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Nutrient Content and Sensory Characteristics of Bison Meat

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Bison (known as North American buffalo) offers an alternative for those wishing to add variety to their meat choices. Bison meat is being produced for human consumption, but demand exceeds production. While bison is gaining popularity, the general public knows little about the nutritional content of bison meat.

Nutrient composition data are available for four lean cuts of bison: ribeye, clod, top round and top sirloin. Essentially no differences exist among these cuts of meat in nutrient composition. All cuts of bison are lean. The nutrient information given here is based on a 100 gram (about 3 ounces) serving of bison, primarily as uncooked meat. This portion is about the size of a deck of cards. Most of the research on the nutrient content of bison meat was conducted collaboratively by the University of Nebraska and North Dakota State University.

Calories and Macronutrients (Proteins, Fats, and Carbohydrates)

Protein is used in the human body to build and repair tissues, produce enzymes and some hormones, and maintain cell membranes and components of the immune system. Bison meat is a rich source of protein as each serving has about 22 grams of protein. Bison cuts are complete proteins containing all the essential amino acids in appropriate amounts.

Not only is bison meat a rich source of protein, it also is very low in fat, containing roughly 2 percent fat per serving, and only 66 mg of cholesterol per serving. Current recommendations are that Americans should consume less than 30 percent of their calories from fat and less than 300 mg of cholesterol daily. Bison meat can be labeled as low-fat according to labeling regulations. The types of fat present in bison are worth mentioning. Monounsaturated fats account for over 46 percent of total fats present in bison, while 43 percent of the fat is saturated, and the remaining 11 percent is polyunsaturated. American Heart Association dietary guidelines call for obtaining all three types of fat as part of a healthy diet, with up to 15 percent of calories being from monounsaturated, up to 10 percent of calories from polyunsaturated, and 8 to 10 percent of calories from saturated. Monounsaturated fats often are touted as the "healthy fat," because eating them does not raise cholesterol levels.

Bison meat contains linoleic and linolenic fatty acids, which also are known as omega-6 and omega-3 fatty acids, respectively. These omega fatty acids are believed to be useful in many functions of the human body including assisting in formation of cell membranes, aiding in the production of hormone-like compounds, and participating in immune and visual processes. These two omega fatty acids are called "essential," meaning the substance is necessary for us to eat and cannot be made in our bodies.

The carbohydrate content of bison is comparable to other meats. Meats are not good sources of carbohydrates.

The food energy or caloric content of bison cuts is low, particularly for a meat. The average caloric

content of a serving of bison is about 140 calories, which is about 7 percent of calories, based on a 2,000 calorie diet.

Vitamins and Minerals

Several vitamins and minerals are found in uncooked bison meat. Bison meat is a rich or good source of vitamins and minerals (*Figure 1*). When a food contains 20 percent or more of the Daily Value or Reference Daily Intake of a nutrient per serving, the terms "major source of," "rich in," or "high" can be used to describe the content of this nutrient in the food or food product. The term "good source," "source of," or "important source of" indicates that a food contains from 10 to 19 percent of the nutrient per serving.

