



# Overview Section: Production

*From Cows to Corn, Agricultural Production in the Rockies*

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### Key Findings:

- Cattle and calves are the highest grossing product in the Rockies region, bringing in \$8.5 billion in 2007.
- Dairy is the top product in three Rockies states, who together comprise 12 percent of the nation's dairy production.
- Arizona produces 20 percent of the nation's lettuce, New Mexico produces 22 percent of the nation's pecans.
- Idaho is also the only Rockies state in the top 50 percent (ranked 23<sup>rd</sup>) of agricultural exporting states in the U.S.

### Introduction

The eight-state Rockies region has long been viewed as a frontier. Old photos and countless movies show settlers, ranchers, and cowboys dealing with the mountainous region and hardships, including conflicts with American Indians, cattle rustling, and crippling droughts. This sensationalized view of the Rockies' history has a true foundation in the early days of cattle production, but what is the Rockies' current role in U.S. agricultural production? Today, is the Rockies region producing more than beef? This versatile region is capable of producing a great number of livestock and crop products, some of which are traditional to the region and others that might surprise Rockies' urbanites.

Given the wide-open spaces and rural areas that remain nationwide, the significance of agriculture, as shown in Figure 1, is surprising. Agriculture accounted for only one percent of the U.S. gross domestic product (GDP) in 2008, a dramatic drop from four percent in 1975.<sup>1</sup> Comparatively, industrial activity accounted for almost 20 percent, while the services sector accounted for some four-fifths of GDP.<sup>2</sup> When considered in purely economic terms, this very small agricultural percentage vastly understates the importance of agriculture to the United States.

Although agriculture has a comparatively small economic footprint, it has a large land footprint. Today, 40 percent of private land in the United States is

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used for agriculture. While 24 percent of that land is in the Rockies,<sup>3</sup> the region produces only eight percent of the total agricultural commodities in the United States.<sup>4</sup> This implies that agricultural land in the Rockies might be less productive compared with that in other regions, possibly due to the arid climate, high elevations, and water limitations. Still, 66 of 281 counties in the Rockies are categorized by the USDA as agriculturally dependent, as shown in Figure 2.<sup>5</sup>

The map of the Rockies in Figure 3, with counties identified by the most important economic sector (called sector dependency), depicts a fascinating patchwork of varying economic dependency. Many counties that are not categorized as agriculturally dependent also have large agricultural production. For example, although not agriculturally dependent, Weld County in Colorado is the only county outside of California ranked in the top ten agricultural producing counties in the United States. In 2007, Weld produced \$1.54 billion of agricultural products, of which the vast majority came from livestock.<sup>6</sup> Like Weld, many counties in the Rockies have large product receipts from their agriculture, but other sectors, like services or mining, are more important to the local economy

As food markets globalize, production becomes more specialized and less regionally diverse. The discussion below provides an overview of food production nationwide and in the Rockies region. To analyze the different statistics for various agricultural products, all comparisons of products in the Rockies are made in terms of dollar value.

When compared in dollar value, the Rockies region is just as reliant on dairy production as it is on beef, despite commonly held notions. Half of the Rockies states have dairy as their top product; Idaho is equally a dairy and potato hub. The largest export in all Rockies states (except New Mexico) is a crop or grain, not a livestock product. This is slightly different from the average view of agriculture in the Rockies, but fairly accurate when compared with the United States as a whole.

**The United States**

Many agricultural products are important to the U.S. economy; Figure 4 identifies crops where U.S. production is

ranked at the top of global use. However, U.S. cattle products rank high among the top 20 products in global sales, depicted in Figure 5. Globally, the United States is the number one beef and milk producer (in dollar value). Out of the top five global agricultural products, the United States is the number one producer of three: cow milk, beef, and chicken meat.<sup>7</sup>

Agricultural production in the United States is globally important, even though it only accounts for a small percentage of the national GDP. Although the U.S. imports large quantities of food, mostly due to the large demand for food diversity, the nation is a net food exporter, leading the world in overall food exports. From September 2008 to September 2009, the United States exported \$9.1 billion of food and imported \$7.6 billion worth.<sup>8</sup> The top U.S. exports differ from the top five commodities produced, as shown in Table 1. While livestock products dominate the top five commodities produced, grains and crops dominate the top five exports, reflecting the importance of domestic vs. international markets and the associated trade barriers such as tariffs, transportation, and health-related restrictions. This pattern is also apparent in the Rockies region.

**Historical Agricultural Production in the Rockies**

By comparing data for the Rockies region in 1910, 1950, and 2007, we can assess how agricultural production has changed over time. In 1910 corn ranked first in national

Figure 1: Composition of Gross Domestic Product, United States, 2008  
Source: CIA World Factbook, 2009

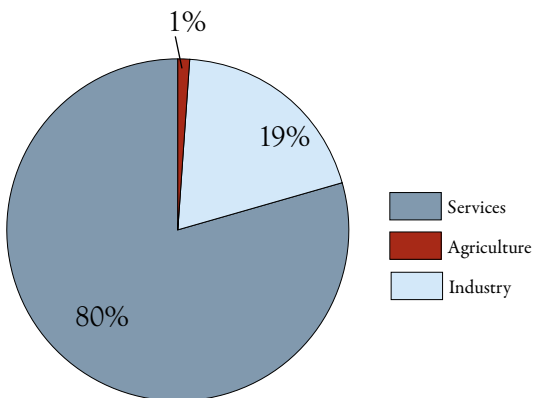
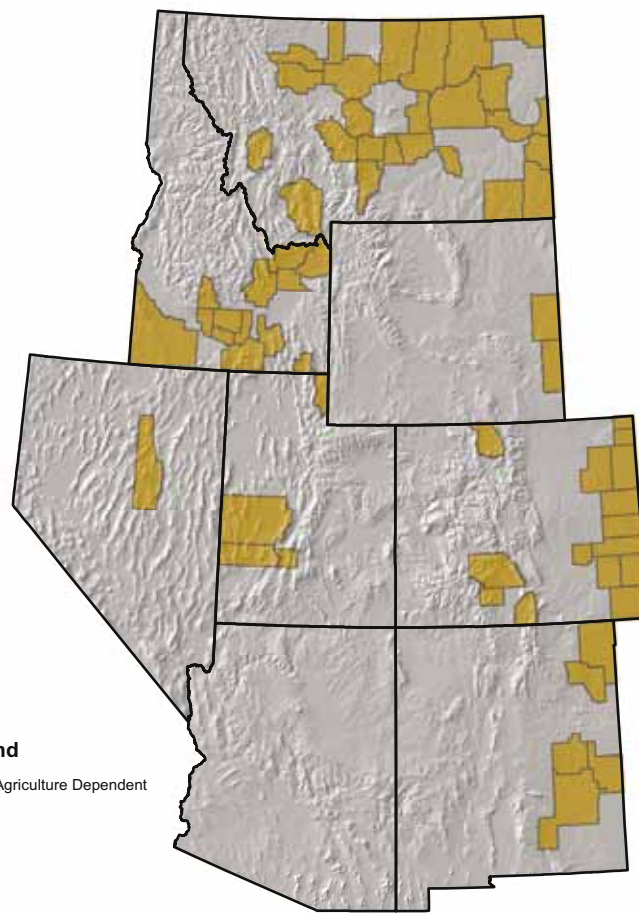


Figure 2: Agriculture Dependent Counties in the Rockies, 2004



Source: Economic Research Service, U.S. Department of Agriculture, 2004

production, but did not even make the top ten in the Rockies (see Table 2), where hay dominated.<sup>9</sup> Much of the Rockies region has historically been devoted to grazing cattle because dry conditions and sparse prime farmland made row crop production difficult. Often, the crops that were grown were feed for beef cattle such as hay, silage, and alfalfa. Cereals ranked second in the Rockies region in 1910, followed by cattle. Although hay was used for livestock production, it outranked livestock in value. Large stocks of forage crops such as hay were needed as additional feed for cattle, and sheep and swine, which were also prevalent in the Rockies region in the early 1900's.

With cheaper beef production, sheep and swine eventually lost their economic standing in the Rockies region. While some wool and sheep operations still exist in the Rockies, they have been dwarfed by other livestock operations. This trend is nationwide: today the United States does not even rank in the top 20 nations for wool production, but ranks number two in pork production, behind China.<sup>10</sup> Globally today, the production of these commodities is on a much smaller

Figure 4:

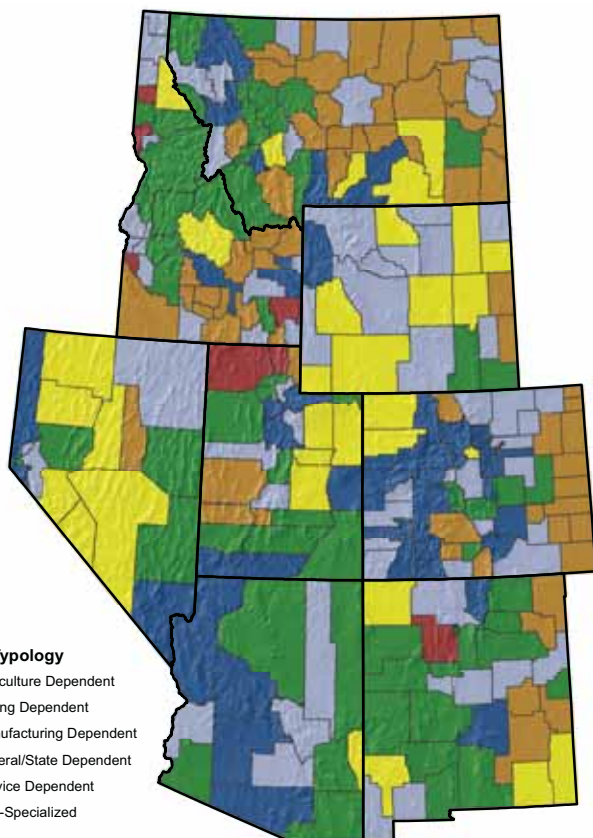
## Global Production Rank of the United States, by Value, 2007

Source: Food and Agriculture Organization of the United Nations

Notes: nes: not elsewhere specified or included; Indigenous meats include the meat equivalent of exported live animals and exclude the meat equivalent of imported live animals.



Figure 3: Economic Typology of the Rockies, 2004



Source: Economic Research Service, U.S. Department of Agriculture, 2004

scale than that of beef and cattle products. This national shift is reflected in the Rockies by the downward movement of wool, sheep, and swine in the top ten commodities of the region. In the Rockies, the beginning of the twentieth century was notable for its great diversity of agricultural products.

As shown in Table 2, by 1950 cattle had become the number one commodity in the Rockies and was followed upward by small grains and cotton. In 1910, cotton was not even in the Rockies' top ten products, but by 1950 it ranked third in value. Sheep and sheep products moved to number four, and dairy made a jump to number five (and remains important in the Rockies today – see *Dairy case study*, p. 81).<sup>11</sup>

From 1910 to 1950 vegetables and grain crops became increasingly important in the Rockies, as the development and expansion of irrigation systems made more land available to support the production of water-intensive crops. This rise in human food products also played an important role in feeding growing urban populations. The growth in cotton can also be attributed to the growing population and the growth of large-scale industries that demand cotton, such as the textile, paper, and food oil industries.

