In many cases, calves born in spring will be weaned in late fall or early winter during the annual roundup, when ranchers bring in their herds to sort, vaccinate, and perform other management functions. In some cases, calves are left with their mothers during the winter with the anticipation that the mom will "kick off" the older calf, before the next brother or sister arrives.

As the calves are weaned, some are held back as replacement stock, or to build the herds. Others are sorted to be finished for meat. This is when a divergence of finishing protocols begins to occur.

Some producers will leave the animals with the main herd, letting them graze and mature until the time comes to harvest the animal for meat. Others will move the animals into pastures where they will be grouped with other "yearlings" to be grazed until final finishing.

Many producers will begin to incorporate a ration containing grains and other feedstocks to finish their bison. Some will bring animals into finishing facilities. Others have on-farm paddocks for finishing. Still others harvest directly out of the pasture.

There are a variety of reasons for each of these finishing protocols.

The Customer is Always Right

That common axiom in the retail business particularly applies to bison meat shoppers. Sales of bison meat have steadily climbed for the past two decades because of three factors: great taste, nutritional attributes, and environmental sustainability.

Bison producers and marketers have a responsibility to provide their customers with high quality, flavorful meat. After all, those customers are paying a premium, and expect to receive full value.

The bison business is also largely in a position of "having one chance to make a good first impression." Most people eating beef have encountered a bad experience from time-to-time…a steak that was overcooked, or a piece of meat that was tough and chewy. They weigh that experience against all the times that they have eaten a flavorful, tender cut of beef.

A majority of the American public still hasn't experienced their first taste of bison. So, that first taste colors their impression of how all bison will taste. An enjoyable eating experience will encourage that customer to come back for more. A tough or gamy eating experience will create an impression that all bison tastes bad.

Several factors contribute to the flavor and quality of bison meat.

The first factor is the animal's diet. Meat carries a flavor that reflects the diet that the animal eats prior to being harvested. This creates a significant challenge for producers who focus on grass-fed and grass-finished bison. Hundreds of different grass and plant species grow throughout the seven major types of ecosystems in North America.[12] Native plants flourishing on

[12] Vogel, K.P. and Moor, K.L. (1993) Native North American Grasses, p. 284-293, https://hort.purdue.edu/newcrop/proceedings1993/V2-284.html

the southern plains of Texas have significantly different nutritional content than the hard grass varieties prevalent in the Western Tier states and parts of Canada. Each of those plants impart a different flavor characteristic to the meat harvested from animals grazing those pastures or rangelands.

Seasonality also plays a major role in the quality of the grasses, and the taste of the meat. The climate of North America—particularly in the semi-arid grassland ecosystems, is extremely variable. Particularly in the northern climates, meat harvested off fall grass will have a far superior flavor and texture than meat from animals that were eating dormant winter grass. This seasonal variability is a major reason that a significant amount of grass-fed beef sold in the United States is imported from countries like Uruguay and Australia, where climates are less variable.

A third factor is the natural biology of the animal. The natural anabolic/catabolic cycle of bison that is ideal for reproduction creates a challenge when striving to produce high quality bison meat on a year-round basis. Just as bison should be on the gain to conceive, being on-the gain is an important factor in meat quality. Meat sourced from an animal that is losing weight will likely be tough, chewy, and off-flavored. That's not a recipe for creating repeat customers.

A bison's rumen is very structured, ensuring that forage-based feeds are retained for long periods of time. Bison retain feed in their digestive system longer than cattle. Longer feed retention means that bison have more time to digest the fiber in feeds such as sedges and grasses. However, when consuming alfalfa or alfalfa brome hay, there is virtually no difference in digestibility between bison and cattle because the fiber level in alfalfa-based forages is typically lower than in grasses and sedges. Forages with lower fiber levels do not need to stay in the digestive tract as long to be fully digested as compared to forages with higher fiber levels.[13]

The goal, therefore, for all ranchers raising bison for the commercial meat market is to finish animals that will produce consistently high quality, flavorful meat.

