

Oregon Agriculture, Food and Fiber: An Economic Analysis

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Notes for the Reader

This report provides a profile of agriculture, food and fiber in the Oregon economy and includes estimates of economic contributions. Those measurements may be standalone estimates or a different way of representing or separating a standalone metric already in the report (e.g. value-added portion of sales). Readers need to exercise care when adding one metric to another to avoid double counting. This can happen when a standalone estimate is combined with one of its components like adding the *value-added portion of sales* estimate, which is a part of sales and includes only the value-added by a business and does not include the value of inputs purchased from the business' suppliers, to the *sales* estimate. This value-added component of total sales can be the most useful estimate for determining economic contribution and is comparable to the U.S. GDP. If you have questions about which measurements can and cannot be combined, please contact one of the authors or another Extension economist.

We welcome sources for more precise and reliable data; please contact the authors if you have suggestions to improve our estimates. This analysis should be considered within the context of combining different data sets and in some cases different years of data to get a consistent picture of the size and characteristics of the Oregon agriculture, food and fiber industry.

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“Agriculture’s contributions to our economy and to our environment are important. But frankly, its contribution to what is the fabric of Oregon is most noteworthy. Oregon would not be what it is without our agriculture industry. Whether it’s small farms, large farms, whether products are marketed locally or internationally, it’s all a valued part of our way of life.”

-Katy Coba, Director
Oregon Department of Agriculture



Introduction

During the Great Recession of 2007-2009¹ and the continuing recovery, parts of the state’s agriculture, food and fiber industry have outperformed other sectors. In 2015, the Oregon economy is recovering and the agriculture, food and fiber industry has continued its steady growth. This report provides a series of estimates of the agricultural, food and fiber industry’s growth and contributions to the larger Oregon economy, key findings include:

- Oregon’s agriculture, food and fiber industry is economically linked to approximately 13.2 percent, \$50 billion, of all Oregon sales, 10.6 percent, \$22.9 billion, of Oregon’s net state product and 13.8 percent, 326,617, of full and part-time jobs in Oregon.
- Oregon’s principal operators of farms and ranches make up less than one percent of the total population of Oregon. However, when paid and unpaid on-farm workers are included the total number of workers on the farms and ranches increases to approximately four percent of Oregon’s population.²
- The number of farms and ranches and total farm acreage has decreased. However the output of Oregon farms has increased 39 percent to \$5.7 billion dollars between 2010 and 2014.
- Farmers and ranchers have increased the efficiency of their use of inputs (land, water, chemicals, etc.) from 1960 when Oregon ranked 46th out of the 50 states to today when it ranks 15th and is still improving at a rate of 1-3 percent per year.

¹ U.S. Bureau of Labor Statistics 2012. *BLS SPOTLIGHT ON STATISTICS THE RECESSION OF 2007–2009*.
http://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf

²U.S. Census Bureau 2014. *Census of Agriculture 2012*, Chapter 2. Tables 1 and 7.
http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_1_US/usv1.pdf

This report briefly profiles and then provides estimates of the economic effects based on sales, jobs, and the income portion of sales or net product for the agriculture, food and fiber industry. Specifically, in this analysis we:

- Describe Oregon's agricultural industry (e.g. number of farms, ranches and crops by acres and sales).
- Estimate agriculture's "economic footprint" or the linkages in all Oregon industries to the agriculture, food and fiber industry.
- Calculate the extent to which Oregon's economy depends on agriculture, food and fiber exports.
- Discuss the implications of these findings for the future of the agriculture, food and fiber industry and the economy of Oregon.

In the 2011 update of this report, we extended the analysis of Oregon's agricultural contributions from farmgate to dinner plate. In that report, we included all the food service and drinking places industry with the caveat that these jobs and sales were an estimate of the potential economic effects if food services and drinking places sold only Oregon food and beverages. In this report we have refined this analysis by developing a method to estimate the portion of food services and drinking places that rely on Oregon food. We provide two estimates; 1) the portion of food services and drinking places that rely on Oregon produced food and the expenditures in the rest of the economy that are linked to these services and 2) the potential for growth of Oregon agriculture, food and fiber industry and the whole Oregon economy if half of the food used to create meals in Oregon's food and drinking places was grown and/or processed in Oregon.

