# U.S. Bison Census, Value of Production, and Economic Impact 1997

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**Abstract**

Based on a survey conducted with the National Bison Association, the best current available estimate of the number of privately owned bison in the United States is more than 107,000 head. The value of the national bison inventory in 1997 was estimated at $232,134,542 and the value of production of the national bison herd was nearly $69,977,831.

The primary business use of bison is meat sales, but other bison-related activities also are important. The average direct income for a job in the bison industry is $23,081, which exceeds the average income for employment in U.S. agriculture. Bison production in 1997 appears to have been a viable and profitable option for agricultural producers. Based on input from the census surveys received, the average net profit per head of bison was approximately $297.39 in 1997.

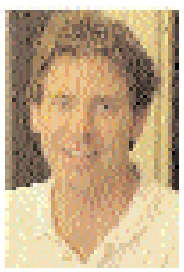
## 1. Introduction

Forty to sixty million bison are estimated to have once roamed freely throughout North America (Minnesota IMPLAN Group, 1996). Extensive hunting in the late 1800s nearly caused the extinction of bison and only about 700 head remained at the turn of the century (Denver Buffalo Company, 1997).

Bison numbers are once again growing in North America, but the number of bison in the United States is not currently available from any source, not even from federal and state agencies that track populations of other livestock species. An accurate count of bison is necessary to effectively seek fair and beneficial treatment of the bison industry when legislation is proposed concerning animal disease prevention, meat inspection, animal transportation, and inter- and intra-state commerce in meat and meat by-products. Additionally, effective marketing and promotion of the bison industry requires more data than is currently available.

Knowledge of the impact of the bison industry on the United States economy is essential if the bison industry is to receive the attention it deserves on important production and marketing issues. Thus, obtaining a census of bison numbers, an estimate of the value of bison production, and an estimate of the economic impact of bison production is an important undertaking.



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## 2. U.S. Bison Census and Value

In cooperation with the National Bison Association, efforts were made to estimate the number of bison in the United States by obtaining a census of the bison population. A census survey was developed and distributed to every known bison producer in late 1997 and early 1998. A list of known bison producers was developed from the National Bison Association membership listing, from various state bison association contacts, knowledge from industry experts, and from contacts with many state Departments of Agriculture. All of these producers were mailed a survey along with a mailing from the president of the National Bison Association. Unanswered surveys were followed up with reminder letters and finally telephone calls. This process revealed that not all of the producers were still producing bison in 1997 and also revealed new producers not initially contacted with the survey. This latter group was contacted by telephone and included in this study. In all, 1,095 bison producers were identified and included in this study. Certainly, it is unlikely that this census survey reflects 100 percent of bison producers in 1997. However, because all known producers were contacted via the survey or by telephone, these numbers are believed to represent the best available census count of bison in the United States.

### 2.1 National Bison Inventory, December 31, 1997

There were more than one hundred thousand privately owned bison in the United States as of December 31, 1997. Table 1 shows the distribution of bison among various age and gender categories. A total of 107,626 bison

**Table 1: Bison Inventory for Calendar Year 1997**

| Description | Beginning Inventory Jan. 1, 1997 | Ending Inventory Dec. 31, 1997 |
|---|---|---|
| Cows & Heifers | | |
| Mature (greater than 10 years old) | 8,800 | 9,107 |
| Mature (greater than 2 years old but less than 10 years old) | 27,939 | 34,239 |
| 2 years old | 7,705 | 8,194 |
| Yearling heifers | 8,821 | 11,219 |
| Heifer Calves | | 16,045 |
| Bulls | | |
| Trophy Hunting | 313 | 543 |
| Mature (greater than 2 years old) | 3,975 | 4,070 |
| 2 years old | 4,122 | 4,709 |
| Yearling Bulls | 8,035 | 7,577 |
| Bull Calves | | 11,563 |
| | | **TOTAL: 107,266** |