Commercial bison producers have traditionally utilized a grain-mixed ration to produce a consistently flavorful and tender product that meets the customers' expectations. While corn traditionally served as the base grain for many finishing rations, barley, oats, field peas and other crops and grain byproducts are now widely used to provide the optimum level of protein and energy (calories) that are easily digested by bison.

[13] Feist, Murray (2012) Basic Nutrition of Bison, Saskatchewan Department of Agriculture. http://mbfc.s3.amazonaws.com/wp-content/uploads/2012/08/12-16-Bison-Nutrition.pdf

One long-time bison producer notes that the total mixed ration would have a minimum of about 60 percent grain-type feed with about 78 percent total digestible nutrients (TDN).

"Free choice" is a term widely utilized among producers who practice grain finishing.

"Our feed is 100 percent free-choice. The animals have regular access to a grain-based pellet, along with high quality forage," one marketer reported.

Another said, "In our operation, free choice includes at least different types of hay (grass, alfalfa, mixed, or on grass with hay, grain, etc.) in addition to rolled or pelleted grain-type feed with around 78 Percent TDN available to them at all times."

Because bison are self-limiting eaters by nature, providing a selection of feed on a continuous basis allows the animals to freely choose the feed that meets their nutritional needs. Commercial feeders typically supply vitamins and minerals, either mixed in the feed ration, or provided on a free choice basis as well.

Bison finished in this manner will generally be finished on grain for a minimum of 90 days. The biology of bison tends to limit the maximum period for grain finishing. That's because bison do not have the amount of internal fat that is found in most breeds of modern beef cattle. Thus, at some point in time, feeding bison a grain-based diet begins to add unwanted back fat to the animal.

Daily rate of gain (DRG) is a benchmark of performance in all livestock production, including bison. Each day an animal is fed (whether in a finishing facility or on pasture) is a cost to the producer. The DRG is important in determining whether the final value of the meat will exceed the cost of raising the animal.

Beef cattle produced in commercial finishing facilities typically average a daily gain of 2.95 lbs. per day.[14] Bison producers utilizing commercial grain finishing systems strive for about 1.25/lbs./day for heifers and 1.75/lbs./day for bulls. This is one reason that bison meat commands a higher price than beef in the retail market. And, because grass-finished bison have an even lower rate of gain, those producers must charge an additional premium to be profitable.

DRG also determines how quickly animals reach optimal weight and maturity for the best quality of meat. Bison and beef animals must obtain a level of maturity to produce quality, flavorful meat. However, the quality and flavor will also diminish as the animals age. Those muscles become tougher as the animal grows older. Commercial cattle are typically harvested at 14-18 months of age. Bison finished on rations with grain will typically reach harvest weight at

[14] Iowa State University (2016) Monthly Returns from Cattle Feeding. https://www.extension.iastate.edu/agdm/livestock/html/b1-35.html

20-24 months of age. Grass-finished bison are generally older than 27 months at the time of harvest.

Producing bison meat with consistent quality and flavor is particularly challenging for ranchers committed to grass-fed production.

Historically, the grass-fed segment of the bison business has focused on small-scale production and direct marketing on a seasonal basis. Small scale producers can harvest animals in late summer or fall when the pastures are imparting the best flavor to the meat and can sell directly to their customers. This is one reason that grass-fed meat is often frozen for later sale.

As consumer demand for grass-fed meat has grown, grass-fed bison producers have worked to provide meat with more consistent flavor through the seasons with stored grass hay and forages, carcass aging, and other techniques.

Most bison, though, are finished with some degree of a grain-based diet to assure seasonal consistency of flavor.

Living Environment

"Crammed in a feedlot" and "stuffed with grain" sounds like a stressful existence for any animal. And, animals raised under stressful conditions produce lower quality meat. As undomesticated animals, bison are particularly susceptible to stress. In other words, high stress equals lower quality. So, responsible producers strive to minimize stress regardless of the finishing systems utilized.

Stress has two components, acute (short-term) and chronic (long-term). Bison are great at handling acute stress that creates the "fight or flight" response to a stimulus. They can fight or run from grizzly bears or humans and when all threats are past, go back to grazing.