When we gathered detailed data for this analysis or made estimates using the IMPLAN model, we included the calculated number. While the numbers produced using an IMPLAN model appear to be precise by providing detailed numbers to the dollar and job, they are likely to have some error and are all estimates.

What businesses are included in the agriculture, food and fiber industry?

Each time we do this report, we reconsider what industrial sectors to include in the aggregated agriculture, food and fiber industry. We must include the farmgate and dockside production sectors (e.g. grain farming, beef cattle ranching and fishing) food processing (e.g. frozen fruits, juices and vegetables manufacturing and seafood processing) and fiber industries that might use primary agricultural inputs (leather processing and wool). However, it remains difficult to accurately estimate the economic linkages of industries directly related to farmgate and processing production.

Directly related industries, or goods and services that may be provided by the farmers and food processors if they are not available from other businesses, include wholesale trade, transportation and warehousing and retail trade. The "Food Dollar"³ is used to provide an estimate of the percentage or cents of a dollar expenditure on food that can be attributed to each step in food production, distribution and sales process. Since the first step is producing the commodity or farm production for which we have an estimate, we can calculate the other steps by comparing their percentage of the food dollar with the farm production percentage (10.5 percent).⁴

³ Canning, Patrick 2015. Food Dollar Series – Documentation. USDA Economic Research Service. <http://www.ers.usda.gov/data-products/fooddollar-series/documentation.aspx>

⁴ Ibid.

Using the IMPLAN model we can obtain a better estimate of the food services and drinking places' sales that are linked to Oregon agriculture, food and fiber than from a food dollar approach. The IMPLAN model calculates the percentage of Oregon food and beverages used by Oregon food services and drinking places as 31.5 percent. We considered that portion of the food services and drinking places sector to be a forward linkage to basic agricultural and food production.

Oregon Farm and Ranch Overview

Oregon is home to approximately 35,000 farms and ranches. A farm is defined as any place from which \$1,000 of agricultural products were produced and sold, or normally would have been sold, during the Census of Agriculture (2012) year. These farms and ranches grow and raise over 225 different crops on 16.3 million acres. Oregon's principal operators of farms and ranches make up less than one percent of Oregon's total population. However, when paid and unpaid on-farm workers are included that percentage increases to four percent of Oregon's population.⁵ Over the years the decline of the number of farmers reflects both production efficiencies that have reduced the need for farm labor and changes in the operator to hired labor ratio. Hired labor has moved "farmer" or farm labor residences off the farm though the work is still done on farm. Table 1 provides a snapshot of Oregon farms and ranches.

Table 1. Oregon farm and ranch highlights

Category	1997	2002	2007	2012
Number of farms and ranches	39,975	40,033	38,553	35,439
Total land in agriculture (millions of acres)	17.7	17.2	16.4	16.3
Total ag land and buildings value (billion dollars)	17.7	20.4	31.0	31.0
Average value/acre (dollars)	1,005	1,185	1,802	1,882
Market value of farm sales (billion dollars)	3.9	3.8	4.8	4.9
Net farm income (million dollars)	0.67	0.50	0.86	0.96

Source: United States Department of Agriculture (USDA)-NASS Census of Agriculture and USDA Economic Research Service

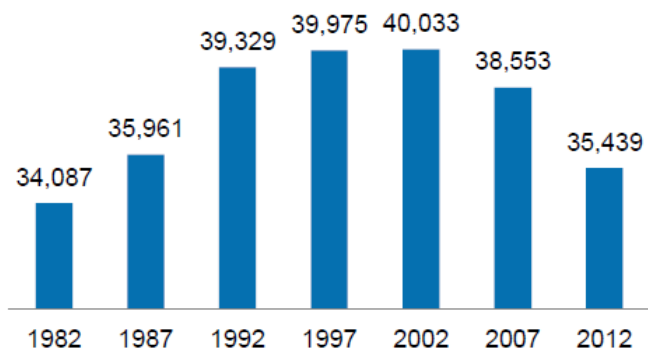
Farm numbers decline but size and sales increase

As Table 1 shows, there has been a decline in the number of farms and a small decline in the number of acres in agricultural production between 2007 and 2012. As Figure 1 indicates, this is not a new trend for Oregon. Nor is it unique to Oregon. The number of farms in the U.S. declined 4.3 percent, or by approximately 95,500 farms, from 2007 to 2012.⁶

⁵U.S. Census Bureau. Census of Agriculture 2012, Tables 1 and 7.