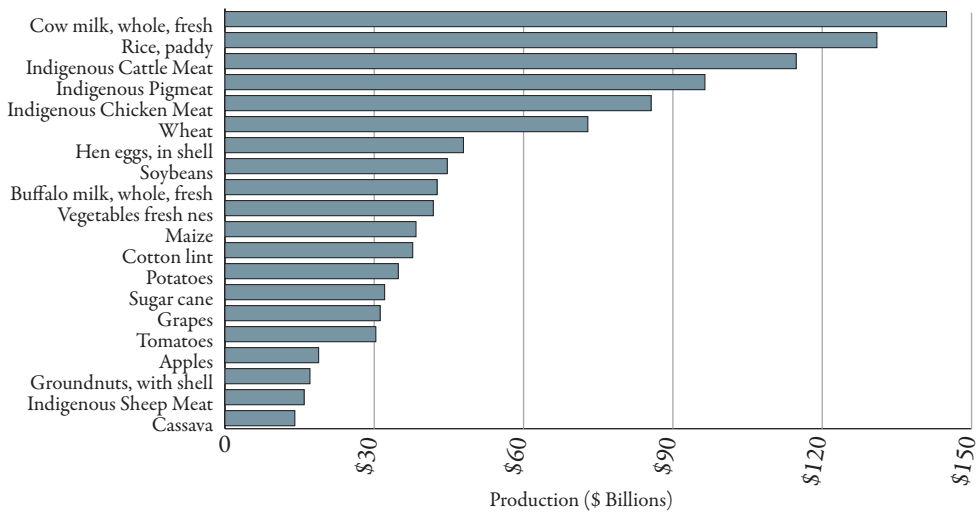
What are the top products of the Rockies now? Today, cattle production is still the most valuable commodity in the Rockies, with dairy a close second.<sup>12</sup> Over the decades, dairy developed from a very small regional product to a huge source of income. For several states in the Rockies, dairy is the

Figure 5:

Top 20 Products, Global Production (Int. \$ Billions), 2007

Source: Food and Agriculture Organization of the United Nations, 2009

Note: Indigenous meats include the meat equivalent of exported live animals and exclude the meat equivalent of imported live animals.



diversification of the region. While the U.S. recovers from the current economic crisis more slowly than some other countries, the percentage of major products produced in the Rockies that are bound for the export market could increase as demand grows in areas with high economic growth such as Asia but could decrease in the domestic market. The declining U.S. dollar will also make Rockies products cheaper for other countries to purchase, thus stimulating exports. The USDA's projections for the next nine years indicate a slow increase in U.S. wheat exports with increasing population and food use of wheat but decreasing feed use of wheat.<sup>14</sup> This is consistent with the forecasted drop in beef demand.

Table 1:

Top 5 Agricultural Exports, United States, Estimated, FY 2008

Product	Value (Millions of Dollars)
Soybeans and Products	\$19,332
Feed Grains and Products	\$18,148
Wheat and Products	\$14,836
Other	\$12,681
Live Animals and Meat	\$9,455

Source: USDA, Economic Research Service, 2009

With a drop in demand, meat production is forecasted to decline through 2011.<sup>15</sup> Domestic per capita consumption is predicted to decline as well, but the export sector may be boosted as Asian markets increase their demand for beef products. The overall livestock production in the next two years is forecasted to decline due to higher feed prices. Higher feed prices will result in cattle remaining on pasture and rangeland for longer time before going to feedlots, which might be easier in the Rockies due to the large amount of land available for grazing.<sup>16</sup> (This could also have negative impacts due to overgrazing.) Longer time on pasture will also increase the weight of cattle going to slaughter, bringing a higher price per head. However, the additional resources needed to raise the cattle could erode any extra profits for ranchers<sup>17</sup>.

number one agricultural product. Today, cattle and their input products are closely followed by crop production for human consumption, with vegetables ranking in the top five products.<sup>13</sup> Many of these crops, specifically grains, make up large shares of exports from the region. Over time, production has consolidated to several large-scale commodities seen in the Rockies region today. The strong hold by cow products may have unfavorable economic health implications for the Rockies. As the beef and dairy markets fluctuate, so too will the economic well-being of those involved in Rockies agriculture.

*Future*

What can the Rockies region expect for the future? In recent years, crop prices have reached historically high levels due to high oil prices, increased demand, and new uses. For the Rockies region of the future, prices of important export and domestic products such as wheat, beef, milk, and cotton will likely influence the rural economic health and product

Since the Rockies region has a largely livestock-based production base, the economic health of agriculture in the Rockies depends greatly on the prices and demand for livestock as well as the international demand for grains which currently lead the Rockies exports. The recent plunge of global milk demand has led to financial problems for U.S. dairy farmers,<sup>18</sup>

Table 2:

Top 10 Agricultural Products for Selected Years, Rockies Region

Rank	1910	1950	2007
1	Hay and Forage	Cattle and Calves	Cattle and Calves
2	Cereals	Small Grains	Dairy Products
3	Cattle and Calves	Cotton Harvested	Grains, Oilseeds
4	Sheep and Lambs	Sheep and Lambs	Vegetables
5	Wool Shorn	Dairy Products	Other crops and Hay
6	Other Grains	Irish Potatoes	Wheat
7	Swine	Poultry and Products	Greenhouse/Nursery Products
8	Dairy Products	Vegetables	Corn
9	Sugar Beets	Sugar Beets	Hogs and Pigs
10	Berries/Fruits/Nuts	Legumes	Poultry and Eggs

Source: USDA Census of Agriculture, 1910, 1950, and 2007

Note: "Other Grains" in 1910 column includes dry edible beans, peanuts, and sorghum.

and many dairies in the Rockies could go out of business. As the recession lifts and disposable incomes again increase, so too should beef demand; however, the overall percentage of income spent on meat products will continue to decline in the future.<sup>19</sup>

The shifts in consumer spending affect each state differently due to the unique basket of goods each state

produces. Though many Rockies states produce similar products, the receipts for each product can vary greatly. Furthermore, certain states are well known for specialty products that have little importance in the other Rockies states, as described in the next section.

### State by State Agriculture in the Rockies

While national and Rockies regional agriculture illuminate much about the importance of agriculture, as discussed above, each of the eight states in the Rockies has its own particular agricultural character. The sections below summarize how agriculture varies throughout the region (See Tables 3 and 4).

#### Arizona

Arizona, unlike most of the other Rockies states, obtains over half of its agricultural receipts from vegetables and crops rather than livestock. Many parts of the state have a full-year growing season, allowing for increased production and yields.<sup>20</sup> In recent years, dairy has become more prevalent, now accounting for 23 percent of Arizona's agricultural value. This new market is influencing the types of crops produced; fields that were traditionally cotton are being converted to alfalfa and forage crops.<sup>21</sup> Although crops make up a greater percentage of production in Arizona, beef cattle still account for 18 percent of Arizona's production value.

#### Idaho

Idaho, the potato state, does indeed produce the most potatoes in the U.S. However, potatoes are not the state's most valuable agricultural product.<sup>22</sup> Dairy takes top place (accounting for 36 percent of Idaho's production value), and Idaho ranks fourth in the country for milk production.<sup>23</sup> Livestock products (dairy as well as cattle and calves) account for 55 percent of Idaho's production.<sup>24</sup> Although Idaho ranks third nationally for vegetable production, all vegetables and potatoes combined only account for 14 percent of Idaho's production.<sup>25</sup> Idaho is also the only Rockies state to be in the top 50 percent (ranked 23<sup>rd</sup>) of agricultural exporting states in the U.S. The greater diversification of major products and exports compared to other Rockies states helps insulate Idaho from downturns in any one of the major commodity markets.

#### Utah and Nevada

Utah's production is based on livestock: dairy is the number one product, followed by cattle, and then hogs. Utah does not rank highly nationwide among dairy-producing states, but dairy products make up 21 percent of Utah's agricultural production.<sup>26</sup> Utah is also one of two Rockies states to have sizeable hog production. Although three of Utah's top five commodities are livestock, its number one export is wheat products,<sup>27</sup> following the general trend of domestic livestock consumption and grain exports.

As in other parts of the West, cattle are important to Nevada, providing 39 percent of Nevada's farm receipts.<sup>28</sup> Overall Nevada ranks 47<sup>th</sup> in the U.S. for agricultural production and is the least productive Rockies state. The low production reflects the limited availability of private land, water for

**Table 3:**  
**Top 5 Agricultural Products by State, 2007**

State	Product	Percent of State Farm Receipts	Percent of U.S. Value
Arizona	Dairy products	23%	2%
	Cattle and calves	20%	1%
	Lettuce	16%	20%
	Hay	6%	3%
	Cotton	5%	3%
Colorado	Cattle and calves	51%	6%
	Dairy products	8%	2%
	Wheat	7%	4%
	Corn	6%	1%
	Hay	6%	6%
Idaho	Dairy products	36%	6%
	Cattle and calves	19%	2%
	Potatoes	13%	24%
	Hay	8%	7%
	Wheat	8%	4%
Montana	Cattle and calves	41%	2%
	Wheat	34%	8%
	Barley	4%	16%
	Hay	4%	2%
	Dairy products	3%	<1%
Nevada	Cattle and calves	39%	<1%
	Hay	26%	2%
	Dairy products	19%	<1%
	Onions	6%	3%
	Potatoes	3%	1%
New Mexico	Dairy products	44%	4%
	Cattle and calves	31%	2%
	Hay	6%	3%
	Pecans	3%	22%
	Onions	2%	5%
Utah	Dairy products	24%	1%
	Cattle and calves	21%	1%
	Hay	15%	3%
	Hogs	11%	1%
	Greenhouse/nursery	5%	<1%
Wyoming	Cattle and calves	70%	2%
	Hay	6%	1%
	Hogs	4%	<1%
	Sheep and lambs	4%	8%
	Sugar beets	3%	2%

Source: USDA Census of Agriculture, 2007

agriculture, and exceptionally limited prime farmland compared to other states. Surprisingly, Nevada ranks tenth among seed producers in the United States. It exports a very small dollar value of animal products and livestock, relying rather on crops for its agricultural income.

