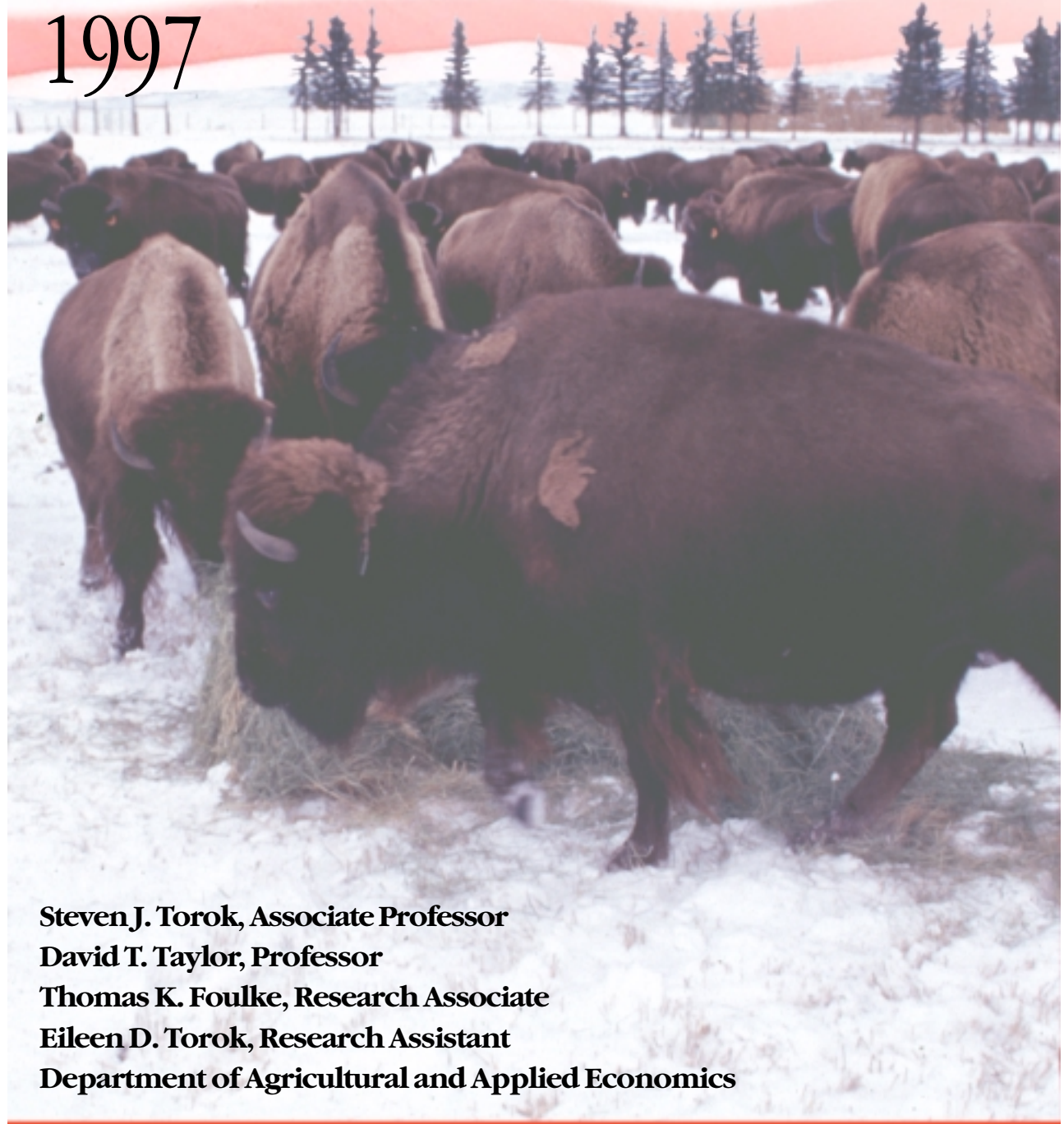


U.S. Bison Census and Value of Production, 1997



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Abstract

According to a census conducted by the University of Wyoming and the National Bison Association to which 1,095 individuals responded, 100,000 head of bison are currently in the United States. The value of the national bison inventory is almost \$232,000,000 and the value of production of the national bison herd is nearly \$75,000,000.