⁶USDA-NASS 2012. U.S. Census - Table 1. Historical Highlights: 2012 and Earlier Census Years.

Figure 1. Change in Number of Oregon Farms 1982-2012

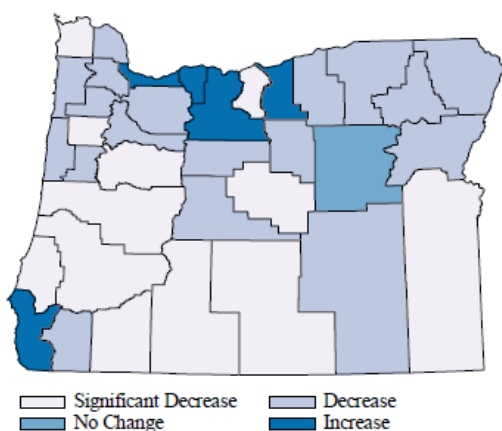


Source: USDA NASS 2012 Census of Agriculture Oregon Highlights

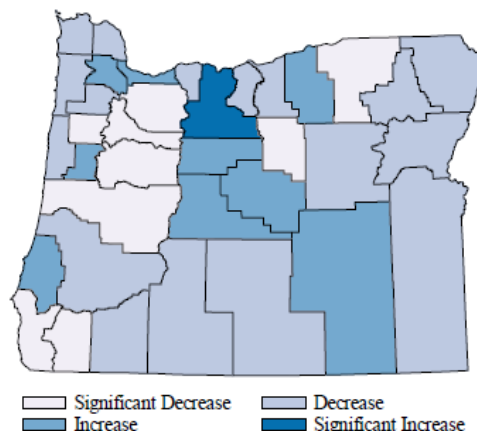
Changes in number of farms and farm acreage are distributed across the Oregon counties as Figure 2 illustrates. The number of farms in Oregon declined by 8.1 percent, while the total acreage only declined by 0.6 percent. The farms and ranches with sales below \$5,000 have decreased from 22,101 to 18,728 or by 3,373 farms; however farms with sales above \$5,000 have increased from 16,452 to 16,711 or by 259 farms with the largest increase in the \$10,000 to \$24,999 category of sales. These factors combined to cause the average size of a farm to increase from 425 to 460 acres.⁷

Figure 2. Change in Number of Oregon Farms and Acreage 2007 to 2012 by County

Change in Number of Farms, 2007 to 2012



Change in Land in Farms, 2007 to 2012



Source: USDA NASS 2012 Census of Agriculture Oregon Highlights

These changes are due to a number reasons. Since the average acres per farm increased by 35 acres some consolidation of farming operations is a likely reason. The recent recession seemed to have taken its toll on many of the smaller farms that did not have the reserves or assets to weather the hard times. Also affecting some counties is the conversion of agricultural land to other purposes. While Oregon’s land use laws slow the conversion of agricultural land to other uses, as populations increase, urban growth boundaries (UGB) fill up and these boundaries and uses are expanded onto agricultural lands reducing the number of agricultural acres.

⁷USDA-NASS 2012. Oregon Census - Table 1. Historical Highlights: 2012 and Earlier Census Years and Table 2. Table 2. Market Value of Agricultural Products Sold Including Landlord’s Share and Direct Sales: 2012 and 2007.

Conversion of farmland on the urban fringe can create unforeseen compatibility issues (e.g. timing and costs of farm practices) for remaining farmers and ranchers, which may ultimately contribute to even more acres removed from agricultural production due to the higher management costs. At the same time, for farms and ranches with a high proportion of their sales made directly to consumers or which have agritourism as a part of their operations, proximity to population centers can create opportunities for them to use more value added practices.

Non-farm development on agricultural lands; recreational developments, conservation reserves, rural residential use and aggregate mining also remove acres from production. Unlike urban growth, these conversions on agricultural lands can be more easily reversed than residential and large scale commercial developments.