**Table 4: Top 5 International Agricultural Exports by State, 2007**

State	Product	Value (millions)	Rank among States
Arizona	Cotton and linters	\$114	10
	Vegetables and preparations	\$93	10
	Wheat and products	\$47	32
	Fruits and preparations	\$47	8
	Other	\$44	27
Colorado	Wheat and products	\$337	8
	Live animals and meat	\$193	12
	Feed grains and products	\$146	15
	Hides and skins	\$134	5
	Other	\$83	21
Idaho	Vegetables and preparations	\$362	3
	Wheat and products	\$268	12
	Other	\$171	15
	Dairy products	\$147	4
	Feeds and fodders	\$88	8
Montana	Wheat and products	\$526	4
	Feeds and fodders	\$60	14
	Vegetables and preparations	\$54	14
	Feed grains and products	\$38	27
	Seeds	\$17	13
Nevada	Seeds	\$19	10
	Vegetables and preparations	\$13	25
	Wheat and products	\$4	43
	Feeds and fodders	\$3	41
	Live animals and meat	\$2	41
New Mexico	Dairy products	\$112	6
	Tree Nuts	\$38	4
	Wheat and products	\$35	35
	Cotton and linters	\$22	16
	Vegetables and preparations	\$18	21
Utah	Wheat and products	\$116	21
	Hides and skins	\$81	7
	Live animals and meat	\$52	22
	Dairy products	\$25	12
	Other	\$24	32
Wyoming	Feeds and fodders	\$14	34
	Feed grains and products	\$11	35
	Wheat and products	\$11	42
	Live animals and meat	\$9	35
	Seeds	\$7	30

Source: USDA, Economic Research Service, 2007

### Montana

Although cattle accounts for 41 percent of Montana's farm receipts, no livestock product is in its top five exports (which instead include feed grains and fodders for livestock).<sup>29</sup> Montana produces 16 percent of the barley and eight percent of the wheat in the U.S., compared to only two percent of the cattle.<sup>30</sup>

### Colorado and Wyoming

Ranching and beef production continue to play important roles in Colorado and Wyoming agriculture. With over 50 percent of farm receipts coming from cattle, no other agricultural product matches cattle's economic importance. In Colorado, dairy products are the second most important, providing eight percent of Colorado's farm receipts. Wyoming is even more reliant on livestock, with almost 70 percent of farm receipts coming from cattle. Colorado's largest export is wheat, and the state ranks eighth in wheat production and twelfth in animal and meat production in the U.S.<sup>31</sup> Due to the lack of agricultural market diversity in Colorado and Wyoming, the volatility in the beef market determines the stability of their industry. Wyoming, in addition to beef, produces eight percent of the sheep and lambs in the country, but this high percentage of production only accounts for a very small percentage of Wyoming's farm receipts.

### New Mexico

New Mexico is very dependent on the dairy industry, which provides almost half of the state's farm receipts (New Mexico ranks sixth nationwide in dairy production). The projected average milk price for 2009 was approximately \$12 per hundred weight compared with \$18 in 2008.<sup>32</sup> As global dairy demand and prices plummet, the dairy industry of New Mexico will suffer along with those of other large dairy states.

Although chile peppers only account for a very small portion of New Mexico's agricultural value, the state is world famous for Hatch chiles. Small value-added projects, such as the promotion of Hatch chiles as a sought-after brand, have helped independent sectors of agriculture command higher prices and generate larger profits. New Mexico ranks high among the U.S. states in exports of dairy products and tree nuts (mainly pecans). As seen in Table 4, New Mexico does not have large cattle exports; vegetables, cotton, and wheat along with dairy and tree nuts represent the most important exports to the state.

### Agriculturally Dependent Counties

There are 66 counties in the Rockies region that qualify as agriculturally dependent, meaning that they rely on their agricultural income for 15 percent or more of their annual labor and proprietors' receipts (see Figure 2 and Figure 3). These counties are more heavily dependent on agriculture than other counties which rely on services, manufacturing, mining, or other industries for a large portion of their local economy. Often these counties are quite rural, located away from major cities and large populations. Agriculturally dependent counties are not the only important counties for agriculture in

the region, however. Weld County, Colorado, for example has the highest production value in the Rockies, but is not agriculturally dependent (see Table 5).

Of the 66 agriculturally dependent counties in the Rockies, only nine have a fairly even split between value

from crops and value from livestock. The rest rely heavily on one or the other. Crowley County, Colorado, for example, gets 99 percent of its agricultural sales from livestock, while Sheridan County, Montana, gets 87 percent of its receipts from crop production. This huge segregation of production between the two categories leaves such counties vulnerable to market fluctuations for their respective commodities.

From the entire United States to specific counties in the Rockies, the massive array of agricultural production can be compiled into two large categories: livestock and crops. As global trends shift, so too has the array of production in the Rockies region. Still, since the early days as a frontier region, livestock has held a firm place in Rockies' production and has largely served domestic consumption. Livestock production involves the participation and skills of many different agricultural sectors. The close links and ties between these sectors subject the employees and industry to market and input price fluctuations. The cattle and bison case studies further explore the livestock industry in the Rockies, while the cotton section reports on a little known Rockies commodity.

**Table 5:  
Top Agricultural Sales, County by State, 2007**

State	Rank, County	Percent of State Total Receipts	Thousands of Dollars
Arizona	1. Yuma	30%	\$959,968
	2. Maricopa	25%	\$813,491
	3. Pinal	25%	\$799,811
	4. La Paz	4%	\$136,593
	5. Cochise	4%	\$117,130
Colorado	1. Weld	25%	\$1,539,072
	2. Yuma	12%	\$711,391
	3. Morgan	8%	\$493,863
	4. Logan	7%	\$442,107
	5. Kit Carson	6%	\$336,986
Idaho	1. Cassia	11%	\$626,721
	2. Gooding	11%	\$624,420
	3. Twin Falls	8%	\$471,860
	4. Jerome	8%	\$461,599
	5. Canyon	7%	\$420,928
Montana	1. Yellowstone	6%	\$164,647
	2. Chouteau	5%	\$147,243
	3. Richland	4%	\$106,957
	4. Fergus	4%	\$101,167
	5. Teton	4%	\$97,705
Nevada	1. Lyon	18%	\$91,108
	2. Humboldt	15%	\$74,355
	3. Churchill	13%	\$66,921
	4. Nye	11%	\$58,238
	5. Elko	10%	\$53,599
New Mexico	1. Dona Ana	18%	\$388,787
	2. Curry	16%	\$347,323
	3. Chaves	16%	\$339,088
	4. Roosevelt	12%	\$253,950
	5. Union	6%	\$136,971
Utah	1. Beaver	15%	\$210,636
	2. Utah	13%	\$181,729
	3. Box Elder	10%	\$141,243
	4. Millard	10%	\$137,805
	5. Cache	10%	\$136,064
Wyoming	1. Goshen	14%	\$157,512
	2. Laramie	11%	\$124,094
	3. Platte	8%	\$97,071
	4. Fremont	8%	\$86,701
	5. Park	7%	\$81,775

Source: USDA Census of Agriculture, 2007

Note: Sales represent the current market value of all agricultural products sold.

<sup>1</sup> CIA World Factbook. "Economy." <https://www.cia.gov/library/publications/the-world-factbook/geos/us.html> (accessed December 2, 2009); The World Bank. 2008. *2008 World Development Indicators Online*. Washington, DC: The World Bank. <http://go.worldbank.org/U0FSM7AQ40> (accessed December 2, 2009).

<sup>2</sup> CIA World Factbook.

<sup>3</sup> United States Department of Agriculture. *2007 Census of Agriculture*. Geographic Area Series. 2009.

<sup>4</sup> *Ibid.*

<sup>5</sup> Agriculture dependent counties are based on the USDA methodology. Farm earnings account either for 15 percent of total earnings or for 15 percent of all occupations in the county.

<sup>6</sup> United States Department of Agriculture. *2007 Census of Agriculture*.

<sup>7</sup> FAOSTAT (United Nations). "Food and Agriculture Commodities Production." <http://faostat.fao.org/site/339/default.aspx> (accessed December 2, 2009).

<sup>8</sup> U.S. Census Bureau. U.S International Trade in Goods and Services. [http://www.census.gov/foreign-trade/Press-Release/current\\_press\\_release/ftdpress.pdf](http://www.census.gov/foreign-trade/Press-Release/current_press_release/ftdpress.pdf) (accessed December 3, 2009).

<sup>9</sup> United States Department of Agriculture. *1910 Census of Agriculture*.

<sup>10</sup> FAOSTAT (United Nations). "Food and Agriculture Commodities Production." <http://faostat.fao.org/site/339/default.aspx> (accessed December 2, 2009).

<sup>11</sup> United States Department of Agriculture. *1950 Census of Agriculture*.

<sup>12</sup> United States Department of Agriculture. *2007 Census of Agriculture*.

<sup>13</sup> *Ibid.*

<sup>14</sup> United States Department of Agriculture. Agricultural Baseline Projections, "Baseline Presentation 2009-2018." <http://www.ers.usda.gov/briefing/Baseline/> (accessed December 2, 2009).

<sup>15</sup> *Ibid.*

<sup>16</sup> *Ibid.*

<sup>17</sup> *Ibid.*

<sup>18</sup> "Milking It," *The Economist*. July 11, 2009. Vol. 392, Issue 8639, p. 31-31.

<sup>19</sup> United States Department of Agriculture. Agricultural Baseline Projections, "Baseline Presentation 2009-2018."

<sup>20</sup> Post, John. Interview by author, Marana, Arizona. July 10, 2009.

<sup>21</sup> Cline, Harry. "Cotton No Longer King in West, but Agriculture Continues to Grow." *Western Farm Press*. 2007. [http://westernfarmpress.com/mag/farming\\_cotton\\_no\\_longer/](http://westernfarmpress.com/mag/farming_cotton_no_longer/) (accessed December 2, 2009).

<sup>22</sup> United States Department of Agriculture. *2007 Census of Agriculture*.

<sup>23</sup> *Ibid.*

<sup>24</sup> *Ibid.*

<sup>25</sup> *Ibid.*

<sup>26</sup> *Ibid.*

<sup>27</sup> *Ibid.*

<sup>28</sup> *Ibid.*

<sup>29</sup> *Ibid.*

<sup>30</sup> *Ibid.*

<sup>31</sup> *Ibid.*

<sup>32</sup> "Factbox: US Dairy Farms in Crisis as Milk Price Dives." July 31, 2009. <http://www.reuters.com/article/businessNews/idUSTRE56U64A20090731> (accessed December 2, 2009).

# Case Study: “More than Burgers and Milk - the Cattle Industry in the Rockies”

By Russell Clarke

## Introduction

The presence of the cattle industry is evident on any drive around the Rockies. Miles of fencing, large herds, and expansive hay fields are all part of the regional landscape. This domesticated animal has become the foundation of agriculture in the Rockies region. Whether cattle are used for beef production, dairy products, or breeding, they have large impacts on the environment, community, and economy. Classic ranching, an often romanticized and challenging profession, is just one part of the trip from pasture to plate. The entire process requires many inputs and is influenced by numerous factors such as feed prices, government regulation, and market conditions. The cattle industry is increasingly interconnected; driven up and down by myriad factors.

Analyzing farm receipts by state in Table 3, beef cattle and calves range from just under 20 percent to 70 percent of total farm sales in the Rockies. No state in the region has less than 19 percent agricultural income from cattle. Livestock plays a large economic role to the region. As shown in Table 3, the number one product by value in every Rockies state is either cattle and calves or dairy products. However, the ranchers and farmers who have spent their lives and effort building and maintaining their operations have not seen the end of tough times. The cattle industry has taken a hit, amplified by the economic recession. Today the dairy and beef industries are just as vulnerable as ever, leaving agriculture in the Rockies region fighting to protect itself from an uncertain future.