Bison is predominately used for meat, but other bison-related resources also are important. Bison production is a viable and profitable option for agricultural producers. The average direct annual income for a job in the bison industry is \$25,307, which greatly exceeds the average income for most agricultural jobs in the United States. Moreover, according to a model based on information from the surveys received, the average net profit per head of bison is almost \$300 per year.

Introduction

Forty to 60 million bison once roamed freely throughout North America (Saskatchewan Agriculture and Food, 1999). Extensive hunting in the late 1800s nearly caused bison to become extinct and only about 700 head remained at the turn of the twentieth century (Denver Buffalo Company, 1997).

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

Understanding the economic impact of the bison industry on the United States economy is

essential if the bison industry is to be considered when important production and marketing issues are discussed. Determining the employment and income multipliers that result from bison-related activities is critical to develop an accurate picture of the bison industry as a part of the agricultural sector. Therefore, obtaining a census of bison and an estimate of the value of bison production is an important undertaking.

Methodology

The National Bison Association and the University of Wyoming Department of Agricultural and Applied Economics conducted a census of the United States bison population. A survey was developed and distributed to every known bison producer in 1997 (see Appendix 1). The list of bison producers was developed from the National Bison Association membership, various state bison association contacts, knowledge of industry experts, and contacts with several state's Departments of Agriculture. To ensure as many surveys as possible were returned, a mailing by the president of the National Bison Association and follow-up letters were sent, and follow-up telephone calls were conducted. A total of 1,095 surveys was



included in the study data set and data analysis was performed on these survey results.

Survey data was analyzed using the social accounting and economic impact assessment software system, IMPLAN Pro™. This software package 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 (IMPLAN Pro™ User's Guide). IMPLAN Pro™ analysis was used to determine the secondary economic bison production impacts by calculating output, employment, and income multipliers, which are commonly calculated to show the total effects of an entity, including both direct and indirect returns.

A typical budget for a bison production enterprise was developed using the livestock budget generating software package, Lbudget. The budget provided inputs to the IMPLAN Pro™ model. Based on the assumptions made, regarding livestock, land, labor, equipment, and capital, the model calculated an average net profit of \$297.39 per head, a 15.5 percent return to risk and management (profit). For a detailed discussion of the Livestock Enterprise Budget used in this study, see: Thomas Foulke, Steven J. Torok, David Taylor and Edward Bradley, "Livestock Enterprise Budget," University of Wyoming Cooperative Extension Bulletin, forthcoming. Assumptions used in the model were based on consensus of four industry experts who evaluated the Bison Enterprise Budget.

Table 1. Bison Inventory and Sales for Calendar Year 1997.

Age group	Beginning inventory January 1, 1997	Number born	Number of deaths	Number of head purchased	Number of head sold	Ending inventory December 31, 1997
Cows 10 years and older	8,800	2,647	194	573	1,266	9,107
Cows 3-9 years	27,939		267	1,957	1,211	34,239
2-year-old heifers	7,705		85	744	605	8,194
Yearling heifers	8,821		112	1,641	2,448	11,219
Heifer calves		11,579	376	3,566	5,758	16,045
Trophy bulls	313		14	22	300	543
Bulls over 2 years	3,975		72	200	411	4,070
2-year-old bulls	4,122		113	605	5,490	4,709
Yearling bulls	8,035		179	4,151	5,824	7,577
Bull calves		11,931	285	4,352	4,676	11,563
					Total:	107,266



Table 2. National Bison Inventory, December 31, 1997.

Age group	Number of head	Market value per head (\$)	Value of inventory (\$)
Cows 10 years and older	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
Yearling 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
Totals:	107,626		\$231,375,342

U.S. Bison Census and Value

As of December 31, 1997, more than 100,000 bison were counted in the United States. Table 1 shows bison distribution among different age and gender categories. A total of 107,266 bison was counted from among the bison owners who returned surveys. The largest category was cows between two and ten years old, which constituted approximately one-third of the total bison inventory. The value of the national bison inventory in 1997 was estimated at \$231,375,342 based on the average market values for the age categories as reported by survey respondents. Table 2 summarizes this data.