**Table 2: Value of the National Bison Inventory, December 31, 1997**

| | Number of Head | Market Value Per Head | Value of Inventory |
|---|---|---|---|
| Cows over 10 years | 9,107 | $2,224 | $20,253,968 |
| Cows 3 – 9 years | 34,239 | $2,638 | $90,322,482 |
| 2 year old Heifers | 8,194 | $2,735 | $22,410,590 |
| Yearlings Heifers | 11,219 | $2,262 | $25,377,378 |
| Heifer Calves | 16,045 | $2,110 | $33,854,950 |
| Trophy Bulls | 543 | $2,379 | $1,291,797 |
| Bulls over 2 years | 4,070 | $2,134 | $8,685,380 |
| 2 year old Bulls | 4,709 | $1,690 | $7,958,210 |
| Yearling Bulls | 7,577 | $1,357 | $10,281,989 |
| Bull Calves | 11,563 | $946 | $10,938,598 |
| **TOTAL:** | **107,626** | | **$232,134,942** |

were counted from among the bison owners who returned census surveys. The largest category was cows age two to ten years old, which constituted approximately one-third of the total bison inventory. The value of the national bison inventory in 1997 was estimated to be $232,134,942 based on the average market values for the age categories as reported by the census survey respondents (Table 2). Note that the market for bison is not fully developed (i.e., the market is thin with few buyers and sellers,) therefore the price a particular producer receives for bison sold may vary significantly from the average values used in this study.

### 2.2 Value of Production, National Bison Herd, 1997

Bison production estimates were based on changes for the 1997 herd inventory. Production, for the purpose of this survey, indicates either the birth of a new heifer or bull calf, or a change in market value when a heifer, cow/bull, or calf changes age categories. Producers were asked for their inventories on January 1, 1997, the number of bison calves born, the number of deaths, the number of head bought, the number of head sold, and their inventories on December 31, 1997. These data were collected for ten categories of bison (Table 3). For the purpose of this study, any calves born between January 1, 1996 and December 31, 1996 were considered yearlings. Thus, the number of heifer and bull calves is considered zero at the start of this census.

Prices received by producers per head varied considerably due to age and weight differences between the classes of bison. For example, while bull calves received an average market price of $946, yearling bulls sold for an average of $1,357. The value of production of the national bison herd was calculated from the changes in inventory of the various age categories multiplied by the average market prices for each of the age categories as reported by the census survey respondents. In 1997, the value of production of the national bison herd was estimated at 69,977,831 (Table 3).

### 3. Economic Impact of the National Bison Herd, 1997

The economic importance of the national bison herd is described in this section. Multiplier calculations can be particularly interesting because they estimate both the direct effects and secondary effects of the bison industry within an economy. The income multiplier shows both the income earned by bison producers for their bison and related products, and also the income earned by those whose economic activities occur in whole or in part because of the bison industry. Examples of such secondary activities include sales of supplies, wages and salaries of workers in supply businesses, and spending of those wages and salaries in retail and other economic sectors.

Results of the census surveys were used to estimate the economic impacts of the bison industry within the US economy using a social accounting and economic impact assessment software system called IMPLANPro. IMPLANPro was developed to support federal land and resource management planning and follows standard accounting conventions such as those used by the Bureau of Economic Analysis and the United Nations (Minnesota IMPLAN Group, 1996). IMPLANPro software and database estimate the impacts of economic changes in counties, states, or the whole United States (Minnesota IMPLAN Group, 1996). IMPLANPro analysis is used here to estimate the secondary economic impacts of bison production on output, employment, personal income,