Chronic stress is more subtle. Chronic stress can make bison more susceptible to health issues and inhibit their ability to gain weight.[15] Bison finished in stressful conditions don't grow as efficiently, are more susceptible to disease, and experience higher mortality rates. For producers in the business of raising bison for food, those are factors to be avoided. Producers using all types of finishing protocols work hard to minimize stress on their animals.

Bison also have a natural pecking order and are in constant competition to sort out their position in that order. Providing adequate space for bison is a prerequisite for reducing the

[15] Hunter, D. and Woodbury, M (2016) Bison Health, Chapter in Bison Produces Handbook, 2nd Edition. P. 120.

stress they experience when housed in commercial finishing facilities. Typical cattle finishing facilities are designed to provide each animal 45 ft.^{2} – 250 ft.^{2}. For bison 400 ft.^{2} is considered a minimum amount of space, and many facilities are moving toward providing animals with greater space.

Additionally, several bison operations are utilizing facility designs that provide bison with access to pasture and other open space during the finishing period.

Turner Enterprises, Inc., for example is implementing a variety of models including SNAP (Supplemental Nutrition for Animal Production) facilities, which allow for the bison to be finished on the ranch of their birth in facilities that have additional square footage per animal compared to many commercial feeding facilities.

“The goal is that the only truck ride the animal will ever take is on the day we send it to be processed,” said John Hansen,” Director of Ranch Operations for Turner Enterprises, Inc. The ranch managers involved in this project are carefully monitoring the bison to assess the reduction on stress.

High Plains Bison, another larger producer and marketer of bison meat, is gravitating to a loose confinement model where animals have 2,400 ft^2. per head.

“We are finding that sickness and mortality is greatly reduced,” said Chad Bullinger, Chief Production Officer of High Plains Bison. “The rate of gain is exceeding the level in more conventional facilities. The reduction in stress is important because the animals have room to roam and can separate themselves according to their pecking order.”

Beaver Creek Buffalo Co. near Goodland, KS, has utilized large paddocks for many years.

Ken Klemm, owner of Beaver Creek Buffalo, noted, “When it comes time to prepare them for market we gather the animals destined for slaughter and place them in our feeding paddocks. These paddocks contain self-feeders of hay and grain. We do not force feed the animals but allow them the choice of what and how much they would like to eat. These small paddocks (larger than one acre each) are then planted to a crop each year after the animals are removed.

“Since these paddocks are planted to a green and growing crop each year we avoid filth and stress. Each paddock is monitored to be certain that the nutrients that the animals leave are never more than the planted crops can utilize. Perhaps the biggest environmental benefit gained is that by keeping the soil microorganisms alive and healthy under these paddocks they can decompose the manure and bring it back into the system,” he said.

Paddocks are already widely used by grass-fed producers to effectively manage their herds, as well as their natural resources.

Tom Barthel of Snake River Farm produces both bison and beef on his farm near Becker, MN. His 225 acres is divided into 70 paddocks. He moves his beef herd daily between paddocks, and his bison herd every few days. He averages harvesting about 17 bison and 108 beef animals each year using this practice.

The use of paddocks and free-choice feed access illustrates that there are multiple gradations in finishing protocols. In fact, paddocks are regularly utilized within the cow-calf sector. Rotating animals throughout the paddocks on a scheduled basis enables ranchers to maintain healthy grasslands through controlled grazing and amply rest the land.

Impact of Finishing Protocols on Nutritional Value of Meat

The nutritional characteristics of bison meat are prime factors for many shoppers in making the decision to purchase our products.

Discussion among nutritionists and dieticians during the past two decades has focused on the important role that Omega 3 fatty acids play in human health, particularly in reducing the risk of heart disease. Many nutritionists emphasize the importance of eating foods with a "proper" balance of Omega 3 to Omega 6 fatty acids.