Value of Production, National Bison Herd, 1997

Bison production was based on changes in inventory for the 1997 herd. Production, for the purpose of this survey, indicates either the birth of heifer and bull calves or a change in market value when a heifer, cow, or calf changed age categories. For example, while bull calves received an average market price of \$946, yearling bulls sold for an average of \$1,357. The production value of the national bison herd also was calculated from the inventory changes of the various age categories, as reported by survey respondents. For 1997, the production value of the national bison herd was \$74,999,199 (see Table 3).



Table 3. Value of Production of the National Bison Herd, 1997.

Age group	Beginning inventory	Ending inventory	Change in inventory	Market price (\$)	Value of production (\$)
Cows 10 years and older	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	16,871	16,871	946	15,959,966
				Total:	\$74,999,199

Economic Data of the National Bison Herd, 1997

The economic importance of the national bison herd is described in this section. Multiplier calculations show both direct and secondary effects. For example, the income multiplier shows both the income earned by bison producers and the income earned by those whose economic activities are related in whole or in part to the bison industry. Secondary economic activities include supply sales, wages and salaries of workers in supply businesses, and spending of those wages and salaries in retail and other economic sectors. Multipliers were calculated for industry output, employment, and income. Data related to the economic importance of the national bison herds are summarized in Table 4. Data related to investments and returns in bison herds are summarized in Table 5.

U.S. Bison Inventory

Surveys received from 1,095 U.S. bison producers indicated that they owned 107,266 head of bison, with an average value of \$2,157 per head. The total value of the U.S. bison inventory was \$231,375,342.

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 that occurred as a result of the bison industry. Direct output, such as the birth of calves or an increase in weight and animal market value, totaled \$74,999,199 in 1997. Secondary output of \$92,785,094 also was generated by activities, which supplied, supported, and resulted from the bison industry, for a total industry output of \$167,784,292. Because the total output of the U.S. bison industry was 2.237 times more than the direct output, the "output multiplier" was 2.237 in 1997.



Table 4. Economic Importance of the National Bison Herd, 1997.

U.S. bison inventory	Number of producers	1095
	Number of head	107,266
	Value of inventory	\$231,375,342
	Average value per head	\$2,157
Industry output	Direct output	\$74,999,199
	Secondary output	\$92,785,094
	Total industry output	\$167,784,292
	Output multiplier	2.237
Employment (annual job equivalents)	Direct employment	867
	Secondary employment	1,099
	Total employment	1,966
	Employment multiplier	2.267
Personal income	Direct personal income	\$21,939,880
	Secondary personal income	\$30,218,422
	Total personal income	\$52,158,302
	Income multiplier	2.377
Average income per job	Direct income per job	\$25,306
	Secondary income per job	\$27,499
	Total income per job	\$26,532
	Average income per job in U.S. Agriculture	\$15,157



