Contribution of the Potato Industry to

Idaho's Economy

by Garth Taylor, Paul Patterson, Joe Guenthner, and Lindy Widner

HIGHLIGHTS

Idaho is the nation's largest producer, packer, and processor of potatoes. Idaho has been the number one potato-producing state for the past 50 years. The state's growers produce about 30% of the U.S. potato crop, but the Idaho potato industry is more than potato fields. Idaho frozen and dehydration processors produce 40% of U.S. processed potato products, and Idaho fresh packers provide one-third of the nation's fresh potato shipments.

Idaho's potato production, packing, and processing sectors combine to form the Idaho potato industry, which creates jobs, sales, and paychecks and adds value to the state's economy. Jobs, sales, value added, and income directly created by business in Idaho's potato industry are all measures of the industry's economic *size*. The total size of Idaho's potato industry in 2002 was:

- 15,500 jobs
- $3.4 billion in sales of potatoes and potato products
- $720 million in value added
- $490 million in income

Impact, another measure of an industry's role in the economy, measures the jobs, sales, value added, and income that are directly created by business activity in Idaho's potato industry plus the indirect jobs, sales, value added, and income created as "potato export dollars" ripple through businesses that are backward linked to the potato industry. The $2.7 billion in 2002 sales outside Idaho of fresh and processed potato products and of potatoes directly from the farm created a total impact of:

- 39,500 jobs
- $6.7 billion in sales
- $1.9 billion in value added
- $1.3 billion in income

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DEFINITIONS

Jobs—employment specified by the U.S. Department of Commerce.

Exports—sales of goods and services outside the state of Idaho. Thus, potato exports include sales of potatoes and of potato products to customers outside Idaho.

Value added—comprises four components: (1) wages and salaries, (2) proprietor's income, (3) indirect business taxes, and (4) dividends, interest, and rents. Value added is most closely aligned with the definition of state gross domestic product.

Income—paychecks, defined as two components of value added: (1) wages and salaries and (2) proprietor's income.

INTRODUCTION

Idaho's economic roots are firmly planted in agriculture. Idaho agriculture has grown from subsistence family farms into the vast agribusiness industry we know today, providing jobs and paychecks for Idahoans as well as food for the nation and the world.

Idaho farmers received over $700 million in potato revenue in 2002, making potatoes Idaho's number one crop that year. Potato production creates jobs and income, not only on the farm, but also in transportation and farm supply industries. Further economic activity is generated when potatoes are packaged for the fresh market or processed for the frozen and dehydrated product markets.

This study measured the contribution to Idaho's economy of the four sectors of the potato industry—production, fresh packing, dehydration processing, and frozen processing—in 2002. Idaho's potato industry is concentrated along the Snake River Plain, extending from eastern Idaho through the Magic Valley to western Idaho's Treasure Valley. The potato industry in Malheur County, Oregon, was included in this analysis.

STRUCTURE OF IDAHO'S POTATO INDUSTRY

Idaho farmers have been growing potatoes since before statehood. But it was the introduction into Idaho of the Russet Burbank, possibly as early as 1895, and its extensive planting on Idaho's new irrigation projects that launched the potato industry into the level of prominence seen today. Because Idaho potato fields were distant from most U.S. consumers, Idaho's potato industry needed marketing help. Marketing help arrived when the Idaho Potato Commission developed promotion, quality control, and research programs. The combination of production and marketing expertise created the image of the Idaho potato as a superior product for which consumers were willing to pay a higher price.

By 2002 Idaho accounted for 32% of U.S. potato shipments. The Idaho fresh industry, which started as a seasonal business, now ships year-round due to improved storage technology and earlier maturing varieties. While Idaho growers planted Russet Burbank on 66% of their acres in 2006, this was a drop from 80% in 1997 and from 98% in 1987. The Russet Norkotah, a variety grown for the fresh market that was non-existent in 1987, went from 5% of potato acreage in 1997 to nearly 12% in 2006.

Figure 1. Idaho potato sales, by category, 2002.