Also a contributing factor to these changes in agricultural land use may be the increasing average age of the operators of farms and ranches. Oregon's average age for farmers and ranchers (all operators) has increased from 55.3 to 57.4 over the last five year years.⁸ An aging farmer/rancher population could contribute to the number of farms and ranches sold either to be added to another farm or ranch or for other uses.

Despite a decrease in the number of farms and overall agricultural acres, the market value for Oregon farmgate production has increased as discussed below. The increase in sales caused Oregon farmers and ranchers to experience increases in the value of the agricultural land and buildings as well as the average value per acre.

Increasing value of agricultural lands and building is important as it increases the value of collateral farmers and ranchers use to secure operating and investment capital, adds more certainty that reasonable returns on investment can be attained and allows those farmers and ranchers who lease their land to others to increase the price of land they lease. However, the negative effects are increased cost of production for those farmers and ranchers who need to lease acreage and the additional motivation to sell the farm or ranch when the market is strong.



⁸Oregon 2007 Census of Agriculture – State Data USDA, National Agricultural Statistics Service Table 49 and Selected Operator Characteristics for Principal, Second, and Third Operator: 2007. OREGON 2012 CENSUS OF AGRICULTURE - STATE DATA USDA, National Agricultural Statistics Service Table 55. Selected Operator Characteristics for Principal, Second, and Third Operator: 2012.

Farms and Ranches by Type

Oregon's variety of soils and climatic regions support a diverse agriculture, food and fiber production. Table 2 categorizes farming into two categories *Crop Production* and *Animal Production*. It should be noted there are a number of ways to categorize and measure production. The National Agricultural Statistics Service (NASS) categorizes the data using the North American Industry Classification System (NAICS), which broadly describes all types of industry in the U.S. and sacrifices details.

This loss of detail is an important consideration. Many of Oregon's commodities that traditionally appear in the Oregon Department of Agriculture and other agencies' information include products, such as hay, that are significant components of the Oregon agriculture, food and fiber industry yet are not specifically identified in NAICS. Continuing with hay as the example, it is included in "Other crop farming" by NAICS. Hay farming as part of other crop farming is the largest crop farming type with 4,877 farms and over 1.5 million acres and it is the second largest type of farm that sells its production. Hay is raised in almost every corner of the state. The Oregon beef and milk industries create year round demand for Oregon hay. Hay is also an important export for Oregon with approximately two-thirds of the hay production exported to other states and countries.⁹

Cattle ranching and farming, which includes dairy cattle and milk production at 8,905 farms, is the most prevalent farming type that sells their production in the state. Cattle are also raised on a wide variety of soil and topography across the state.



Oregon has a robust specialty crop industry. Among specialty crops, fruit and nut farming has the largest number of farms at 4,280¹⁰—with berry farms, excluding strawberry farming, leading in this category. Oregon is a national leader in terms of agricultural production for several fruit and tree nut farms including blackberry, boysenberry, hazelnuts and black raspberry production. In 2013, Oregon ranked among the top 4 states nationally for total production of 29 different specialty crops.¹¹

Grain farming and crops used to produce bio-oil also utilize a large number of acres. This is predominately due to the state's large wheat industry. Most of Oregon's wheat production takes place east of the Cascade Mountains where farmers have access to large tracts of land. After hay, wheat is the predominate crop in this region due to its ability to be cultivated in dry-land production systems.

⁹IMPLAN Group, LLC, IMPLAN System (data and software), 16740 Birkdale Commons Pkwy, Suite 206, Huntersville, NC 28078 www.implan.com

¹⁰USDA-NASS. 2012 Oregon Census Highlights Report.