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

	Type of costs	Per head (\$)	% of total	Total herd (\$)
Operating costs	Range land	282.27	14.8	11,069,351
	Native hay	172.22	9.0	6,753,689
	Protein cake -14%	17.98	0.9	705,094
	Corn (whole-bulk)	9.90	0.5	388,233
	Mineral	8.80	0.5	345,096
	Salt	1.91	0.1	74,902
	Freight/trucking	29.89	1.6	1,172,150
	Advertising	6.50	0.3	254,901
	Electricity	3.50	0.2	137,254
	Veterinary medicine	3.01	0.2	118,039
	Machinery (fuel, lubrication, repair)	50.42	2.6	1,977,244
	Vehicle (fuel, repair)	39.73	2.1	1,558,031
	Equipment (repair)	9.75	0.5	382,351
	Housing and improvements (repair)	20.06	1.0	786,662
	Hired labor	174.72	9.1	6,851,727
	Owner labor	87.36	4.6	3,425,864
	Interest on capital	36.33	1.9	1,424,698
		Total	\$954.35	49.9%
Ownership costs	Capital recovery			
	Purchased livestock	14.66	0.8	574,899
	Housing and improvements	125.70	6.6	4,929,385
	Machinery	61.44	3.2	2,409,399
	Equipment	35.89	1.9	1,407,443
	Vehicles	74.70	3.9	2,929,396
	Interest on retained livestock	131.70	6.9	5,164,678
	Taxes and insurance	16.66	0.9	653,330
	Overhead	200.00	10.5	7,843,094
		Total	\$660.75	29.7%
	Return to risk and management	\$297.39	15.5%	\$11,662,289
Grand Total		\$1,912.49	100%	\$74,999,199
	Direct employment (jobs)			866.9
	Direct hired labor			\$6,851,727
	Direct owner labor			\$3,425,864
	Direct owner earnings			\$11,662,289
	Total Earnings			\$21,939,880
	AEPJ			\$25,308



Employment and Employment Multiplier

Direct employment in the U.S. bison industry in 1997 was 867 annual job equivalents. Secondary employment that occurred because of the bison industry generated 1,099 annual job equivalents. Total employment in the U.S. bison industry was 1,966 annual job equivalents, and the employment multiplier was 2.267.

Personal Income and Income Multiplier and Average Income Per Job

In 1997, direct income to the U.S. bison industry totaled \$21,939,880. The secondary income was \$30,218,422. Total income in the U.S. bison industry was \$52,158,302 and the employment multiplier was 2.377 in 1997. The average annual income for individuals directly employed by the U.S. bison industry was \$25,307 in 1997. People engaged in secondary employment received an even higher average annual income of \$27,499. Average annual incomes in the U.S. bison industry were significantly higher than incomes reported by other agriculturists, where average annual incomes per job were only \$15,157 (U.S. Department of Commerce, 1997).

Bison-Related Activities

Although people are becoming more interested in bison, little reliable data is available regarding the number of producers providing entertainment-related activities, the number of customers purchasing these activities, or the types of bison-related activities offered.

Bison Photography

According to 1,095 surveys received, 72 operators offered bison photography for a fee, and a total of 3,875 people paid for bison photography in calendar year 1997. Responses were wide ranging. Half of respondents reported fewer than 10 photography visitor days, and the number of visitor days ranged from 1 to 1,500 with 5 and 10 visitor days being the most common responses.

Paid bison photography typically was sold to professional photographers and documentary filmmakers. Bison ranch visitors and tourists who took snapshots of bison at no cost undoubtedly enjoyed much more bison photography.

Bison Viewing Activities

One hundred twenty-one bison producers offered paid visits for bison viewing, trail rides, and related activities. A total of 343,653 visitor days or visitors was reported. The number of visits ranged from 1 to 160,000, and half the respondents reported less than 30 visits. The most common response was 10 visits. Clearly, more bison operators make bison viewing activities a small part of their businesses, while other producers draw large numbers of visitors for bison viewing. While bison photography frequently is available to visitors at no cost, structured viewing opportunities, such as trail rides, are seldom free of charge.

Bison-Related Meals

Fifty-eight of 1,095 respondents reported visitors who purchased bison cookout and dinner experiences. In total, 12,484 dinner guests were served. Half the operations reported ten or fewer dinner patrons. The number of dinner guests reported ranged from 1 to 5,000.

Bison By-products

Many bison producers sell bison by-products such as bison hides, robes, wool made from bison hair, and bison skulls. While the market for western-themed bison products is important, the primary value of a bison carcass is the meat. Because bison by-products represent an important market, the researchers also tried to determine how many hides, skulls, and other bison by-products survey respondents sold.