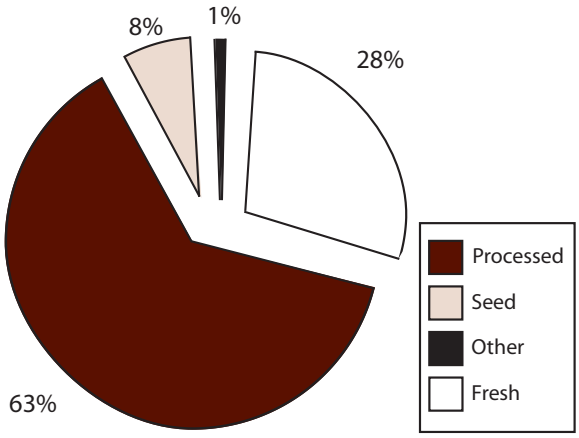
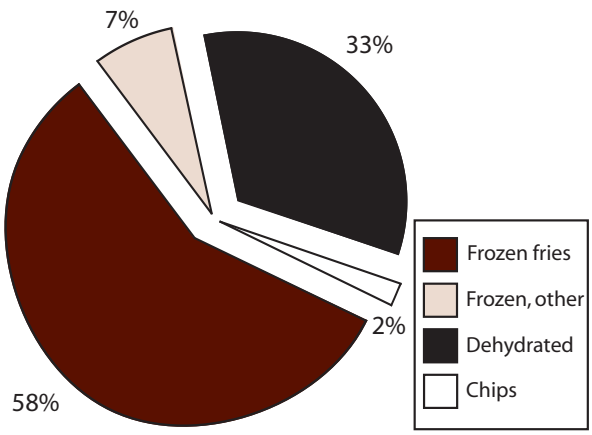


Figure 2. Idaho processed potato sales, by category, 2002.



The Russet Burbank also proved to be quite suitable for the processing industries. When dehydrated potato products were developed and frozen potato processing rode the wave of fast food popularity, processors used the Idaho-grown Russet Burbank for their raw product. Idaho quickly became the nation's biggest potato-processing state, accounting for 40% of processed potato production in 2002.

Like the fresh industry, processing also began as a seasonal business. Improved storage technology now allows processors to operate year-round with storages capable of maintaining quality for up to 10 months. New, early maturing varieties, such as Shepody, Ranger, and more recently, Alturas, increased processing efficiency. Processors achieve higher product recovery rates with newly harvested potatoes than with potatoes coming out of long-term storage.

USDA production and sales data were used to quantify the flow of potatoes leaving the farm for packing sheds and processing. On average 92% of Idaho's total potato production is sold off-farm. The majority of Idaho's potatoes are placed in storage and thus shrink and other losses typically account for 7% of Idaho potato production. The remaining 1% is used on-farm where produced (household use, livestock feed, and seed).

Figure 1 shows the primary marketing categories for potatoes sold off-farm. Commercial potato growers sold 91% of Idaho's crop to the fresh and processing markets in 2002. The processing category, which includes frozen, dehydration, and chipping, accounted for nearly two-thirds of Idaho's crop. Fresh market sales by growers accounted for 28% of the total, while the Idaho seed potato industry made up 8%. The remaining 1% in the "other" category is a residual that includes potatoes sold for livestock feed and paid diversion programs.

Frozen fries made up the largest category of Idaho potato processing at 58% of sales (figure 2). Together with the "other frozen" category, total frozen potato processing constituted almost two-thirds of all Idaho processed potato sales. Dehydrated potatoes made up one-third of the processing sector, and potato chips made up the remaining 2%.

Idaho potato production experienced significant growth during the 1980s and early 1990s (figure 3). The growth resulted from both an increase in planted acres and significant yield increases. From 1987 to 2006 average yields increased by 15%, from 296 to 341 cwt per acre, an average annual growth rate of 0.75% (2.2 cwt) per year.

The late 1980s and early 1990s also saw a significant expansion of potato production in other major U.S. potato states and in Canadian provinces to meet a growing demand for processed potatoes. Domestic consumption of French fries grew, and overseas markets expanded rapidly, especially in Asian Rim countries.

The expansion of the Canadian potato industry was helped by trade agreements that reduced trade barriers and by a strong U.S. dollar that

hurt U.S exports to the rapidly growing Asian market. From 1991 to 2003 the Canadian potato industry set new production records nine times.

When the overseas export market declined during the Asian financial crises of the late 1990s, more Canadian fries moved into the U.S. market. To balance processing capacity for a shrinking market, processors reduced production and ultimately closed several older Pacific Northwest plants in favor of the newly constructed and more efficient plants in Canada. This included Simplot's Heyburn, Idaho, plant, which closed in 2003.