## Dairy

Although often considered a beef region, the Rockies produces a great deal of dairy products and contains 14 percent of the dairy cows in the United States.<sup>1</sup> The emergence of the dairy industry, producing what is now the region’s second most valuable commodity, is fairly recent, due to the availability of cheap labor, energy, and land. Idaho has a large dairy sector in part due to the cheap energy costs associated with its hydroelectric facilities, which lower costs by about one third compared to dairy costs in California, the nation’s largest dairy producer.<sup>2</sup> When asked why dairy was New Mexico’s number one commodity, Loren Horton of Las Uvas Dairy<sup>3</sup> responded, “About ten years ago the state asked the dairies from other states to come here, telling them they had lots of feed crops, land, and water resources. Now the water is a problem.”

Currently the U.S. dairy industry is struggling. By summer of 2009, more than 100,000 milk cows had been sent to slaughterhouses after historically low milk prices in the earlier part of the year.<sup>4</sup> The projected average milk price for 2009 was between \$11.85–12.15 per hundredweight compared with \$18.34 in 2008.<sup>5</sup> Dean Horton, who sent over nine percent of his cows to slaughter as a result of the low prices, said “In 60 years, we’ve never had a downturn like this.”<sup>6</sup> Many in the industry believe the spring culling of dairy cows did little to help the milk price. Another cull was announced on July 10, 2009, to further reduce the milk supply and boost prices.<sup>7</sup> The culls are a result of many dairy associations working together to implement price increasing strategies to mitigate the large imbalance between the milk supply and demand. Though the first round of culling did not achieve price goals, the second cull is expected to help.

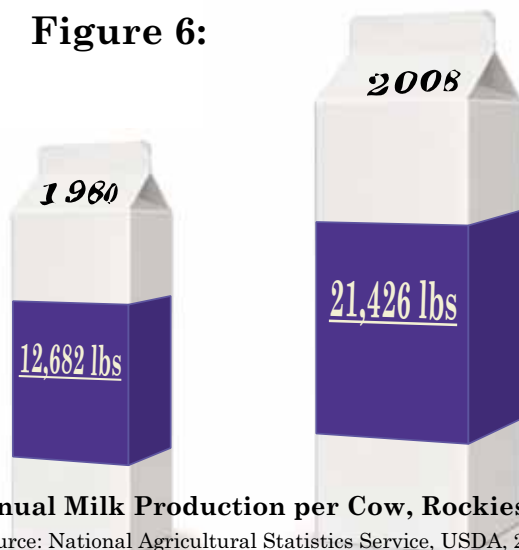
For a quantity of milk that costs \$15 to produce, Dean Horton is only getting \$9. This massive drop in farm receipts for milk has not been mirrored in store prices. Retail prices fell 13 percent between January and July 2009, while the price per hundredweight of milk has fallen nearly 50 percent during the same time period.<sup>8</sup>

From 2007 to 2008 there was a 16 percent increase in the global demand for U.S. dairy. Since 2008 sales have dropped by half.<sup>9</sup> At Las Uvas dairy, Dean Horton estimated they are currently losing \$50-60 thousand per day. When asked if Las Uvas can weather the low prices Loren Horton said, “I believe we will make it through this, but it’s going to be a lot tougher for many of the smaller dairies.”

The government has established several programs to help the dairy industry during this historic slump. The Milk Income Loss Contract (MILC) program compensates U.S. dairy farmers when the average milk price falls below a specific level. This program is part of the 2008 farm bill with an extension through 2012, and benefits dairies that produce both for the domestic and international market. Eligible dairies can apply for the monthly payments when milk prices fall below \$16.94 per hundredweight.

Eligible dairies must be in compliance with the Highly Erodible Land and Wetland conservation provisions and not make more than \$500,000 in off-farm income. By

**Figure 6:**



**Annual Milk Production per Cow, Rockies Region**

Source: National Agricultural Statistics Service, USDA, 2009.



using a baseline price of \$16.94, the MILC payments equal 45 percent of the difference between the current milk price and the baseline. The baseline price is adjusted monthly according to feed costs.

MILC payments are very expensive, with over \$1 billion spent in 2009 alone.<sup>10</sup> In addition to keeping farmers afloat, this minimum price system can influence overproduction, causing more milk to flood the domestic market and contributing to further price drops; the same price drops the culling was supposed to alleviate.

The organic milk market has added value to a struggling product. Aurora Dairy<sup>11</sup> produces organic milk for private labels. Their classification as a producer-handler (they operate their own state-of-the-art processing plant) excludes them from applying for MILC payments. One advantage they do have over conventional and other organic producers is the ability to ultra-pasteurize their milk, giving it a shelf life of over 60 days (well past conventional pasteurized dairy products). Sona Tuitele, vice president of public relations and communications at Aurora Dairy says, “90 percent of our clients choose ultra-pasteurization over conventional pasteurization.”<sup>12</sup> Even with the added value of organic milk and ultra-pasteurization, Aurora Dairy is still impacted by the conventional milk market. According to Sona Tuitele there has never before been a shortage of demand for organic milk.<sup>13</sup>

The Dairy Export Incentive Program (DEIP) aims to help U.S. dairy exporters gain access to overseas markets. Tom Vilsack, Secretary of the U.S. Department of Agriculture, re-authorized the DEIP in May 2009, a move commended by many dairy organizations.<sup>14</sup> Programs like the DEIP and MILC that allow American dairies to sell products below costs have been criticized in many other countries as protectionist measures that help push foreign competitors out of business.<sup>15</sup> Secretary Vilsack’s announcement for the allowance of maximum subsidies for

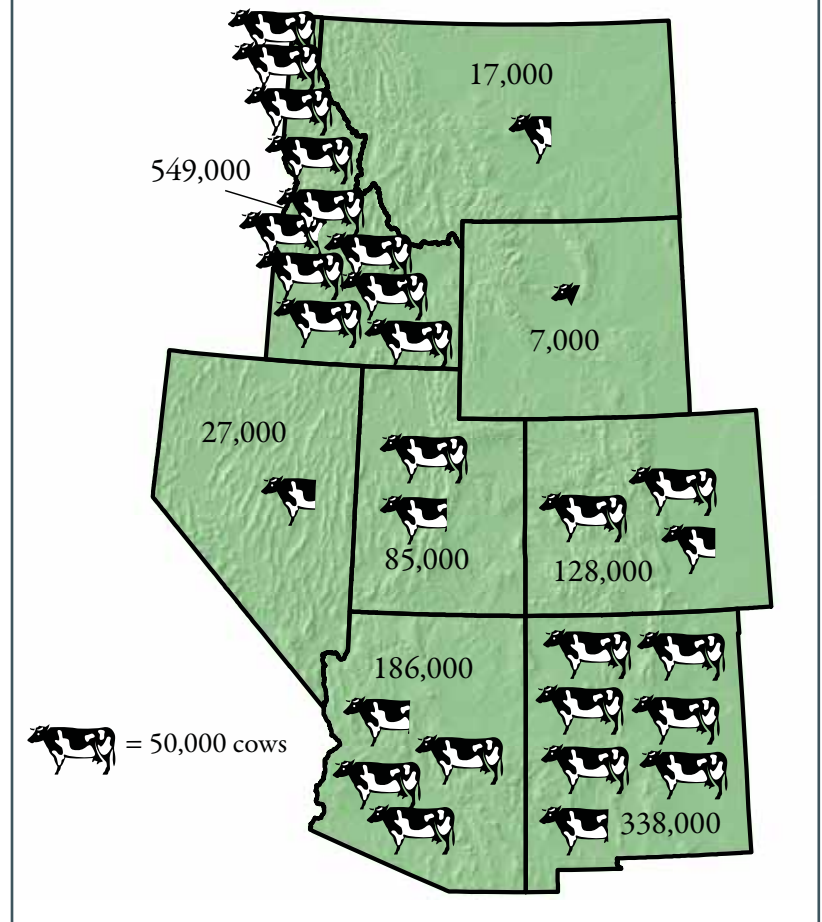


© Russell Clarke '10, Las Uvas Valley Dairy.

Figure 7:

Number of Milk Cows, Rockies Region, 2008

Source: USDA, National Agricultural Statistics Service, 2009



dairy exports came after the European Union (the world’s largest dairy exporter) reinstated dairy subsidies.<sup>16</sup>

Rockies dairy productivity has undergone a dramatic increase since 1980, as shown in Figure 6. Meanwhile the distribution of dairy activity in the Rockies is clustered in several states, as shown in Figure 7. States where large dairies bring in huge shares of the farms receipts (Idaho and New Mexico) could see harder times than states such as Wyoming, with its smaller dairy industry. The future output per cow is predicted to increase while the number of dairy cows falls.<sup>17</sup> If prices finally rise and dairies again become profitable, the dairy landscape could be filled with fewer cows, fewer dairy farmers, and a different impact on the Rockies region.

### Beef Cattle

The dairy industry can cull cows and sell them to the meat market as a tool to increase prices. Unlike the dairy industry, the beef industry does not have the option of another market

for their product and must also compete with chicken and pork. However, “beef is still for dinner”; Americans spent over \$76 billion on beef in 2008, representing over half the money spent on retail meat.<sup>18</sup> The average American eats nearly 60 pounds of beef per year, about half a pound more than chicken.<sup>19</sup> Eight out of ten people in the United States consume beef on a “regular” basis, according to U.S. NPD Group’s National Eating Trends Service, a food and beverage consulting firm. The large demand is reflected in the amount of beef produced: in 2008 over 26 billion pounds, harvested from an average of 660,000 cattle sent to slaughter each week.<sup>20</sup>

between 2008 and 2009,<sup>25</sup> and beef exports are predicted to drop by nearly 8 percent by the end of 2009.<sup>26</sup> Texas, the nation’s largest beef producing state, is also having its worst drought in recent history.<sup>27</sup> The intense drought is drying up pastureland, forcing ranchers to sell cattle at reduced prices because they cannot feed them. This impacts ranching operations in the Rockies where drought conditions have not occurred on a regional scale. Feed is one of the major costs in beef production, and in 2009 feed prices were expected to be \$3.00 to \$4.50 for a bushel of corn,<sup>28</sup> lower than in 2008, but higher than prices for most of the last 30 years. These lower prices are due to a good crop. Whether this will inflate



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Even with high demand, ranchers are making less per pound of beef than they were six years ago, while retail outlets are making more. The wholesale price of beef per pound was \$2.22 in 2003, while in June 2009 it was \$2.16.<sup>21</sup> Comparatively, the retail price during the same period went from \$3.74 per pound to \$4.29.<sup>22</sup> Producers’ share of the income per pound dropped from 48% in 2003 to 42% in April 2009.<sup>23</sup> By volume, beef production was 26.24 billion pounds in 2003 and 26.56 billion in 2008, only a slight increase compared to the retail price.<sup>24</sup>

The beef industry, like the dairy and pork industries, is in a historic slump, and all are connected through the commodity markets. Beef prices dropped by 19 percent

the herd size, hurting the industry in the future, or come as a relief for the time being is yet to be seen.<sup>29</sup>

Today’s traditional trip from pasture to plate requires the services of many different sectors. No longer is the calf born, raised on the ranch’s pasture, and slaughtered on the ranch or nearby butcher. The typical method is now to raise calves on pastures for a little less than a year and then sell them at auction following the weaning period. The animals are bought by stockers, many times family ranches, who then feed the cow either grass and/or grain. Once the cows are 12 to 18 months old they are brought to a feedlot, where they are given antibiotics and growth hormones to quickly build muscle. The resulting productivity gains in beef

production are depicted in Figure 8. During their four to six month stay at the feedlot, the cows are given a 70 to 90 percent grain diet (unlike their natural grass diet), then transported to slaughterhouses where they are killed and processed under the watch of USDA inspectors.<sup>30</sup> The economic consequences of falling beef demand and prices are affecting not just the rancher, but all of the entities involved in the trip from pasture to plate.