One literature review funded by the National Institute of Health in 2010 concluded, "Research spanning three decades supports the argument that grass-fed beef (on a g/g fat basis), has a more desirable SFA lipid profile (more C18:0 cholesterol neutral SFA and less C14:0 & C16:0 cholesterol elevating SFAs) as compared to grain-fed beef. Grass-finished beef is also higher in total CLA (C18:2) isomers, TVA (C18:1 t11) and n-3 FAs on a g/g fat basis. This results in a better n-6:n-3 ratio that is preferred by the nutritional community. Grass-fed beef is also higher in precursors for Vitamin A and E and cancer fighting antioxidants such as GT and SOD activity as compared to grain-fed contemporaries.

"Grain-fed beef consumers may achieve similar intakes of both n-3 and CLA through consumption of higher fat portions with higher overall palatability scores. A number of clinical studies have shown that today's lean beef, regardless of feeding strategy, can be used interchangeably with fish or skinless chicken to reduce serum cholesterol levels in hypercholesterolemic patients."[16]

[16] Dailey, C, Abbot, A; Doyle, P, Nader, G; and Larson, S (2010) "A review of fatty acid profiles and antioxidant content in grass-fed and grain-fed beef. Nutrition Journal, March 10. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2846864/

All bison meat has a nutritional advantage over beef because of the biological differences in the species. For example, a 100 gram serving of grain-finished bison sirloin has 113 calories, 21.4 grams of protein, 2.4 grams of fat, and 3 milligrams of iron.[17] A comparable serving of grain-finished beef has 154 calories, 21.7 grams of protein, 7.06 grams of fat and 1.54 milligrams of iron.[18]

From that standpoint, grass-fed bison is often considered the gold standard of red meat nutrition. Again, feeding regimens are not an either-or proposition, unless produced under the requirements of the USDA's grass-fed definition or the American Grassfed Association's certification program (See those definitions in attachment A).

A 2014 study conducted on western Canadian bison compared the nutritional profiles of grass-fed and grain-finished bison, along with bison that were grass-fed and supplemented with oat and pea screenings. That study found that the nutritional profile was modestly impacted not only by the composition of the feeding rations, but also by the seasonality of the crops included in those rations.[19]

The study found that all Canadian retail bison ribeye steaks contained less than 3% fat, and that grass-finished bison had the highest level of Omega-3 fatty acids. The study also noted that supplementation during early season or late season "would likely impart similar beneficial health effects and was considered more desirable than that of Grain bison."[20]

One study comparing samples from 31 grass-fed bison carcasses and 100 grain-fed bison carcasses found that there are little discernable differences in the protein content, but that grass-finished bison meat was 23 percent lower in fat, and seven times higher in Omega 3 content.[21] The results of that study are listed in Attachment B. This study was conducted in 1997, and did not include many of the feeding regimens that have been developed over the past two decades.

Research continues to show that bison finished under all types of feeding protocols offer a nutritional benefit over beef finished under those same protocols.

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[17] USDA (2018) Bison Top Sirloin, Separable lean only, timed to 0" fat, raw. National Nutrient Database for Standard Reference Legacy Release.
[18] USDA (2018) Beef Bottom Sirloin, Separable lean only, trimmed to 0" fat, raw. National Nutrient Database for Standard Reference Legacy Release.
[19] Turner, R; Pilfold, J; Jenson, J, Prema, D; Donkor, K; Van Hamme, J; Cinel, B; Gailbraith, J; and Church, J (2014) Fatty Acid Profiles of Western Candadian Bison (bison bison) Meat; Journal of Food Research, Vol. 3, No. 6, September 5.
[20] IBID
[21] Marchello, M; and Driskell, J.A. (2001) Nutrient Content of Bison Meat from Grass and Grain-Finished Bulls, North Dakota State University.