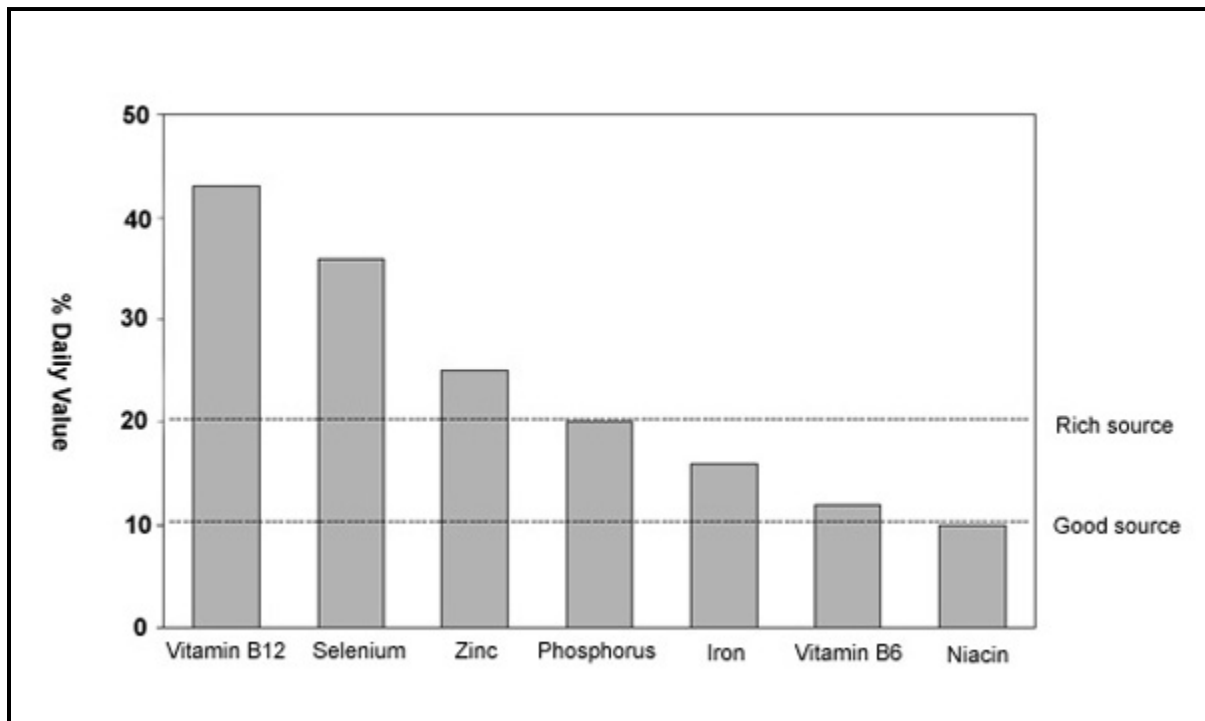


Figure 1. Bison meat is a good or rich source of these nutrients.

Bison meat contains many vitamins but is highest in vitamin B₁₂, vitamin B₆, and niacin content. Bison meat contains enough vitamin B₁₂ to be considered a major source of the vitamin, since one serving of raw bison meat contains 43 percent of the Daily Value. Vitamin B₁₂ is involved in folate metabolism and also is used in maintenance of myelin sheaths which insulate nerve fibers. A serving contains 12 percent of the Daily Value for vitamin B₆, which is used in protein metabolism and formation of several neurotransmitters. It is also a good source of niacin, providing 10 percent of the Daily Value per serving. Niacin plays a role in energy metabolism as well as fat synthesis and fat breakdown. Vitamins present in a serving of bison meat to a lesser extent are riboflavin at 6 percent of the Daily Value, thiamin at 3 percent of the Daily Value, and vitamins A and E at insufficient levels to be of nutritional importance. It does not contain detectable amounts of vitamin C and folic acid.

Bison meat contains many minerals but is highest in selenium, zinc, phosphorus, iron, copper and magnesium content. Bison meat is high in selenium, containing about 47 percent of the Daily Value per serving. Selenium functions as an antioxidant, helping to prevent free radical damage. Bison meat is a

major source of zinc, containing about 25 percent of the Daily Value per serving. Zinc is used in wound healing, protein metabolism and the storage and release of insulin. A serving of bison meat contains 20 percent of the Daily Value for phosphorus. Phosphorus functions in energy metabolism and nucleic acid synthesis, and is a component of bone and of some buffers.

A serving of bison meat is a good source of iron, containing 16 percent of the Daily Value. Iron helps transport oxygen to cells and returns carbon dioxide from the cells. Iron is also important for immune function. Minerals present in a serving of bison meat to a lesser extent are potassium at 9 percent of the Daily Value, copper at 7 percent of the Daily Value, magnesium at 6 percent of the Daily Value, and calcium and manganese at levels insufficient to be of nutritional importance.