But consumer demand is changing as fast as is productivity. Table 6 identifies the growing array of beef types, each appealing to segments of a changing consumer base. Buyers want organic, natural grass-fed, and/or grass-finished beef. These new consumer demands have created a niche market for some operations, depending on how they raise and market

**Table 6: Beef Type Definitions**

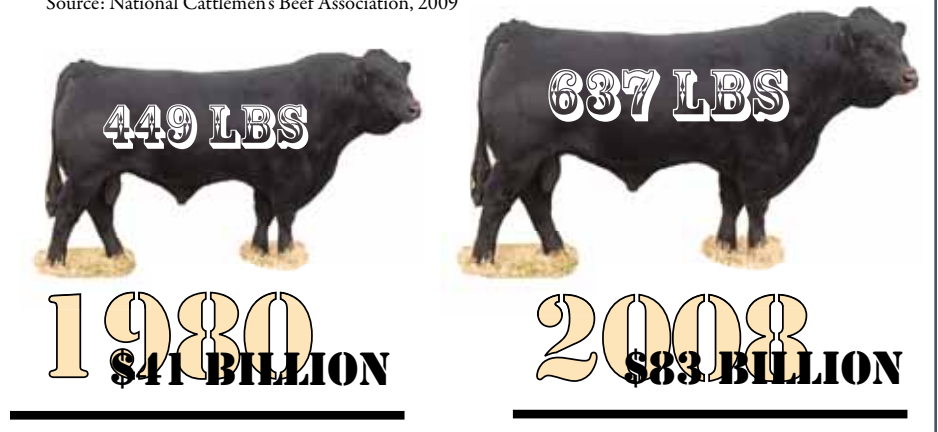
<b>Traditional</b>	<small>JBS Swift</small> Fed feed grain, which consists of mostly corn, spend much of their life in Confined Animal Feeding Operations (CAFO). This allows them to be fattened with less time and money.
<b>Natural</b>	<small>Colorado’s Best Beef Company</small> Cattle are fed natural, certified grain. They can still be finished in feedlots.
<b>Organic</b>	<small>Rocky Mountain Organic Meats</small> Cattle are fed only certified organic feed and grass. Often they are confined in feedlots and fed “organic” feed.
<b>Grass-Fed</b>	<small>Pecos Valley Grass-fed Beef</small> Cattle are fed only grass and forage until 90 to 160 days before slaughter, at which time they are finished with grain.
<b>Grass-Finished</b>	<small>Lasater Grasslands Beef</small> Cattle only eat grass and forage.
<b>Free-Range</b>	Cattle are free to roam the pasture and grasslands and not confined to feedlots. Most grass-fed and finished are free range.

their beef. The USDA has yet to publish official definitions for beef production methods, which has led to questionable labeling on consumer products. Typically, grass-finished beef means that the cow is raised on grass pasture its entire life and never receives grain supplements or ends up in a feedlot. This requires a large amount of pastureland as grazing areas must be rotated to avoid overgrazing. Organic beef typically means that the cow cannot be given antibiotics or growth hormones and must be fed organically grown feed. An operation can keep a cow confined and just feed them grass and organic feed. Often organic and natural beef is finished in a feedlot. To be considered organic, beef cows must be raised organically from birth, whereas dairy cows can transition from conventional to organic over a 12 month period. Given the higher cost of feed and land associated with grass-fed and grass-finished beef, these niche beef operations are not the industry norm, and organic and natural beef make up less than two percent of the beef market.<sup>31</sup>

Cattle do have economic value beyond just their meat component. The dollar amount given to the byproduct after the slaughter of cattle is dubbed “drop credit.” The drop credit ranged from \$150 to \$200 during 2008, but had dropped to \$80 to \$85 in summer 2009.<sup>32</sup> This is largely due

Figure 8: Change in Pounds of Beef per Steer, and Annual Retail Value of Beef Consumed, 1980 - 2008

Source: National Cattlemen’s Beef Association, 2009



to reduced consumer demand for leather products (e.g., in fashion, automobiles, or furniture), which in turn impacts the producer. The shoe and automobile industries are two of the leading purchasers of cow hides. Both have seen a heavy fall in consumer demand, allowing high inventories and low prices. As the dairy industry culls cows, it impacts both beef and hide prices. With more culls expected from the dairy industry, hide prices can only rise in the long term as cattle stocks are minimized and consumer demand rebounds from the global recession. With Asian markets already showing signs of recovery, it is possible that their increased demand can compensate for some of the faltering domestic demand.



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## Cattle Issues

Before the plummeting milk demand and the subsequent price drop, Loren Horton at Las Uvas Dairy cited EPA projects and requirements as the largest financial obstacle to his dairy operations.<sup>33</sup> One major expenditure he listed was the replacement of perfectly operating confinement tanks and ponds to comply with new regulations. Livestock operations, however, can be a significant source of water quality problems. The runoff from large-scale confined animal feeding operations (CAFOs) is the only livestock runoff controlled under the Clean Water Act. The involvement of the EPA and other government organizations in livestock industries can create tension given the high cost of compliance and potential impact on local watersheds.

A proposed amendment to the current Clean Water Act, known as the Clean Water Restoration Act, would give the U.S. Army Corps of Engineers and the Environmental Protection Agency control over all watersheds and “all activity affecting these watersheds.” This proposal would allow these government entities to have greater control over operations on farm and ranchland.<sup>34</sup> Currently these lands are not under the jurisdiction of the Clean Water Act. In an industry where the EPA is often viewed as the enemy, additional regulation by a federal agency could create an even larger rift between the operators and government.

A related concern is the new climate legislation before Congress, possibly resulting in a cap and trade system for greenhouse gas emissions. Enteric fermentation, caused by ruminant digestion, is the largest current producer of methane, a greenhouse gas 20 times more potent than carbon dioxide. Though methane is more heat trapping than carbon dioxide, it stays in the atmosphere for a much shorter time. The current proposed greenhouse gas legislation (The Waxman-Markley bill) would not restrict methane emissions from cattle. However, many livestock producers are not enthusiastic about carbon legislation because their business has little room for carbon sequestration projects compared to farming. This has caused a rift between sectors which might be able to participate in offset programs (crop producers), and those which cannot participate as easily (livestock producers).<sup>35</sup> As debate over climate legislation continues, it could shed light on the carbon footprint of the livestock industry, as well as provide alternative income



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possibilities to certain agricultural sectors in the Rockies.

Many livestock operations, especially dairy farms, have potential for value-added activities that could help offset methane emissions and produce added income, mitigating their association with commodity price fluctuations. The large numbers of dairies in the Rockies and the stringent renewable energy portfolios required by many Rockies states make the potential for biogas electricity production from cow manure a favorable value-added activity. The methane emissions from manure can be collected and used to create natural gas using biogas reactors. Once refined, this gas can power already existing natural gas plants or new electricity production facilities on the dairy premises. In Vermont, some dairies are using electricity production to make upwards of \$200,000 a year.<sup>36</sup> In the Rockies, one dairy in Idaho (the number four dairy-producing state in the U.S.) has a 2.25 megawatt biogas digester and sells the power to Idaho Power Company.<sup>37</sup> The upfront costs for the required facilities and digesters can be prohibitively expensive, but the recent implementation of tax credits reduces these capital costs. Senators from Idaho and Nebraska are proposing a tax package for promoting manure uses such as electricity production and garden compost production.<sup>38</sup>

Colorado Pork in Lamar, Colorado, already uses its manure to produce electricity with a biogas reactor, cutting its electricity costs significantly. Financial help from the state enabled the farm to purchase the gas reactors. In Weld County, Colorado, Xcel Energy has agreed to buy manure gas for its natural gas plant in Platteville. This proposed biogas facility, being developed by Environmental Power Corp., will be the largest in the country, able to power 17,000 homes.<sup>39</sup> The majority of this manure will come from dairy and cattle operations. With the current movement toward energy

security and reducing carbon emissions, some livestock operations could profit from the proposed carbon legislation. Biogas is one more innovative value added project to help diversify the agricultural economy of the Rockies.

The use of growth hormones and antibiotics in livestock and the subsequent development of antibiotic-resistant bacteria have garnered strong opponents and been hotly debated. The government has made several attempts to restrict antibiotics in livestock, including a recent proposal by Congresswoman Louise M. Slaughter of New York that would ban seven types of antibiotics important to humans from being administered to livestock.<sup>40</sup>

Use of recombinant bovine somatotropin (rBST), a growth hormone that increases milk production in dairy cows, is now banned in many dairy operations. Consumer concerns about the safety of rBST caused most dairies to stop using the product, finding it otherwise hard to sell their milk.<sup>41</sup> The hormone has been known to cause disease in cattle, although adverse health effects in humans have not yet been demonstrated. Monsanto, the only FDA-approved vendor of rBST (in Posilac), cites consumer demand as the reason why dairy producers have moved away from Posilac.<sup>42</sup> The FDA has not banned the product; rather consumers have demanded rBST-free milk. Though increasingly rare in dairy production, hormones are still widely used in feedlots and CAFOs for beef cattle throughout the United States; about 80 percent of cattle raised in feedlots receive hormones.<sup>43</sup>

Antibiotics are often distributed to livestock entering feedlots to prevent disease. This preventative application of antibiotics can result in bacterial resistance to common antibiotics. The Obama administration announced that it would aim to ban antibiotic use on farm animals that are

not sick. Seventy percent of antibiotics used in the United States are for healthy livestock.<sup>44</sup> The powerful farm lobby will challenge any measure against the preventative use of antibiotics on livestock,<sup>45</sup> but the issue has attracted public attention, and increased demand for antibiotic-free beef could affect the livestock industry.

The widespread effects of the recession have been felt hard by the cattle industry. Due to the close connections among the different livestock industries and related sectors, many factors impact the Rockies' cattle producers. With falling milk prices, low pork prices, and culled dairy cattle, the industry hopes to see the business environment improve. During this setback, entrepreneurial and value-added projects are sure to increase, creating new markets and ideas within the Rockies cattle industry.

<sup>1</sup> United States Department of Agriculture. *2007 Census of Agriculture*. Vol. 1.2. Geographic Area Series. Table 11. 2009.

<sup>2</sup> Miller, John. "Mountains of Manure: Idaho Energy Czar Aims to Harness Cow Pie Power." *Mayfield Press*. December 23, 2008. <http://www.mayfield.co.nz/article.php?story=20081223094918151> (accessed December 2, 2009).

<sup>3</sup> Dean and Loren Horton own Las Uvas Dairy, located in Hatch, New Mexico. Las Uvas is New Mexico's largest dairy.