The loss of contract acres was particularly acute in Idaho. The initial response by growers in Idaho—reducing potato acres—was not sufficient to match the lower demand from processors. With more open-market potatoes and a fresh market plagued by declining consumer demand, the price for fresh potatoes and open-market processing potatoes collapsed in 2000.

As overseas demand has picked up in recent years, and as the U.S. dollar has weakened, some frozen processing contract acreage has returned to the Pacific Northwest. The Idaho potato industry has also made the painful adjustments necessary to bring supply in line with demand. But with a continuing decline in fresh potato consumption in the U.S., more changes are likely for the industry. Changes in Idaho's potato industry, both positive and negative, will have impacts far beyond the potato fields.

CONTRIBUTION OF POTATOES TO IDAHO'S ECONOMY

The potato industry does not exist in isolation. Rather, it purchases inputs and adds value before selling potato products to consumers. A chain of industries forms a potato industrial complex of linked buyers and sellers. From any one link in the chain, the industries that supply inputs are *backward linked*. The industries to which goods and services are sold are *forward linked* to the potato industries.

Potato growers are at the center of Idaho's potato industrial complex. Backward linked industries are the agricultural suppliers that provide financing, fertilizer, chemicals, machinery, and other inputs. Also backward linked are the businesses such as retail stores, accountants, and fuel distributors that are linked to the agricultural supply firms. Forward linked industries from potato growers are the fresh packers and dehydration and frozen products processors. Forward linked to processors and packers are food retailers and the food service industry. Restaurants and grocery stores are excluded from our definition of the Idaho potato industry because they would exist even in the absence of potato production in the state.

The contribution of the potato industry to Idaho's economy is evaluated using two measures—industry size and industry impact. Size measures the magnitude of the potato industry, while impact measures the linkages of the potato industry to other industries of Idaho's economy.

Figure 3. Idaho potato production and planted acres, 1987-2006.

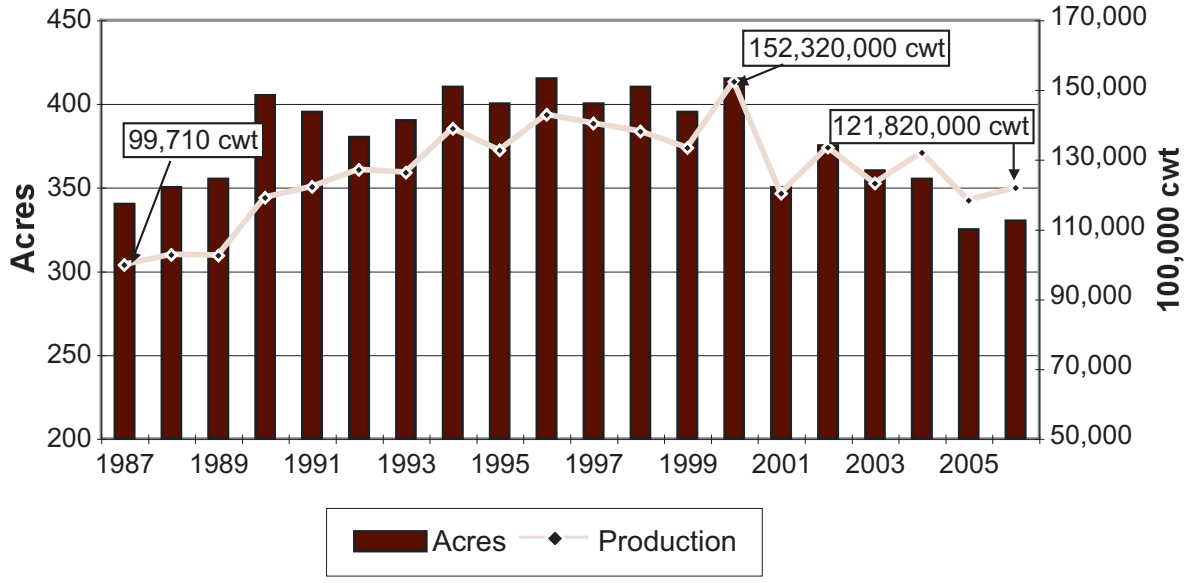


Table 1. Idaho potato industry size, by sector, 2002.