Bison meat contains 45 mg of sodium per serving, and is low in sodium, containing less than 140 mg of sodium per serving. Adults and children should consume less than 2,400 mg of sodium daily. Most Americans consume more sodium than recommended. High intakes of sodium have been associated with increased prevalence of hypertension.

The nutrient content data presented so far in this paper are based on raw meats. Consumers and food service staff cook meat differently and, occasionally, improperly. Cooking can affect the nutrient composition of meat. The mineral content of the ribeye cut of bison has been reported to increase following broiling because of the loss of moisture in the meat during cooking. However, 59 percent of the thiamin, 68 percent of the vitamin B₆, 67 percent of the vitamin B₁₂ and 76 percent of the vitamin E were retained when bison patties were either broiled or grilled. Therefore, one might expect retentions of about two-thirds for the B-vitamins and about three-quarters for the fat-soluble vitamins.

Preparing Bison Meat

Preparing bison meat is comparable to preparing other lean meats. Food safety techniques should be followed. Wash hands with soap and water after handling raw bison meat. Use separate cooking utensils and plates/platters for raw and cooked bison meat.

Meat from bison is similar to that from beef. Cut bison meat tends to be darker red than beef. It does not have a "gamey" taste.

Bison meat can be cooked much like lean beef, but generally is cooked at a lower temperature or for a longer time than typical cuts of beef. Since bison is lower in fat than other red meats, it is easier to overcook. Ground bison meat should be cooked to an internal temperature of at least 160°F and the juices should be clear, not red. Roasts and steaks should be cooked to an internal temperature of 145° F (medium rare) or 160°F (medium). The oven should be set at around 275°F. After cooking, eat the meat within three to four days, storing in the refrigerator. For best quality, cook ground bison within two days of purchase, and steaks and roasts with three to five days; otherwise, the meat should be frozen for future use. Ground or chopped bison will keep in the freezer for about four months. Roasts and steaks will keep for six to nine months. Bison meat also can be stewed. Bison meat can be substituted for beef in recipes. The National Bison Association has cooking tips and recipes available on its Web site.

Sensory Characteristics

The sensory characteristics of broiled and grilled bison patties were evaluated by a trained sensory panel. The ground bison patties were cooked to an internal temperature of 160°F. The yield of the cooked patties was similar (around 80 percent) for both cookery methods. The cooking time for the grilled patties was significantly shorter than for the broiled patties. Cooking time was about four minutes

for grilled patties and about nine minutes for the broiled patties.

Bison patties were obtained from the North American Bison Cooperative, which slaughters about half the bison used for meat in the United States and Canada. A trained sensory panel indicated that both broiled and grilled bison patties had desirable sensory characteristics (surface color, interior color, juiciness, tenderness, aromatic intensity and flavor intensity).

A panel evaluated some of the sensory characteristics of ribeye steaks from bison. These steaks were described as juicy and tender.

Summary

Bison is a healthy alternative for those wishing to add variety to their meat choices. It is high in protein, low in fat, and relatively low in calories, at just 140 calories per 100 gram serving. Its low fat content makes bison a good choice for those trying to lower their total fat or saturated fat intake. In addition, bison is a rich source of vitamin B₁₂, selenium, zinc, and phosphorus, and is a good source of iron, vitamin B₆, and niacin. Bison meat is low in sodium. The retention of vitamins during cooking ranges from 67 to 76 percent, while that of minerals is over 100 percent, as the minerals become more concentrated. Both grilled and broiled bison patties and ribeye steaks are tender and juicy. Bison meat is a low-fat, low-sodium, nutrient-dense, tasty food that is relatively low in calories. Bison meat meets the Food and Drug Administration requirements for being labeled as "healthy."

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