Bison Hides

Bison leather is used to produce both fashion and industrial products. Tanned hides with hair on are sold as decorator items (Alberta Agriculture, 1999). Of the 1,095 surveys received, 195 respondents reported selling 6,787 bison hides. With a range from 1 to 1,500, the vast majority of respondents reported selling five or fewer hides. Bison hides and robes can be sold for approximately \$800 to \$1,000 (Art by Pierce, 1999; Hides and Mounts, 1997; Diamond M Buffalo Products, 1999; Western General Store, 1999).

Bison Skulls

Bison skulls can be bleached and sold as decorator items (Alberta Agriculture, 1999). Of the 1,095 surveys received, 206 respondents reported selling bison skulls. The number of skulls sold ranged from 1 to 300, and half of the respondents reported selling five or fewer skulls. Bison skull prices range from \$140 to more than \$300, depending on size (Art by Pierce, 1999; Hides and Mounts, 1997; Diamond M Buffalo Products, 1999; Western General Store, 1999).

Other Bison By-products

Other marketable bison by-products include mounted heads, retailing for approximately \$1,295 to \$2,500, depending on size (Hides and Mounts, 1997; Western General Store, 1999), as well as hornshells, hair processed into buffalo wool, and bleached bones (Alberta Agriculture, 1999). Of the 1,095 surveys received, 76 respondents reported direct sales of these bison by-products. The number of other miscellaneous bison by-products sold ranged from 1 to 2,000, and more than half of respondents reported selling of six or fewer units.

Additional Revenue Generating Activities from Bison Operations

Many survey respondents reported additional revenue generating bison-related activities in 1997. Most common activities are listed below.

- Concessions and/or catering: Concessions and catering are common activities that generate revenue on a seasonal or spot basis. At least 20 respondents reported selling 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. Bison producers also reported catering to parties for groups such as Ducks Unlimited, church memberships, scouts, and others.
- Unpaid visitors: In addition to the 200 respondents who reported revenue generating visitors for bison viewing and photography activities, unpaid visitors may gain an increased awareness and appreciation for bison, which is important to the industry. For example, one respondent reported 50,000 unpaid visitors, annually. Several others reported that schools bring students on educational field trips.
- Consulting: Ten respondents said they provide research and consulting services. No other details were provided.
- Hunts: Seven respondents reported bison hunting revenue for 1997.

Unique and interesting products and activities reported by 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 respondents reported that no revenue was generated in 1997 because they were beginning their operations. They should report additional bison-related activities in the future.



Summary

Before this census was conducted, 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 received thousands of requests each year for information. Without an accurate headcount, the NBA was unable to predict herd growth and, therefore, was unable to take advantage of promotional opportunities when the herd reached milestones such as 100,000 head.

Because U.S. bison owners reported 107,000 head, it can now be stated that more than 100,000 bison are privately owned in the United States. This information will support the continued growth and success of the U.S. bison industry.



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Appendix 1: Survey Form

Name _____ Date _____
 Address _____ Telephone Number _____

**NATIONAL BISON ASSOCIATION
 UNIVERSITY OF WYOMING**

BISON INVENTORY AND SALES FOR CALENDAR YEAR 1997

Description	Beginning inventory Jan. 1, 1997	Number born	Number death loss	Number of head purchased	Number of head sold	Average weight of bison sold	% of bison grain-fed	Average price received for your bison	Ending inventory Dec. 31, 1997
A. Cows and Heifers									
Mature greater than 10 years old									
Mature greater than 2 years old but less than 10 years old									
2 years old									
Yearling heifers									
Heifer calves									
B. Bulls									
Trophy hunting									
Mature greater than 2 years old									
2 years old									
Yearling bulls									
Bull calves									
C. What is the average age you replace your breeding cows? Breeding bulls?									

Number of visitor days or number of people who pay you for other bison related activities:

- (a) Bison photography _____
- (b) Bison viewing, trail rides, etc. _____
- (c) Bison cookouts, dinners, etc. _____

Number of bison byproducts you sell directly:

- (a) Bison hides _____
- (b) Bison skulls _____
- (c) Other bison byproducts _____

Please report any activities from your bison operations that generate revenue (include description and amount of customers):

I did not own any bison in 1997

Thank you for your cooperation. All data are CONFIDENTIAL.

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