¹¹Oregon Department of Agriculture. Oregon Agriculture: Facts and Figures 2014.

http://www.nass.usda.gov/Statistics_by_State/Oregon/Publications/facts_and_figures/facts_andfigures.pdf

Table 2. Oregon farms and farmland by type

Farm type	Number of farms	Number of acres
Animal Production	19,079	10,286,625
Cattle ranching & farming	11,904	8,503,954
Sheep and goat farming	1,871	154,830
Poultry and egg production	965	30,454
Hog and pig farming	447	24,925
Animal aquaculture	70	11,744
Other animal production	3,822	1,560,718
Crop Production	16,360	6,014,953
Fruit and nut farming	3,689	280,476
Greenhouse, nursery and floriculture production	3,147	247,757
Grain and oilseed farming	1,209	2,113,015
Vegetable and melon farming	1,184	282,330
Other crop farming	7,131	3,091,375

Source: USDA NASS, 2012 Census of Agriculture, Table 51

Farm and Ranch Ownership

According to NASS in the Census of Ag, 91 percent of Oregon farms are owned by a family/individual or owned by a family-held corporation (see Table 3 and Figure 3). In the Census of Agriculture, NASS does not separate the partnerships farm category between related and unrelated people, yet in its 2012 typology report NASS indicates 96.7 percent of farms in Oregon are family-owned.¹² This leads us to believe that most of the farm partnerships reported in Table 3 may also be family-held. Oregon's high level of family ownership is identical to the U.S. average.¹³

Table 3. Oregon farm and ranch ownership by legal status

Type	Percent (%)	Number
Family/individual	84.3	29,858
Corporation - family held	6.4	2,276
Partnership	6.6	2,330
Other corporation	0.7	264
Other	2.0	711
Total	100.0	35,439

Source: USDA-NASS, 2012 Census of Agriculture, Table 1

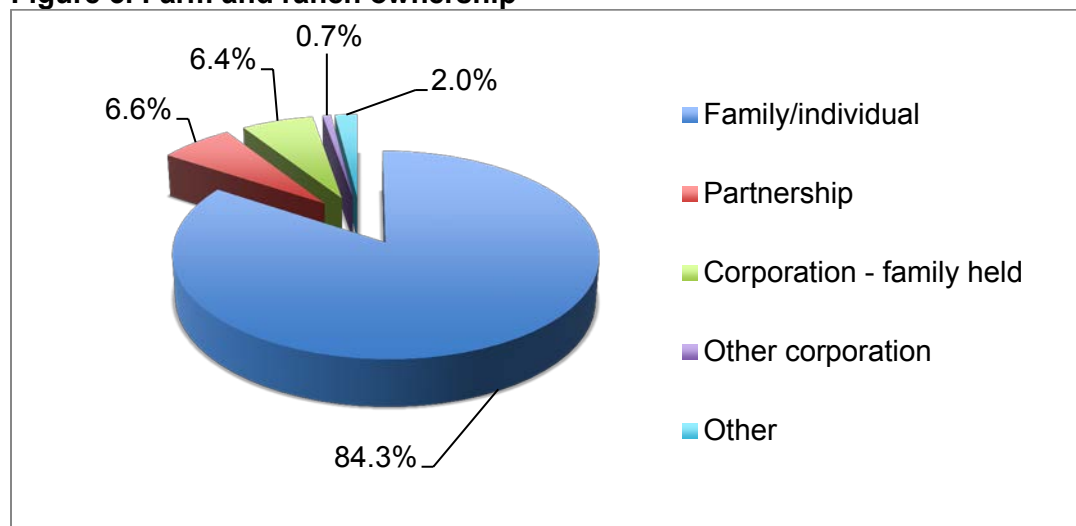
¹² USDA-NASS 2012. Table 38. Summary by Farm Typology Measured by Gross Cash Farm Income, Primary Occupation of Small Family Farm Operators, and Non-Family Farms - Oregon: 2012.

http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Typology/typology13_or.pdf

¹³ USDA-NASS 2012. Table 1. Summary by Farm Typology Measured by Gross Cash Farm Income, Primary Occupation of Small Family Farm Operators, and Non-Family Farms - United States: 2012.

http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Typology/typology13.pdf

Figure 3. Farm and ranch ownership



Source: USDA-NASS, 2012 Census of Agriculture, Table 1

Organic farming and ranching

A great deal of interest has focused on organic food over the last few years and now the US Census collects data on these farms nationally. Two points are important to recognize about organic farms; 1) of the over 35,000 farms and ranches in Oregon, fewer than two percent are in organic production and 2) while the number of Oregon farms and ranches classified as organic have declined, the number of acres have continued to increase. Table 4 provides more details on Oregon organic agriculture. Overall, the organic industry saw a decline in the number of organic farms from 2007 to 2012. The decrease was unexpected as the organic market saw growth during the recession while some other agricultural sectors struggled.¹⁴ The largest decline was reported in farms with less than \$5,000 in organic product sales.