A study published in 2013 concluded, “Bison meat may offer some advantages to health compared to beef. Bison meat is not only lower in total fat content when compared to beef, but also differs in specific fatty acid composition and other components that may lend special nutritional benefits to this nutritionally dense food (Driskell et al., 1997; Marchello, 2001; Cordain et al., 2002). Bison contains an increased amount of certain omega-3 and omega-6 fatty acids such as conjugated linoleic acid (CLA isomers, 18:2 cis-9, trans-11 and 18:2 cis 12, trans-10) and a reduced proportion of linoleic acid. These differences in fatty acid composition may contribute to the potential nutritional benefits provided by bison meat consumption (Cordain et al., 2002; Rule et al., 2002).

“These data suggest that the consumption of bison meat, rather than beef, is associated with a reduced atherogenic risk. Unlike beef, bison consumption did not result in increased inflammation and oxidative stress or decreased vascular function. Thus, in a society which continues to consume large quantities of beef, bison meat appears to provide a healthier red-meat alternative.”[22]

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The Environmental Equation

Concern over environmental stewardship is yet another factor driving growth in demand for grass-fed meat.

For example, The Environmental Working Group’s website entitled “Meat-eaters Guide to Climate Change,” notes, “Well-managed grazing and grass-fed operations are better for the environment. They use fewer energy-intensive inputs and, by regularly moving animals to fresh pasture and keeping them away from streambeds, they spread the manure more evenly and improve the quality and quantity of forage growth. This helps to conserve soil, reduce erosion and water pollution, increase carbon sequestration and preserve biodiversity and wildlife (Johnson 2002, FAO 2009, Pelletier 2010).”[23]

The North American grassland ecosystem evolved under thousands of years of grazing by ruminant animals, with bison being the predominant species. During the past few decades, organizations like the Savory Institute, Holistic Management International, the Regenerative

[22] McDaniel, J; Askew, W, et al (2013) Bison meat has a lower athoregenic risk than beef in healthy men, Nutr Res (2013), http://dx.doi.org/10.1016/j.nutres.2013.01.007
[23] Environmental Working Group (2018) Meat-Eaters Guide to Climate Change and Health, https://www.ewg.org/meateatersguide/a-meat-eaters-guide-to-climate-change-health-what-you-eat-matters/why-go-organic-grass-fed-and-pasture-raised/

Agricultural Alliance and the Carbon Underground have been documenting the environmental benefits of properly managed grassland grazing systems.

Properly managed is a key phrase.

Bison producers must manage their herds within the limits of their available land base. And, even the smallest producers must be economically sustainable to be environmentally sustainable.

Maintaining proper stocking rates on pastures is a key element in grassland health. Stocking rates vary widely based on climate, precipitation, and region. In some parts of the humid east, grasslands will support more than three animal units (mother cow and calf) per acre. In parts of the arid west, more than 50 acres are required to sustain that same animal unit. When sustained droughts hit, the land required to sustain a herd increases dramatically.

Many bison producers use finishing pens and corrals to maintain an economically viable herd while increasing the health and biodiversity of their pastures and rangelands. As mentioned previously, many emerging finishing systems combine finishing pens with ongoing access to grazing lands.

Having the ability to move animals into corals or other facilities provides many producers with a management tool that allows them to be able to manage the animal impact on their pastures and rangelands.

Summary

The finishing of bison simply cannot be categorized as grass *versus* grain. The types of finishing practices utilized in the bison business are as varied as the producers who use them.

Every responsible bison rancher develops finishing protocols based upon their available land base, access to feedstocks, customer expectations, and a myriad of other factors. While those factors vary, bison producers are united in their commitment to responsible animal husbandry, environmental stewardship, and providing their customers with a great tasting, nutritionally superior product.

Attachment A
Defining Grass-Fed

USDA Grass fed Definition:

> ***Grass (Forage) Fed****—Grass and forage shall be the feed source consumed for the lifetime of the ruminant animal, with the exception of milk consumed prior to weaning. The diet shall be derived solely from forage consisting of grass (annual and perennial), forbs (e.g., legumes, Brassica), browse, or cereal grain crops in the vegetative (pre-grain) state or other native plants (e.g., cacti, sedges). Animals cannot be fed grain or grain byproducts and must have continuous access to pasture during the growing season. Hay, haylage, baleage, silage, crop residue without grain, and other roughage sources may also be included as acceptable feed sources. Routine mineral and vitamin supplementation may also be included in the feeding regimen. If incidental supplementation occurs due to inadvertent exposure to non-forage feedstuffs or to ensure the animal's well-being at all times during adverse environmental or physical conditions, the producer must fully document (e.g., receipts, ingredients, and tear tags) the supplementation that occurs including the amount, the frequency, and the supplements provided.*