**Table 3: Value of Production of the National Bison Herd, 1997**

| | Beginning Inventory | Ending Inventory | Change in Inventory | Market Price | Value of Production |
|---|---|---|---|---|---|
| Cows over 10 years | 8,800 | 9,107 | 307 | $2,224 | $682,768 |
| Cows 3 – 9 years | 27,939 | 34,239 | 6,300 | $2,638 | $16,619,400 |
| 2 year old Heifers | 7,705 | 8,194 | 489 | $2,735 | $1,337,415 |
| Yearling Heifers | 8,821 | 11,219 | 2,398 | $2,262 | $5,424,276 |
| Heifer Calves | 0 | 16,045 | 16,045 | $2,110 | $33,854,950 |
| Trophy Bulls | 313 | 543 | 230 | $2,379 | $547,170 |
| Bulls over 2 years | 3,975 | 4,070 | 95 | $2,134 | $202,730 |
| 2 year old Bulls | 4,122 | 4,709 | 587 | $1,690 | $992,030 |
| Yearling Bulls | 8,035 | 7,577 | (458) | $1,357 | ($621,506) |
| Bull Calves | 0 | 11,563 | 11,563 | $946 | $10,938,598 |
| | | | | TOTAL: | $69,977,831 |

**Table 4: Economic Importance of the National Bison Herd, 1997**

| | |
|---|---|
| **U.S. Bison Inventory** | |
| Number of head | 107,266 |
| Value of Inventory | $232,134,942 |
| Average Value per Head | $2,156.87 |
| **Industry Output** | |
| Direct Output | $69,977,831 |
| Secondary Output | $86,562,577 |
| Total Industry Output | $156,540,408 |
| Output Multiplier* | 2.237 |
| **Employment** (annual job equivalents) | |
| Direct Employment | 886.9 |
| Secondary Employment | 1,125 |
| Total Employment | 2,011 |
| Employment Multiplier* | 2.268 |
| **Personal Income** | |
| Direct Personal Income | $20,470,955 |
| Secondary Personal Income | $28,188,505 |
| Total Personal Income | $48,659,460 |
| Income Multiplier* | 2.377 |
| **Average Income per Job** | |
| Direct Income per Job | $23,081 |
| Secondary Income per Job | $25,066 |
| Total Income per Job | $24,191 |

*Average income per job in U.S. Agriculture $15,157 (US Dept. of Commerce)*

**Multipliers were calculated using an economic impact assessment software tool called IMPLAN Pro™.*

and average income per job in the United States. Once these secondary impacts are known, an output multiplier, an employment multiplier, and an income multiplier may be calculated. Data related to the economic importance of the national bison herds are summarized in Table 4.

### 3.1 Industry Output

The total output of the U.S. bison industry consists of the value of bison production as detailed in Table 3, as well as output from economic activity which occurred as a result of the bison industry. Direct output, such as the birth of calves or an increase in weight and market value of animals, totaled $69,977,831 in 1997 (Table 3). IMPLANPro estimates secondary output generated by activities which supplied, supported, and resulted from the bison industry to be approximately $86,562,577 (Table 4). Thus, total output associated with the bison industry was approximately $156,540,408 in 1997 and the output multiplier was 2.237.

### 3.2 Employment

Direct employment in the U.S. bison industry, in 1997, was estimated to be 887 annual job equivalents based on survey respondents. IMPLANPro estimates that secondary employment that occurred as a result of the bison industry to be approximately 1,125 additional annual job equivalent (Table 4). Thus, total employment in the U.S. bison industry was approximately 2,011 annual job equivalents in 1997 and the employment multiplier was 2.268.

### 3.3 Personal Income

Survey respondents reported over $20,470,955 in direct personal income from bison production in 1997. IMPLANPro estimates secondary income of $28,188,505 was generated in associated activities (Table 4). Thus, total income in the U.S. bison industry in 1997 was approximately $48,659,460 and the income multiplier was 2.377. The average annual income for those directly employed in the U.S. bison industry in 1997 was reported by survey respondents to be approximately $23,081 (including production and other activities). IMPLANPro estimates that those engaged in employment secondary to the bison industry receive an even higher average annual income of $25,066 (Table 4). Average annual incomes in the U.S. bison industry in 1997 were likely higher than those in the rest of U.S. agriculture where average annual incomes per job were $15,157 (USDC, 1997).

### 3.4 Returns to Bison Producers

A typical budget for a bison production enterprise was developed using a livestock budget generating software package called

Lbudget, to provide information on the cost of producing bison (Lbudget, 1998). Four bison industry executives evaluated the generated enterprise budget results for accuracy. The created budget is intended as an average and is not representative of any particular producer. Based on further assumptions provided by the four industry executives regarding livestock, land, labor, equipment, and capital, the model calculated an average net profit of $297.39 per head of bison in 1997. This is a 15.5 percent return to risk, and management (Table 5).