	Sales ($ millions)	Jobs	Income ($ millions)	Value added ($ millions)	Exports ($ millions)
Production	$720	4,300	$130	$210	$110
Frozen processing	$1,300	6,000	$170	$280	$1,270
Dehydration processing	$970	3,200	$100	$110	$920
Fresh packing	$400	2,000	$90	$120	$400
Total	$3,390	15,500	$490	$720	$2,700

Potato Industry Size

We used five categories to measure the size of Idaho's potato industry: sales, jobs, income, value added, and exports (table 1). Jobs include farm workers, fresh pack sorters, processing line workers, etc., employed by the farms and businesses of Idaho's potato industry.

As shown in figure 2, a majority of Idaho's potatoes are destined for frozen processing. Correspondingly, with all five size measures, the largest segment of Idaho's potato industry is frozen processing and the smallest is fresh packing. Production and dehydration processing swap second and third rankings depending on the size measure. For example, dehydrated sales are larger than farm (production) sales, but the dehydration processing sector employs fewer workers.

Size Highlights

Sales—Idaho potato industry sales were nearly $3.4 billion in 2002. Frozen processed potato sales were $1.3 billion, and dehydrated potato products brought in nearly $1 billion.

Jobs—Over 15,000 can be attributed to the Idaho potato industry in 2002.

Income—The Idaho potato industry paid close to half a billion dollars in wages, salaries, and proprietor's income. Over one-third was paid by frozen processors, and over a fourth by growers.

Value Added—The Idaho potato industry added over $700 million of value to the Idaho economy in 2002. Over a third ($280 million) came from the frozen potato processing industry, and nearly 30% from growers ($210 million).

Exports—Idaho potato industry sales to customers outside Idaho totaled $2.7 billion in 2002. Virtually all processed and fresh potato products were exported out of state as opposed to only 15% of potato sales from farms being sold to export markets.

Potato Industry Impacts

Businesses whose sales are mostly to customers outside Idaho are *basic* industries. *Nonbasic* industries are support businesses that sell goods and services to other businesses within Idaho. Thus, Idaho potato farmers are a nonbasic industry because they sell raw potatoes to in-state fresh packers and processors. Processors and fresh packers are basic industries because they sell virtually all their product out of Idaho.

Economic impact analysis estimates the contribution of nonbasic businesses to the basic industries they serve. Impacts are partitioned into two levels: (1) direct impacts of each segment of the potato industry and (2) indirect impacts as revenues "ripple" through the economy.

The potato industry's direct and indirect sales impacts totaled nearly $7 billion in 2002 (table 2). The total job impact of Idaho's potato industry was close to 40,000 jobs, of which 11,600 were employed directly in the basic potato businesses and an additional 27,800 were created indirectly in nonbasic industries.

Frozen potato processing, with $3.16 billion in direct and indirect impact sales, was the largest segment of the Idaho potato industry. The dehydration processing industry was the next largest, with $1.96 billion in total impact sales, followed by the fresh packing industry at $1.25 billion. The total (direct plus indirect) sales impact of potato production, $0.31 billion, was a fraction of the industry total, $6.68 billion.

The huge impact of Idaho's potato industry results from potato processing and fresh packing. That does not mean that potato growers are not as important as the other segments of the Idaho potato industry. Idaho's three forward linked potato industries—frozen processing, dehydration processing, and fresh packing—multiply the economic impact of Idaho's potato production activity, adding value before the potatoes leave the state.

Table 2. Idaho potato industry direct and indirect impacts, by sector, 2002.

	Impact	Sales ($ billions)	Jobs	Income ($ billions)	Value added ($ billions)
Production	Direct	$0.11	657	$0.02	$0.03
	Indirect	$0.20	1,573	$0.05	$0.08
	Total	$0.31	2,230	$0.07	$0.11
Frozen processing	Direct	$1.27	5,968	$0.17	$0.28
	Indirect	$1.89	13,043	$0.42	$0.66
	Total	$3.16	19,011	$0.59	$0.94
Dehy processing	Direct	$0.92	3,004	$0.09	$0.10
	Indirect	$1.04	7,350	$0.24	$0.37
	Total	$1.96	10,354	$0.33	$0.47
Fresh packing	Direct	$0.40	1,977	$0.09	$0.12
	Indirect	$0.85	5,877	$0.18	$0.29
	Total	$1.25	7,854	$0.27	$0.41
Total industry	Direct	$2.69	11,606	$0.37	$0.53
	Indirect	$3.99	27,843	$0.89	$1.39
	Total	$6.68	39,449	$1.26	$1.92

Impact Highlights

Sales—Total sales were $6.68 billion of which $2.69 billion were direct and $3.99 billion were indirect. Total sales created by Idaho's potato industry throughout Idaho's entire economy—both in businesses in the potato industry and indirectly from the multiplier effect—were 70% greater than Idaho's 2002 total farm gate cash receipts ($3.95 billion).