<sup>4</sup> Lutey, Tom. "Milk Glut Hits Dairies' Profits." *Billings Gazette*. July 14, 2009. [http://www.billingsgazette.com/news/local/article\\_554edbdcc-7026-11de-ab27-001cc4c03286.html](http://www.billingsgazette.com/news/local/article_554edbdcc-7026-11de-ab27-001cc4c03286.html) (accessed December 2, 2009).

<sup>5</sup> "Factbox: US Dairy Farms in Crisis as Milk Price Dives." July 31, 2009. <http://www.reuters.com/article/businessNews/idUSTRE56U64A20090731> (accessed December 2, 2009).

<sup>6</sup> Horton, Dean. Interview by author, Hatch, New Mexico, July 8, 2009.

<sup>7</sup> "Animal Welfare." *The Economist*. July 23, 2009. Vol. 392, Issue 8641. pp. 63-64.

<sup>8</sup> Lutey, Tom. "Milk Glut Hits Dairies' Profits."

<sup>9</sup> *Ibid.*

<sup>10</sup> "Milking It," *The Economist*. July 11, 2009. Vol. 392, Issue 8639. p. 31-31.

<sup>11</sup> Aurora Dairy is a large organic dairy located in Platteville, Colorado (See p. 48).

<sup>12</sup> Tuitele, Sona. Interview by author, near Platteville, Colorado. July 29, 2009.

<sup>13</sup> *Ibid.*

<sup>14</sup> Nicolson, Dan. "Milking Trade Subsidies." *The Wall Street Journal*. June 8, 2009. <http://online.wsj.com/article/SB124440805084892125.html> (accessed December 2, 2009).

<sup>15</sup> *Ibid.*

<sup>16</sup> *Ibid.*

<sup>17</sup> United States Department of Agriculture. Agricultural Baseline Projections, "Baseline Presentation 2009-2018." <http://www.ers.usda.gov/briefing/Baseline/> (accessed December 2, 2009).

<sup>18</sup> Cattle-Fax, Englewood, Colorado. April 2008. <http://www.cattlefax.com/> (accessed December 7,



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© Emil Dimanchev '11, Las Uvas Valley Dairy, New Mexico.

2009).

<sup>19</sup> *Ibid.*

<sup>20</sup> *Ibid.*

<sup>21</sup> Economic Research Service, USDA. Data Sets: Meat Price Spread. Updated November 18, 2009. <http://www.ers.usda.gov/Data/MeatPriceSpreads/> (accessed December 2, 2009).

<sup>22</sup> *Ibid.*

<sup>23</sup> *Ibid.*

<sup>24</sup> *Ibid.*

<sup>25</sup> "Animal Welfare." *The Economist*.

<sup>26</sup> *Ibid.*

<sup>27</sup> Benning, Tom. "Texas Scorched by Worst Drought in 50 Years." *The Wall Street Journal Online*. July 28, 2009. <http://online.wsj.com/article/SB124872939604384837.html> (Accessed December 2, 2009).

<sup>28</sup> Odesser-Torpey, Marilyn. "Predicting Prices." *QSR Magazine online*. January, 2009. [http://www.qsrmagazine.com/articles/features/124/commodity\\_prices-2.phtml#corn](http://www.qsrmagazine.com/articles/features/124/commodity_prices-2.phtml#corn) (accessed December 2, 2009).

<sup>29</sup> "Animal Welfare." *The Economist*.

<sup>30</sup> Cattlemen's Beef Board and National Cattlemen's Beef Association. "Beef: from Pasture to Plate." <http://www.beeffrompasturetoplate.org/beefchoices-faq.aspx> (accessed September 6, 2009.)

<sup>31</sup> "Beef: from Pasture to Plate." 2009.

<sup>32</sup> Waters, Theoplois. "Car Slump Hits Cattle Industry as Demand for Leather Declines." *The Wall Street Journal Online*. June 8, 2009. Vol. 253, Issue 132. p. C3.

<sup>33</sup> Horten, Loren. Interview by author, Hatch, New Mexico. July 8, 2009.

<sup>34</sup> National Cattlemen's Beef Association, News Release. <http://www.beefusa.org/NEWSCleanWaterRestorationActThreatensRanchersSmallBusinessOwners39120.aspx> (accessed July 23, 2009).

<sup>35</sup> "Is the Climate Bill Dividing Farm Groups?" *Beef*. July 23, 2009. <http://beefmagazine.com/cowcalfweekly/0724-is-climate-bill-farm/> (accessed December 2, 2009).

<sup>36</sup> Zezima, Katie. "Electricity from What Cows Leave Behind." *The New York Times Online*. September 23, 2008. <http://www.nytimes.com/2008/09/24/business/businessspecial2/24farmers.html?scp=1&sq=dairy%20electricity&st=cse> (accessed December 2, 2009).

<sup>37</sup> Miller, John, 2008.

<sup>38</sup> Pore, Robert. "Nelson, Johanns Sponsor Biogas Bill." *The Grand Island Independent Online*. January 24, 2009. <http://www.theindependent.com/articles/2009/01/24/news/ag/doc497bdf516246a164638928.txt> (accessed December 2, 2009).

<sup>39</sup> Raabe, Steve. "Cow Waste to Help Xcel Produce Electricity." *The Denver Post*. March 6, 2009. [http://www.denverpost.com/search/ci\\_11848033](http://www.denverpost.com/search/ci_11848033) (accessed December 2, 2009).

<sup>40</sup> Harris, Gardiner. "Administration Seeks to Restrict Antibiotics in Livestock." *The New York Times Online*, July 13, 2009. <http://www.nytimes.com/2009/07/14/health/policy/14fda.html> (accessed December 2, 2009).

<sup>41</sup> Horten, Loren. Interview by author, Hatch, New Mexico. July 8, 2009.

<sup>42</sup> Monsanto Company. "Is Monsanto Opposed to Truth in Labeling?" Last updated July 16, 2009. [http://www.monsanto.com/monsanto\\_today/for\\_the\\_record/rbst\\_milk\\_labeling.asp](http://www.monsanto.com/monsanto_today/for_the_record/rbst_milk_labeling.asp) (accessed December 2, 2009).

<sup>43</sup> Raloff, Janet. "Hormones: Here's the Beef: Environmental Concerns Reemerge Over Steroids Given to Livestock." *Science News*. Vol. 161, No. 1, January 5, 2002, p. 10.

<sup>44</sup> Harris, Gardiner. "Administration Seeks to Restrict Antibiotics in Livestock."

<sup>45</sup> *Ibid.*

# Case Study: Bison: Back Home on the Range.

By Russell Clarke

*Historically the buffalo had more influence on man than all other Plains animals combined. It was life, food, raiment, and shelter to the Indians. The buffalo and the Plains Indians lived together, and together passed away. The year 1876 marks practically the end of both. . . .*

*Walter Prescott Webb, The Great Plains (Ginn and Company, 1931).*

The physical and mythological strength of the American Bison is unparalleled by any other land mammal in the Americas. It is the icon of the changing American West. A full-grown bison, weighing well over one ton, can hardly be considered in the realm of classic livestock. However, the emergence of a market for bison meat has started to turn this historic symbol of the Wild West into a farm-raised commodity. Today, its presence and numbers in the Rockies tell a story not of Western lore, but of an increasingly important agricultural product.

## History

Massive bison herds once roamed the North American plains. Before 1600, bison numbered between 30 and 70 million.<sup>1</sup> As Europeans arrived and westward expansion ensued, bison were slaughtered for their meat, hides, and range. Bison competed with cattle for grazing, prompting cattle ranchers to cull large bison herds. Some historians have suggested that bison were slaughtered to starve the Native Americans during the earlier years of their oppression. Additionally, a cold spell that froze the plains during the 1840's, limited the bison's access to winter grass.<sup>2</sup> Bison were slaughtered by the millions for their hides on newly extended rail lines, their massacre aided by a rifle specially named for their destruction, the Sharps "Buffalo Rifle."

In 1889 William F. Hornaday surveyed the bison population in North America and estimated that just over 1,000 remained. Following his survey, he devoted much of his time and effort to bison conservation.<sup>3</sup> Since 1889 the bison population has rebounded from near extinction, but their presence today covers only a small portion of their historic range on the American plains. The current abundance of bison has resulted from both consumer demand and

conservation efforts, resulting in an improved bison meat industry and rangeland ecosystem.

## Bison Today

Today, almost 200,000 bison reside on private farms and ranches in the U.S.,<sup>4</sup> while approximately 25,000 bison roam free on public lands. In some areas, bison numbers are now considered healthy enough to institute legal hunts. Montana, for example, set a quota for 144 bison to be taken in 2009.<sup>5</sup> Approximately 4,500 farms and ranches are raising bison in the U.S. The addition of bison statistics to the 2002 USDA Census of Agriculture indicates the growing importance of the bison industry, which has expanded by at least 10 percent each year for the past three years.<sup>6</sup> In 2008 more than 75,000 bison were slaughtered under federal and state regulated programs, more than a 50 percent increase since 2002. However, this new demand has not produced a large increase in the overall number of bison in the Rockies over the past seven years. This could indicate that bison are being taken to slaughter at earlier ages, perhaps due to the increasing use of feed and grain finishing in bison operations.



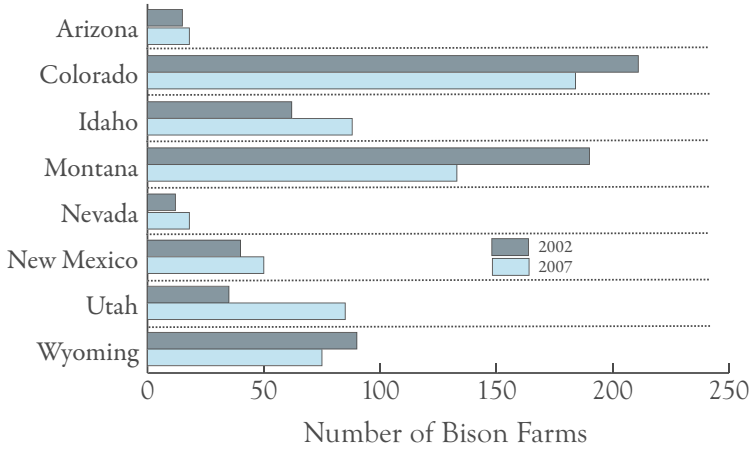
© Elizabeth Kolbe '08, Vemnejo Park Ranch, New Mexico.

The Rockies region as a whole has experienced a slight decrease in the number of ranches raising bison since 2002, as shown in Figure 9. Currently the Rockies region contains about 15 percent of the nation's bison farms. Colorado, Montana, and Wyoming, the states with the largest number of bison ranches have seen a decrease in ranch numbers. In contrast, Arizona, Idaho, Nevada, New Mexico, and Utah have all seen an increase in the number of bison ranches since 2002, with the largest increases in Idaho and Utah. This movement toward a similar number of bison ranches in the different Rockies states could be a result of the niche market.