## 4. Bison-Related Activities

There is a general impression that bison-related activities have become increasingly popular. However, little reliable data is available regarding the number of producers providing these activities, the number of customers purchasing these activities, or the types of bison-related activities that are being offered. The survey respondents were asked what bison-related activities they offer and to estimate the number of persons served from such activities. Thus, this section attempts to supply information on these related activities.

### 4.1 Bison Photography

Seventy-two respondents from the 1,095 census surveys received reported paid bison photography at their operations. A total of 3,875 people reportedly paid for bison photography in calendar year 1997. There was an extremely wide range of responses. The number of visitors ranged from one to 1500 with five and ten visitor days being the most common responses. Half of the respondents reported fewer than ten visitor days of photography.

### 4.2 Bison Viewing Activities

One hundred and twenty-one census survey respondents reported paid visits for the purpose of bison viewing, trail rides, and relat-

**Table 5: Distribution of Expenses for the National Bison Herd, 1997**

| **Operating Costs** | **Per Head** | | |
|---|---|---|---|
| Range land | $282.27 | 14.8% | $10,328,233 |
| Native hay | $172.22 | 9.0% | $6,301,514 |
| Protein cake 14% | $17.98 | 0.9% | $657,887 |
| Corn (whole - bulk) | $9.90 | 0.5% | $362,240 |
| Mineral | $8.80 | 0.5% | $321,991 |
| Salt | $1.91 | 0.1% | $69,887 |
| Freight/trucking | $29.89 | 1.6% | $1,093,672 |
| Advertising | $6.50 | 0.3% | $237,834 |
| Electricity | $3.50 | 0.2% | $128,065 |
| Veterinary Medicine | $3.01 | 0.2% | $110,136 |
| Machinery (fuel, lubrication, repair) | $50.42 | 2.6% | $1,844,863 |
| Vehicle (fuel, repair) | $39.73 | 2.1% | $1,453,717 |
| Equipment (repair) | $9.75 | 0.5% | $356,752 |
| Housing and improvements (repair) | $20.06 | 1.0% | $733,994 |
| Hired Labor | $174.72 | 9.1% | $6,392,989 |
| Owner Labor | $87.36 | 4.6% | $3,196,494 |
| Interest on operating capital | $36.33 | 1.9% | $1,329,311 |
| Total Operating Costs | $954.35 | | |
| **Ownership Costs** | | | |
| Capital Recovery | | | |
| Purchased livestock | $14.66 | 0.8% | $536,408 |
| Housing and improvements | $125.70 | 6.6% | $4,599,351 |
| Machinery | $61.44 | 3.2% | $2,248,084 |
| Equipment | $35.89 | 1.9% | $1,313,212 |
| Vehicles | $74.70 | 1.9% | $2,733,266 |
| Interest on retained livestock | $131.70 | 3.9% | $4,818,891 |
| Taxes and insurance | $16.66 | 0.9% | $609,588 |
| Overhead | $200.00 | 10.5% | $7,317,981 |
| Total Ownership Costs | $660.75 | | |
| Return to Risk and Management | $297.39 | 15.5% | $10,881,472 |
| Grand Total | $1,912.49 | 100.0% | $69,977,831 |

ed activities. A total of 343,653 visitors were reported. The number of visits ranged from one to 160,000. One-half of the respondents reported fewer than 30 visits. The most common response was ten visits. Clearly, there are many operations where bison viewing activities are a small part of their business, while other operations draw a large numbers of visitors for bison viewing. While bison photography is frequently available to visitors at no cost, structured viewing opportunities such as trail rides to areas where bison herds are found are seldom free of charge.

### 4.3 Bison-Related Meals

Fifty-eight census survey respondents reported visitors who purchased bison cookout and dinner experiences; 12,484 dinner guests were served. Half of the operations reported ten or fewer dinner patrons. The number of dinner guests reported ranged from one to 5000.