Source: *Labeling Guidelines for Documentation Needed to Substantiate Animal Raising Claims for Label Submissions. USDA FSIS*

American Grassfed Association Standards

FORAGE
An AGA-Certified Grassfed animal is born, raised, and finished on open grass pastures where perennial and annual grasses, forbs, legumes, brassicas, browse and post-harvest crop residue without grain are the sole energy sources, with the exception of mother's milk, from birth to harvest. Hay, haylage, silage, and ensilage from any of the above sources may be fed to animals while on pasture during periods of inclement weather or low forage quality.

CONFINEMENT
AGA-Certified Grassfed ruminants must graze pasture where they will receive most, if not all, of their nutrition, and be allowed to fulfill their natural behaviors and basic instincts of grazing at all times. The only exceptions to this standard are emergencies that may threaten the safety and well-being of the animals or soil, and management practices such as roundups, sorting, shipping, and weaning.

ANIMAL HEALTH AND WELFARE
Mineral and vitamin supplements may be provided free choice to adjust the animals' nutrient intake and to correct deficiencies in the total diet energy source. The feeding of animal by-products is prohibited, and no antibiotics, ionophores, or hormones of any type may be administered. Any animal in need of medical attention must be treated to relieve its symptoms. If prohibited medication or antibiotics are required for treatment, the animal must be tagged,

identified, and removed from the certified grassfed program. Producers will develop and maintain a written record of all vaccines, medications, and/or other substances used in their animal health care program.

ORIGIN AND IDENTIFICATION
Animals eligible for acceptance in the AGA Certified Grassfed program must be born and raised in the United States of America. Animals must be identified at the earliest opportunity following birth by a producer-determined animal identification system. Each animal's record must include breed, ear tag or unique identification number, date of birth, and owner. Producer records that trace an animal from birth to harvest must accompany animals when delivered to processor. Genetically engineered and or cloned animals are prohibited.

Source: American Grassfed Association. https://www.americangrassfed.org/about-us/our-standards/

Attachment B

Comparison of Micronutrient And Energy Content Of Raw Separable Lean From Grass- vs. Grain-Finished Bison[RL1]

NUTRIENT	GRASS %	GRAIN %	NUTRITIONAL COMMENTS
Protein (%)	21.5	21.7	Excellent source of protein.
Moisture (%)	75.9	74.6	Typical of most meats.
Fat (%)	1.7	2.2	Low in fat. Low intakes associated with decreased incidence of heart disease & cancer. Diet should contain <30% of calories.
Saturated fat (% of fat)	47.4	42.5	Low intakes associated with decreased incidence of heart disease & cancer.
Monounsaturated Fat (% of fat)	35.4	46.5	Higher proportion associated with decreased incidence of heart disease & cancer.
Oleic Acid (% of fat)	34.0	42.7	Higher proportion perhaps associated with decreased incidence of heart disease.
Polyunsaturated Fat (% of fat)	17.2	11.0	Higher proportion associated with decreased incidence of heart disease & cancer.
Linoleic Acid (Omega 6) (% of fat)	13.8	10.5	Recommended Omega-6: Omega-3 intake is 4-10.1.
Linoleic Acid (Omega-3) (% of fat)	3.4	0.5	
Ash (%)	1.2	1.2	Reflective of total mineral content.
Cholesterol (mg/100g)	65	66	Lean Meat. Low intakes associated with decreased incidence of heart disease & cancer.
Food Energy (kcal/100g)	133	141	Relatively low in calories.

Source: Marchello, M; and Driskell, J.A. (2001) Nutrient Content of Bison Meat from Grass and Grain-Finished Bulls, North Dakota State University.