Despite the overall decrease in the number of bison in the Rockies since 2002, the region still has the second

**Figure 9:**  
Number of Bison Farms by State, 2002 and 2007

Source: USDA Census of Agriculture, 2007



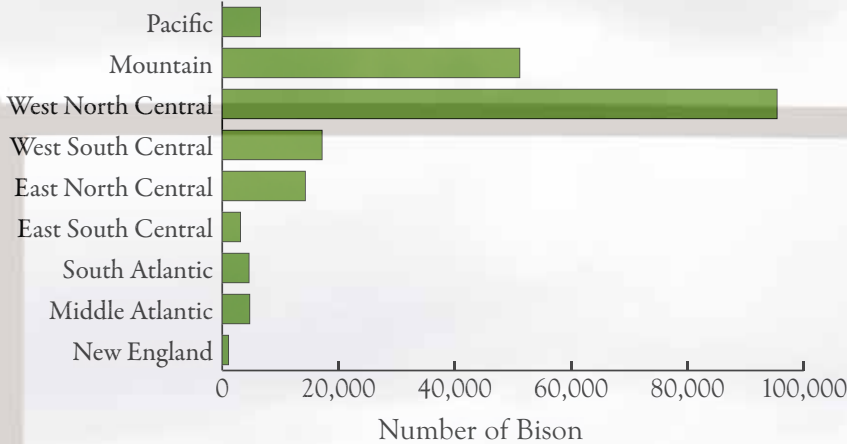
largest inventory of bison in the U.S., as shown in Figure 10. As Figure 11 shows, farm-raised bison inventories decreased in some Rockies states, such as Montana and New Mexico, between 2002 and 2007. The mitigating increase occurred in Colorado, which had far more bison than any other state, making it the bison capital of the region.

As mentioned above, the number of bison farms in Colorado decreased, so the increase in inventory indicates larger bison operations, or smaller operations consolidating. Idaho and New Mexico showed decreases in bison inventory, but increases in the number of farms. This suggests that farms with bison in these states were tending toward smaller herds of bison, the opposite trend of Colorado.

Although the total inventory of bison has dropped, more bison meat continues to go to market than ever before, possibly due to more efficient operations, bison of younger ages going to market, and larger numbers of older herds

**Figure 10:**  
Number of Bison by Census Division, 2007

Source: USDA Census of Agriculture, 2007



©Julia Head '09, Vermejo Park Ranch, New Mexico.

**Figure 11:**  
Number of Bison by State, 2002 and 2007

Source: USDA Census of Agriculture, 2007



being put on the market. This declining inventory provides an idea of where bison production is more important to the niche economy in the Rockies.

**Bison Meat**

Bison tastes similar to traditional beef but has far less fat and more protein. In addition, as shown in a comparison with other meat characteristics in Table 7, bison contains higher amounts of vitamin B and iron and also fewer calories and less cholesterol than beef. These qualities have helped develop a niche market for bison as a healthy alternative to beef. Though traditionally more expensive than beef due to the lack of supply and more expensive breeding stock, the growing bison meat industry has reduced prices and can now compete with beef. In many parts of the country, bison is readily available in health food and grocery stores and increasingly available on menus in mainstream restaurants.



In 2003 the USDA estimated that Americans consumed one million pounds of bison each month. Many bison raised for meat are actually a cross breed between cattle and bison (approximately 3/8 bison and 5/8 cattle), often referred to as “beefalo.” Only 12,000 to 15,000 bison are currently considered “pure.”<sup>77</sup> While bison are no longer in danger of going extinct, their genetic make-up is threatened.

**Bison Commons**

Bison prior to westward expansion in America were an American Plains’ keystone species, influencing the entire ecosystem. After their near extinction, they returned to a very different environment, segmented and developed by farms and ranches for agricultural production. In 1987 Frank and Deborah Popper published an essay in which they promoted the hypothesis that many areas of the Great Plains, made empty by depopulation, be returned to native prairie. They used the term “Buffalo Commons” to describe their proposed nature reserve. Though largely rejected at the time, the idea of the Buffalo Commons has since been considered in future plans for some of the plains states.<sup>8</sup> This idea of returning the plains to bison herds for natural management of native grasses and ecosystems highlights the bison’s importance to the prairie landscape. The presence of bison rather, to some people, is preferable to the presence of cattle, following the argument that traditional bison grazing can increase the biodiversity of the grasslands with less management.<sup>9</sup> Bison eat a greater variety of grassland plants and travel farther distances, churning the soil and spreading seeds.

Recently, the Missouri Breaks region of Montana reignited discussion on bison and ecosystem restoration when the region was cited in a report titled, *Ocean of Grass* as the best location for a working ecosystem involving bison.<sup>10</sup> Biologists in the report pinpointed the Missouri Breaks as the best area in the historic Great Plains for a new preserve.<sup>11</sup> The goal of 3.5 million acres, which might take 20 years to obtain, could contain enough genetically pure bison to support a population of wolves.<sup>12</sup> In 2005, 16 genetically pure bison were introduced as the first step in the long process of building the proposed preserve. The idea behind the preserve is to combine, rather than separate, nature and economy, creating a “working landscape.”<sup>13</sup> Instead of exploiting the land, this venture would stimulate the economy through restoration. This idea of bringing nature and economics together for a common goal is becoming more prevalent in ranching operations and communities in some locations around the Rocky Mountain West.

As more private entities start to raise bison, the establishment of assistance programs from banks and

**Table 7:**  
Nutritional Comparisons of Select Meat Types, 100 Gram Serving

Species	Fat (g)	Protein (g)	Calories (g)	Cholesterol (mg)	Iron (mg)	Vitamin B-12 (mg)
Bison	2.4	28.4	143	82	3.4	2.9
Beef (Choice)	18.5	27.2	283	87	2.7	2.5
Beef (Select)	8.1	29.9	201	86	3.0	2.6
Pork	9.7	29.3	212	86	1.1	0.6
Chicken (Skinless)	7.4	28.9	190	89	1.2	0.3
Sockeye Salmon	11.0	27.3	216	87	0.6	5.8

Source: National Bison Association  
Per 100 Gram (3.5 oz.) Serving - Cooked Meat - Updated March 2007  
Note: Bison, separable lean only, cooked, roasted. USDA ND6 No. 17157  
Beef, composite of trimmed retail cuts, separable lean only trimmed to 0” fat, choice, cooked USDA ND6 No. 13362  
Beef, composite of trimmed retail cuts, separable lean only trimmed to 0” fat, select, cooked USDA ND6 No. 13366  
Pork, fresh, composite of trimmed retail cuts (leg, loin, and shoulder), separable lean only, cooked USDA ND6 No. 10093  
Chicken, broilers or fryers, meat only, roasted USDA ND6 No. 05013  
Salmon, sockeye, cooked, dry heat USDA No. 15086

associations for bison operations is increasing. This, combined with increasing consumer demand for bison as well as open space, may allow the buffalo commons to become a reality in the future.

**Bison Ranching**

Bison, like cows, are ruminants, but naturally eat prairie grasses that cattle may not. Unlike modern cattle, almost all bison are raised on grass, although certain



© Elizabeth Kolbe '08, Vermejo Park Ranch, New Mexico.

operations will finish their bison with grain (for 90 to 120 days before they are sold for slaughter).<sup>14</sup> Unlike many cattle in feedlots, bison are rarely given antibiotics or growth hormones. The lack of antibiotics is often a trigger point for intense debate over cattle-bison diseases such as brucellosis.<sup>15</sup>

The historical presence of bison in the Rocky Mountain region renders them resilient in the face of local diseases and harsh weather conditions. Paul Robertson, director of the San Luis Valley Program of the Nature Conservancy, noted the lack of care required by bison: “we don’t do anything; if they get sick, they die.”<sup>16</sup> By allowing the sick to die, the herd becomes stronger in the future. This minimized care for bison is typical throughout the industry. Bison do well in the freezing cold and searing heat of the plains, requiring less work for the rancher.

Bison also calve easier than cattle. No human aid is needed for bison calving, whereas cattle often require assistance. However, because ranched bison are not domesticated like cattle, bison operations often need higher and more secure fencing, as a male bison can easily jump six feet high. Oftentimes even intensified fencing cannot contain the bison. Full-grown males commonly weigh over 1,200 pounds, sometimes over 2,000. These wild and powerful qualities, and the different training and handling methods required, deter many ranchers from entering the bison industry. This historical symbol of the Rockies is not just an ornamental figure on the plains, but an increasingly important industry to the eight-state Rockies region.

### Medano-Zapata Ranch

The Nature Conservancy’s Medano-Zapata Ranch is home to one of the few conservation bison herds in the country, meaning they are never branded, weaned, or

provided with supplemental feed.<sup>17</sup> They run over 2,000 bison and around 1,000 cattle on 103,000 acres in the San Luis Valley in Colorado.<sup>18</sup> The bison are raised as closely to their natural life cycle as possible. The ranch has year-round water, and its location in the largest alpine valley in the world makes it an exception rather than the industry norm.

The ranch is also a premiere example of collaboration among different, and often competing, entities. Paul Robertson describes the Zapata Ranch as “one of the greatest successes in the Rocky Mountain West.”<sup>19</sup> Owned by the Nature Conservancy, it provides bison, beef, and ranch vacations. The ranch has value-added projects and additional non-traditional ranch incomes such as guest services to mitigate economic losses associated with commodity cycles. Duke Phillips, an area rancher well known for his unique style of holistic range management, manages the bison and cattle herds. The ranch preserves open space and provides beef and bison for the market. It brings nature and economic goals together, and is a working collaboration among area ranchers, the Nature Conservancy, the National Park Service, and Colorado Fish and Wildlife, whose land borders the ranch.

In 2008, the Medano-Zapata Ranch culled 400 two year-old bison for sale on the market. The bison are allowed to roam freely over 44,000 acres of the ranch. Unlike the bison, the cattle raised on the ranch are highly managed on a day to day basis and rotated often to avoid overgrazing of the grasslands. Once a year the bison are gathered and tagged, and a certain number are taken to market. After they are bought on the market, they are usually finished in a feedlot. The ranch would prefer to sell whole animals to private buyers rather than send them to market, ensuring the buyer a grass-finished product and eliminating middlemen. The lack of direct marketing is one of the largest obstacles facing

the bison industry. The Medano-Zapata Ranch has considered raising only bison but this would require “timing and money we just don’t have,” according to Jeff Gossage, the ranch manager.<sup>20</sup>

### Bison’s Future

Recently, other livestock industries such as beef, pork, and dairy have taken huge hits as demand and prices decrease. With the current global economic recession, many higher priced and non-traditional food products have suffered a reduced demand, but



© Stephen G. Weaver. Medano-Zapata Ranch, near Alamosa, Colorado.

the bison industry has remained strong through the crisis.<sup>21</sup> Dave Cater, president of the National Bison Association reported that “the U.S. bison business ended 2008 in its healthiest fiscal position in more than a decade.”<sup>22</sup> However, Paul Robertson of the Zapata Ranch stated that “the bison meat market has been much more volatile than beef in recent years.”<sup>23</sup> The durability of bison during difficult times fuels industry leaders’ optimistic outlook. Although industry leaders acknowledge that bison are unlikely to become a mainstream commodity, they believe that bison can continue to gain recognition and growth in a niche market.