Although there was a decrease in the number of organic farms, there was an increase in the number of organic acres. As mentioned above many smaller farms, a portion of which are organic, also struggled and their numbers declined during the recent recession. In addition and similar to the overall trend in agriculture, competition from larger farms that achieve higher economies of scale with all or a part of their operations as organic can reduce the price of organic commodities causing forcing smaller organic farms with higher costs of production to reduce their prices potentially their viability.

Still, organic farm sales continue to grow and generated \$194 million in farm sales in 2012, more than doubling the sales in 2007. Currently, organic agriculture production contributes four percent of the total farms sales in Oregon.

¹⁴Greene, Catherine, 2013, Growth Patterns in the U.S. Organic Industry, USDA ERS <http://www.ers.usda.gov/amber-waves/2013-october/growth-patterns-in-the-us-organic-industry.aspx#.VZQidOupNk8>

Table 4. Oregon organic agriculture highlights

Category	2007	2012
Number of farms selling organic products	799	554
Percent of total Oregon farms	2.1	1.5
Acres in organic production	92,405	358,779
Percent of total farmland in Oregon	0.6	2.2
Market value of organic farm sales (million dollars)	88	194
Percent of total market value of farm sales	1.9	4.0

Source: USDA-NASS, 2007 Census of Agriculture; USDA-NASS, 2012 Census of Agriculture; USDA Economic Research Service (based on information from USDA accredited state and private organic certifiers)



Farm direct sales and local food

Food sold from the farm or within the region directly to consumers or to local institutions and even large retail chains is also receiving additional emphasis from producers, consumers and decision makers. While we do not have precise data on the percentage of Oregon produced food that is purchased by Oregon food processors, food stores, and restaurants; we do have estimates of those farms and ranches in Oregon that are selling directly to consumers.

Almost 6,700 farms or 19 percent of all farms sold some, or all, of their products through direct sales. Direct sales include sales from roadside stands, farmers markets, U-pick, door-to-door, and Community Supported Agriculture (CSA). Table 5 provides more information on farm direct sales. These are conservative estimates of direct sales from the farmgate for two reasons; 1) only production for human consumption is included so direct farm sales of products like flowers, plants and hay are not in these estimates¹⁵ and 2) although there is an increase in the number of

farms involved with farm direct sales, a substantial decrease in the value of farm direct sales was reported during this time frame - one explanation for this decrease might not be attributable to decreased sales but rather due to data collection since in 2012, the value of Jackson County direct sales decreased from \$13.9 million in 2007 to \$1.5 million due to the exclusion of sales from one business.

Consumers' growing interest in eating local and knowing the origin of their food may increase opportunities for farmers to utilize direct market opportunities to increase their profits and diversify their operations.

¹⁵ United States Department of Agriculture National Agricultural Statistics Service 2012. *Report Form Guide*. http://www.agcensus.usda.gov/Help/Report_Form_and_Instructions/2012_Report_Form/2012_RFG_Final.pdf . Section 53, p. 54.

Table 5. Oregon farm direct sales

	2007	2012
Number of farms with direct sales	6,274	6,680
Value of direct sales (in thousand \$)	56,362	44,177

Source: 2007 and 2012 Census of Agriculture, Table 12

Farmers are also taking advantage of adding value to their commodities. An example of a value added commodity would be turning strawberries into jam. Table 6 reports a select number practices used by Oregon's farmers that add value to their products. This is another way farmers and ranchers are diversifying their operations to capture the value/revenue from the more finished product, thus providing insulation when commodity prices are low. However since the use of these value-added practices is relatively low, the majority of farmers still market their products as commodities. It should be noted that number of CSA's may be lower than 391 as searches of the internet for Oregon CSA's have not produced corroborating data or references for the hundreds of CSA's estimated in the Census of Agriculture.

Table 6. Farm value-added practices in Oregon

Value Added Practice	Number of farms using practice
Produced and sold value-added commodities	3,292
Marketed directly to retail outlets	1,898
On-farm packing	761
CSA	391

Source: 2012 Census of Agriculture, Table 43 - Selected Practices: 2012.