## 5. Bison By-Products

Many bison producers engage in the sale of bison by-products such as bison hides, robes, wool made from bison hair, and bison skulls. Because bison by-products represent an important market, the census survey also attempted to determine how many hides, skulls, and other bison by-products were sold by census survey respondents.

### 5.1 Bison Hides

Bison leather is used to produce both fashion and industrial products. Tanned hides with hair still on are often sold as buffalo robes or for decorative items (Alberta AFRD, 1999). One hundred and ninety-five census survey respondents reported sales of 6,787 bison hides. The vast majority of respondents reported sales of five or fewer hides, with results ranging from one to 1500. Bison hides and robes can be sold for approximately $800 to $1000 (Saskatchewan Agriculture and Food, 1999).

### 5.2 Bison Skulls

Bison skulls can be bleached and sold as decorator items (Alberta AFRD, 1999). Two hundred and six census survey respondents reported sales of bison skulls. The number of skulls sold ranged from one to three hundred with half of the respondents reporting sales of five or fewer skulls. Bison skulls are sold for prices ranging from $140.00 to over $300.00 depending on size (Saskatchewan Agriculture and Food, 1999).

### 5.3 Other Bison Byproducts

Other marketable bison byproducts include mounted heads, retailing for approximately $1295.00 to $2500.00 depending on size (Saskatchewan Agriculture and Food, 1999) as well as hornshells sold as decorator items, hair collected and processed into buffalo wool, and bones bleached and sold as decorator items (Alberta AFRD, 1999). Seventy-six census survey respondents reported direct sales of other bison byproducts. The number of other miscellaneous bison byproducts sold ranged from one to 2000 with over half of the census survey respondents reporting sales of six or fewer units.

### 5.4 Additional Revenue-Generating Activities from Bison Operations

Many census survey respondents reported some additional revenue generating bison-related activities in 1997. A wide variety of bison-related activities were reported. Some of the most common activities were:

Concessions/catering: Concessions and catering appears to be a common activity, which generates revenue on a seasonal or spot basis. At least twenty respondents reported sales of bison sandwiches, burgers, and other bison meat items at local festivals or fairs such as Wild West Days, Buffalo Days, Prairie Day, Frontier Days, and county fairs or catering to parties such as Ducks Unlimited banquets and church, scout, and other parties.

Unpaid visitors: In addition to the approximately 200 census survey respondents who reported revenue-generating visitors for bison viewing and photography activities, it is important to note that there also are many unpaid visitors who may gain an increased awareness and appreciation for bison. For example, one census survey respondent reported 50,000 unpaid visitors annually. Several others reported that schools bring students on educational field trips to bison operations. These activities may generate increased interest in the bison industry in the future.

Consulting: Ten census survey respondents provide research and consulting services. No other details were provided.

Hunts: Seven census survey respondents reported bison hunting revenue for 1997.

Some unique and interesting products and activities reported by census survey respondents included:

- Dog chews/hides
- Fully upholstered buffalo leather furniture
- Buffalo art (welding, etc.)
- Veterinary services including bison consultation and treatment
- Bison handling equipment (chutes, corrals, fencing, gates)

A few census survey respondents reported that no revenue was generated in 1997 because they were only recently beginning their operations. It would be expected that they would report additional bison-related activities in the future.

## 6. Summary

Prior to this census, estimates of the number of bison in the United States were little more than informed guesswork. Despite the lack of reliable data, the National Bison Association (NBA) and other organizations receive thousands of requests each year for information on the bison industry. Hence, without an accurate headcount, the NBA was unable to predict herd growth and therefore unable to take advantage of promotional opportunities when the herd reached milestones such as 100,000 head.

It can now be stated that there are over 107,000 privately owned bison in the United States. The value of bison production was estimated at approximately $70,000,000 in 1997. In addition, the industry supports approximately 885 annual job equivalents. Secondary output, employment, and personal income contribute to the economic impact of this industry. It is believed that this information will support the continued growth and success of the U.S. bison industry.

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