Whether consumers will be willing to pay for a healthier meat, or if greater understanding of food choices can support the bison industry, is unknown. As the current trend moves toward healthier foods, industry leaders expect the future of the bison industry to be strong.<sup>24</sup> Additional marketing and promotion of bison meat will help spread the knowledge of bison’s benefits and could substantially increase demand. Due to the bison’s historical importance in the Rockies and the large regional inventory, this region is sure to play an important role in the future of the industry and the species. The iconic symbol of the American West once again grazes in increasing parts of the Rockies, and tourists continue to be awestruck to see active herds of bison as operational parts of “real” agriculture, not just “native” herds on public lands.

(accessed December 3, 2009).

<sup>6</sup> National Bison Association. “Data and Statistics.”

<sup>7</sup> Robertson, Paul. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

<sup>8</sup> Williams, Florence. “Plains Sense.” *High Country News*. January 15, 2001. <http://www.hcn.org/issues/194/10194> (accessed December 3, 2009).

<sup>9</sup> “Bison Grazing Increases Biodiversity in Grasslands.” *Science Daily*. May 6, 1998. <http://www.sciencedaily.com/releases/1998/05/980506080021.htm> (accessed December 3, 2009).

<sup>10</sup> Forrest, Steve et al. “Ocean of Grass: A Conservation Assessment of the Great Northern Plains.” Northern Plains Conservation Network. 2004. <http://www.worldwildlife.org/what/wherework/ngp/WWFBinaryitem2742.pdf> (accessed December 4, 2009).

<sup>11</sup> *Ibid.*

<sup>12</sup> Manning, Richard. *Rewilding the West*. University of California Press, 2009. p. 18.

<sup>13</sup> *Ibid.* p. 190.

<sup>14</sup> Food, Safety, and Inspection Service, USDA. “Fact Sheets: Meat Preparation.” [http://www.fsis.usda.gov/Fact\\_Sheets/Bison\\_from\\_Farm\\_to\\_Table/index.asp](http://www.fsis.usda.gov/Fact_Sheets/Bison_from_Farm_to_Table/index.asp) (accessed June 15, 2009).

<sup>15</sup> Head, Julia. “Wildlife: Range and Condition.” In *The 2009 Colorado College State of the Rockies Report Card*, edited by Dr. Walter E. Hecox, Elizabeth L. Kolbe, and Dr. Matthew K. Reuer, p. 93. Colorado Springs: Colorado College, 2009.

<sup>16</sup> Robertson, Paul. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

<sup>17</sup> Robertson, Paul. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

Zapata Ranch: <http://www.zranch.org/icws273w2/html/Bison.html>

<sup>18</sup> “Zapata Ranch: A Working Cattle Ranch. [www.zranch.org](http://www.zranch.org) (accessed July 22, 2009).

<sup>19</sup> Robertson, Paul. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

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<sup>1</sup> National Bison Association. “Industry Data and Statistics.” <http://www.bisoncentral.com/index.php?s=&c=14&d=105&a=1064&w=2&r=Y> (accessed December 3, 2009).

<sup>2</sup> Manning, Richard. *Rewilding the West*. University of California Press, 2009.

<sup>3</sup> Hornaday, William. “The Extermination of the American Bison.” 1887. From Project Gutenberg. <http://www.gutenberg.org/etext/17748> (Accessed February 8, 2010).

<sup>4</sup> National Bison Association. “Data and Statistics.” <http://www.bisoncentral.com/index.php?s=&c=14&d=105&a=1064&w=2&r=Y> (accessed July 12, 2009).

<sup>5</sup> Meunier, Andre. “Montana Winter Bison Quota Set at 144 Animals.” *Oregon Environmental News*. June 26, 2009. [http://www.oregonlive.com/environment/index.ssf/2009/06/montana\\_winter\\_bison\\_quota\\_set.html](http://www.oregonlive.com/environment/index.ssf/2009/06/montana_winter_bison_quota_set.html)

<sup>20</sup> Gossage, Jeff. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

<sup>21</sup> Carter, Dave. “Future of the Buffalo Business.” National Bison Association. 2009. <http://www.bisoncentral.com/index.php?c=63&d=70&a=1018&w=2&r=Y> (accessed July 15, 2009).

<sup>22</sup> Carter, Dave. “Expanding Horizons for Bison.” The National Bison Association. <http://www.bisoncentral.com/index.php?s=&c=63&d=64&a=1017&w=2&r=Y> (accessed December 4, 2009).

<sup>23</sup> Robertson, Paul. Interview by author, Zapata Ranch near Alamosa, Colorado. July 22, 2009.

<sup>24</sup> Carter, Dave. “Outlook.” National Bison Association. <http://www.bisoncentral.com/index.php?s=&c=63&d=70&a=1018&w=2&r=Y> (accessed Dec. 4, 2009).

## Case Study: Cotton - Fabric of the Rockies

By Russell Clarke

While the shirt on your back may be manufactured in China, the cotton could be grown in the field bordering your back yard. Although not typically associated with the Rockies, cotton is widely grown in Arizona and New Mexico. Cotton differs from many of the other agricultural products produced in the Rockies. Unlike vegetables and many grains, cotton can be stored for long periods of time before being sold. This allows cotton farmers to mitigate losses due to short-term price fluctuations, improving producers' chance for profit.<sup>1</sup> Vegetable farmers do not have this luxury; generally, they must accept the market price at the time of harvest.

Arizona has a set amount of water rights. To use these rights so that they will not be re-apportioned to other states, Arizona sells water at a discounted rate to farmers, including the cotton farmers of south central Arizona.<sup>2</sup> Farmers in the region welcome this discounted water (\$30 per acre foot), which costs much less than groundwater pumped to the surface using a natural gas-powered water pump (\$80 an acre foot), a common method of extracting groundwater in the Rockies.<sup>3</sup> Though cotton may not be the most water efficient crop in the Rockies, it uses far less water than both alfalfa and sugarbeets (both crops grown on large scales in the Rockies region) and is uniquely suited to Arizona's climate.<sup>4</sup>

With food security and health becoming increasingly important issues, there is much debate over the use of genetically modified (GM) crops. In recent years, cotton

has greatly benefited from GM crop development. Arizona cotton farmer Jon Post praised his new Bullworm-resistant cotton: "I hardly use any pesticides anymore; I might only spray once or twice a year."<sup>5</sup> The reduced costs of pesticides and water for cotton make it a somewhat easier crop to produce, but its profitability is in the hands of the market. As Post stated, "A five percent return is great."<sup>6</sup>

Arizona has long been known for its cotton production. The state has the highest cotton production in the Rockies region and is tenth in the United States.<sup>7</sup> Cotton production makes up about five percent of Arizona's agricultural receipts, but is the state's number one export.<sup>8</sup> Recently, however, as shown in Figure 12, Arizona has had a large decline in cotton production.<sup>9</sup> Part of this decline is due to decreased mill use. The reduction in domestic cotton apparel production will lower the demand for domestic cotton in the United States.<sup>10</sup> Cotton stocks are also declining in the Rockies due to the shift toward feed crops to support the growing dairy industry. Arizona's cotton production in 2008 was 26 percent lower than the previous year. Similarly, the acreage of upland cotton in Arizona was 24 percent less in 2008 than in 2007, and the acreage planted in Pima cotton was less than half of the previous year.<sup>11</sup> These different types of cotton grow at different times of the year, allowing for different harvest seasons. After the forecasted increase in cotton prices, cotton stocks are predicted to increase after a few coming years of decline.<sup>12</sup> In 2009 Texas, the nation's largest cotton producer, experienced its worst drought in 50 years.<sup>13</sup> This could lower the cotton supply, possibly providing better prices for Rockies cotton growers.

<sup>1</sup> Post, Jon. Interview by author. Marana, Arizona, July 10, 2009.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*

<sup>4</sup> Consumption use of water by major crops in the Southwestern United States - USDA, ARS Conservation Research Report 29. May 1982.

<sup>5</sup> Post, Jon. Interview by author. Marana, Arizona, July 10, 2009.

<sup>6</sup> *Ibid.*

<sup>7</sup> National Agricultural Statistics Service, USDA. "Crop Production: 2006 Summary." January 2007. <http://usda.mannlib.cornell.edu/usda/nass/CropProdSu//2000s/2007/CropProdSu-01-12-2007.pdf> (accessed December 4, 2009).

<sup>8</sup> United States Department of Agriculture. *2007 Census of Agriculture*. Vol. 1.2. Geographic Area Series. 2009.

<sup>9</sup> "Arizona upland cotton production down 26 percent in 2008." *Western Farm Press*. September 17, 2008. <http://westernfarmpress.com/cotton/upland-production-0917/> (accessed December 4, 2009).

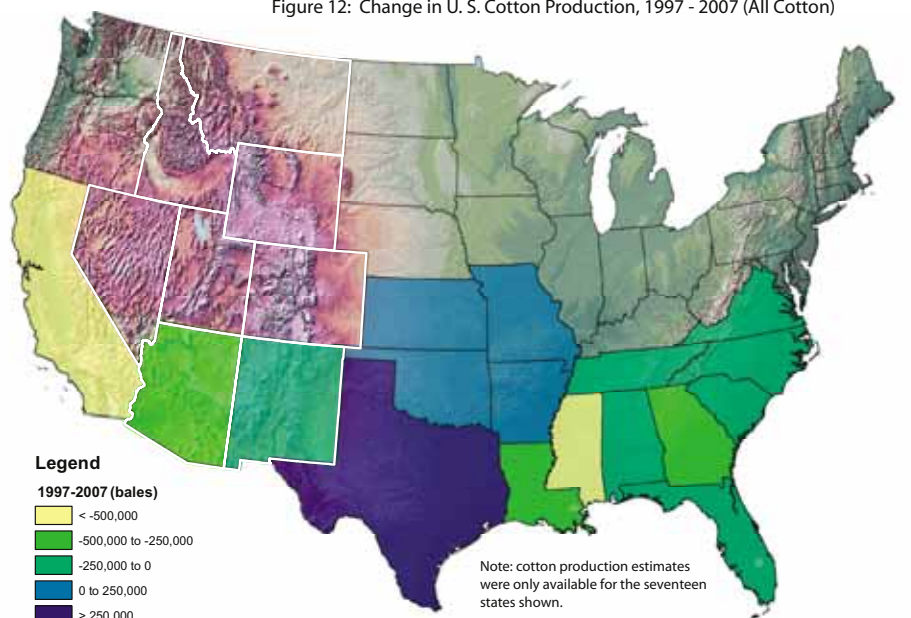
<sup>10</sup> United States Department of Agriculture. Agricultural Baseline Projections, "Baseline Presentation 2009-2018." <http://www.ers.usda.gov/briefing/Baseline/> (accessed December 4, 2009).

<sup>11</sup> "Arizona upland cotton production down 26 percent in 2008." September 17, 2008.

<sup>12</sup> United States Department of Agriculture. Agricultural Baseline Projections.

<sup>13</sup> Benning, Tom. "Texas Scorched by Worst Drought in 50 Years." *The Wall Street Journal Online*. July 28, 2009. <http://online.wsj.com/article/SB124872939604384837.html> (accessed December 4, 2009).

Figure 12: Change in U. S. Cotton Production, 1997 - 2007 (All Cotton)



Source: 2007 Census of Agriculture, National Agriculture Statistics Service, U. S. Department of Agriculture