Jobs—The direct impact is 11,600 jobs in potato farming, processing, and fresh packing. Another 27,600 jobs were indirectly created for a total of nearly 39,500 jobs, about 5% of Idaho's total employment.

Income—The paychecks of those directly employed in the Idaho potato industry is a third of a billion, and the indirect income is just under $0.9 billion, for a total of $1.26 billion.

Value Added—Idaho's potato industry created $1.9 billion of value added. In 2002, Idaho's gross state product (GSP) was $36.7 billion. Thus the potato industry contributed over 5% of Idaho's GSP.

CONTRASTING SIZE AND IMPACT

Confusion often arises in comparing the economic *size* and the economic *impact* of an industry because both measure the same attributes (sales, jobs, income, and value added), but they measure them differently. Illustrating how and why size and impact differ can be best achieved by examining the potato industry in terms of jobs.

The *size* of the potato industry in terms of jobs is a simple count of the 15,500 jobs in the four sectors of the potato industry (table 1). In contrast, the industry's 39,499-job *impact* is the jobs created by "potato dollars," or the exports from the four sectors of Idaho's potato industry. Thus, the jobs impact is over two and a half times the size of employment in Idaho's potato industry.

Impact classifies jobs based on whether they are directly or only indirectly tied to exports (the sales outside the state that bring in new money). Of the 15,500 jobs counted as the size of the potato industry, 11,606 jobs are created by potato exports, the direct impact jobs (657 in potato production, 5,968 in frozen processing, 3,004 in potato dehydration, and 1,977 in fresh packing) (table 3). The remaining 3,894 jobs (15,500 minus 11,606) are not directly tied to exports but are included in the 27,843 jobs of indirect employment (tables 2 and 3).

Indirect employment includes jobs in both the potato industry and other industries of Idaho's economy. Only 15% of jobs in potato production (farming) are directly tied to exports (657 jobs out of nearly 4,300) (table 3). The remaining 3,600—the indirect jobs impact in the production sector—exist because of sales within the state: seed sales to other Idaho potato growers (48) and commercial potato sales to the frozen processing sector (1,611), the dehydration sector (784), and the fresh packing sector (1,160).

In sharp contrast to potato production (farm) jobs, virtually all (99%) of the 6,000 frozen processing jobs and the 2,000 fresh packing jobs count as direct impact jobs because sales from those sectors are essentially all outside Idaho (exports). And 94% of the 3,200 jobs in dehydration processing are directly linked to exports.

The small number of direct jobs in the potato production sector (table 3) relative to the number of indirect jobs shows farming is a nonbasic sector in the Idaho potato industry, backward linked to the potato processing and fresh packing sectors.

Table 3. Direct and indirect jobs impact of Idaho's potato industry.

	Direct impact	Indirect impact				
		Production	Frozen processing	Dehydration processing	Fresh packing	Total indirect
Finance, insurance, real estate	0	144	824	455	459	1,882
Livestock	0	9	73	36	28	146
Manufacturing	0	90	760	368	291	1,509
Mining and construction	0	31	643	439	196	1,309
Other crops	0	9	74	38	30	151
Potatoes—frozen processing	5,968	0	0	0	0	0
Potatoes—dehydration processing	3,004	0	2	1	1	4
Potatoes—fresh packing	1,977	0	0	0	0	0
Potatoes—production	657	48	1,611	784	1,160	3,603
Retail trade	0	283	1,563	862	778	3,486
Services	0	779	5,439	3,261	2,423	11,902
Transportation, communications, utilities	0	87	1,418	844	269	2,618
Wholesale	0	92	634	262	241	1,229
Total	11,606	1,573	13,043	7,350	5,877	27,843

The basic sectors of Idaho's potato industry—frozen and dehydration processing and fresh packing—sell virtually all their product outside Idaho so there are essentially no indirect jobs linked to the other potato sectors.

However, the basic sectors have a big indirect job impact upon Idaho's service businesses. For example, the frozen processing sector creates 5,439 jobs in Idaho's service businesses. The frozen sector indirectly creates 1,611 jobs in the backward linked potato production sector and 1,563 jobs in retail trade businesses (table 3). This is the major strength of Idaho's potato industry and why its impact is over two and half times its size. The same pattern holds true for or all the other attributes (value added, etc.); the impact of Idaho's potato industry is far greater than its size.

IDAHO INPUT/OUTPUT MODEL AND POTATO INDUSTRY MULTIPLIERS

A state economy has three components: (1) local businesses that buy and sell goods and services to each other (households with their labor and wages are considered one of those businesses), (2) exports, or the new money that drives the economy, and (3) imports, savings, and taxes—inputs without which local businesses could not produce goods or services. All three components are necessary to create wealth, income, and jobs for residents of that economy.

To model the relationships between these three components, we constructed an input/output (I/O) model of the Idaho economy. An I/O model is a representation of a regional economy that links changes in the transactions between these components. The impact analysis examines the effects of a change in exports on the entire economy.

Exports—the new money coming into an economy—set off a web of transactions as each business seeks to fulfill its customers' demands. Successive rounds of production and demand arise because suppliers need local inputs to make and sell their outputs. These reverberations gradually wane as a portion of each round of spending leaks out to saving, taxes, and imports.

A multiplier is composed of the direct plus indirect effect. The greater the leakage (imports) the smaller the multiplier. Thus, multipliers are measures of self-sufficiency. Four multipliers were calculated for Idaho:

Sales Multiplier—the sum of direct and indirect sales from all sectors of the economy for one additional dollar of export sales.

Jobs Multiplier—the sum of direct and indirect jobs from all sectors of the economy for an additional $1 million dollars of export sales.

Income Multiplier—the sum of direct and indirect income from all sectors of the economy for one additional dollar of export sales.

Value Added Multiplier—the sum of direct and indirect value added from all sectors of the economy for one additional dollar of export sales.

Estimates of the four multipliers for the potato industry are in table 4. For comparison, estimates of multipliers of other Idaho industries that are linked to the potato industry are also included.

Table 4. Idaho industry multipliers.

	Sales ($ per $1 exports)	Jobs (Jobs per $1 million exports)	Income ($ per $1 exports)	Value added ($ per $1 exports)
Finance, insurance, real estate	2.4	18.1	0.52	1.11
Livestock	3.1	24.9	0.53	0.87
Manufacturing	3.1	19.1	0.69	1.01
Mining & construction	3.2	26.6	0.87	1.19
Other crops	2.8	22.9	0.67	1.13
Potatoes—frozen processing	2.5	15.0	0.47	0.74
Potatoes—dehy processing	2.1	11.3	0.36	0.51
Potatoes—fresh packing	3.2	19.8	0.67	1.01
Potatoes—production	2.8	20.3	0.63	0.99
Retail trade	2.8	33.3	0.84	1.35
Services	3.1	32.2	0.98	1.38
Transportation, communication, utilities	2.8	19.8	0.71	1.17
Wholesale	2.7	22.1	0.78	1.30

Multiplier Highlights

Sales Multiplier—Fresh Packing. The output or sales multiplier for the fresh packing sector (3.2) is highest because the two largest inputs used in producing the packaged fresh potatoes are locally grown Idaho potatoes and local labor.

Sales Multiplier—Processing. Potato dehydration processing (2.1) and frozen potato processing (2.5) have lower sales multipliers than fresh packing because they use a greater proportion of imported inputs. Processing requires local potatoes and local labor, but a higher proportion of other inputs are purchased from out-of-state suppliers.

Jobs Multipliers. The jobs multipliers for the segments of the potato industry range from 11.3 for dehydration processing (the lowest jobs multiplier) to 20.3 for potato production. Lower multipliers reflect labor efficiencies that require fewer workers per dollar of output.

Income Multipliers. Potato industry income multipliers range from 0.36 for dehydration processing and 0.47 for frozen processing to 0.63 for production and 0.67 for fresh packing.

Value Added Multiplier. Fresh pack and potato growing industries have the highest value added multipliers at 1.01 and 0.99 respectively. Dehydrated processing has the lowest value added multiplier at 0.51. Thus, a change in potato fresh pack exports affects Idaho's GSP almost twice as much as the same change in exports of dehydrated potatoes.

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