Overall, total sales for Oregon agricultural commodities continues to grow. From 2007 to 2012, sales of Oregon commodities grew 11.3 percent as shown in Table 7. This growth does not seem to be temporary as we discuss below when sales are updated to 2014 and converted to real dollars in Table 8.

Although agriculture is not as sensitive to U.S. or even global economic trends as many industries that rely more heavily on discretionary spending, some individual crops are and those sales fluctuated and/or declined between 2007 and 2012. An example is the nursery, greenhouse, floriculture and sod industry which experienced markedly reduced sales when the housing bubble burst and spending on landscaping and large recreational plantings like golf courses dramatically declined. The agriculture, food and fiber industry remains vulnerable to weather and disease. Hog and poultry farmers suffered severe losses due to viruses - the PEDV piglet and poultry flu respectively. Additionally, drought emergency declarations have been declared in two-thirds of Oregon's counties as of August 26, 2015.¹⁶

¹⁶Loew, Tracy 2015. *Two-thirds of Oregon counties now in drought emergency*. Statesman Journal 10:19 p.m. PDT August 26, 2015. <http://www.statesmanjournal.com/story/tech/science/environment/2015/08/26/two-thirds-oregon-counties-now-drought-emergency/32437531/>

Table 7. Oregon commodity sales 2007 and 2012 (\$000)

Commodity Group	2007	2012
All crops	2,976,087	3,247,432
Other crops and hay	698,104	803,688
Vegetables, melons, potatoes, and sweet potatoes	339,388	492,143
Christmas trees and short rotation woody crops	116,759	107,803
Nursery, greenhouse, floriculture, and sod	989,483	756,491
Fruits, tree nuts, and berries	515,582	517,166
Grains	316,772	570,142
All livestock and poultry	1,410,055	1,636,242
Cattle and calves	800,336	894,485
Milk from cows	401,786	519,790
Poultry and eggs	119,812	127,481
Other animal products	88,121	94,486
Total sales	4,386,142	4,883,674

Source: USDA NASS 2012 Census of Agriculture and 2007 Census for 2007 Milk from cows. Table 2. Market Value of Agricultural Products Sold Including Landlord's Share and Direct Sales: 2012 and 2007

Basic goods and services like those in the agriculture, food and fiber industry are less susceptible to general inflationary pressures than most goods and inflation has been quite low over the last decade so the increase in current dollar sales over the last few years has also been an increase in inflation adjusted or real dollar sales. USDA Economic Research Service (ERS) analysis of change in real dollar cash receipts between 2010 and 2014 confirms this point.¹⁷ Table 8 shows the ERS estimates and notes a 14.5 percent increase in cash receipts for 2014 over an average of the four previous years.

The majority of the increase in real dollar sales was driven by the animals and products industry. The sectors that experienced real dollar increases benefited from rising demand and technological improvements (e.g. increased substitution of equipment like optical LettuceBot by Blue River Technology machine weeders for labor and time released fertilizer). While the overall average and half of the commodities showed significant increases, a close look at the individual commodities reflects continued volatility of markets that are driven by what happens both in nature and politics around the world.



¹⁷USDA Economic Research Service 2015. U.S. and State-Level Farm Income and Wealth Statistics (Includes the U.S. Farm Income). http://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/annual-cash-receipts-by-commodity.aspx#P7a273624d37249ccb75feeb83c354bb6_4_16iT0R0x37

Table 8. Oregon farmgate cash receipts by commodity, 2010-2014 (2009 real dollars)

Oregon	2010 \$1,000	2011 \$1,000	2012 \$1,000	2013 \$1,000	2014 \$1,000	2014 change compared '10-'13 Average (%)
All commodities	3,739,951	4,629,618	4,866,609	4,947,709	5,204,332	14.5
Animals and products	1,053,384	1,432,017	1,502,802	1,553,726	1,902,977	37.4
Cattle and calves	424,950	654,952	714,275	714,389	898,278	43.2
Hogs	4,560	4,924	2,921	2,213	1,533	-58.1
Dairy products, Milk	406,582	508,927	468,749	494,042	598,912	27.5
Poultry and eggs	139,642	140,120	161,616	165,599	177,910	17.2
Miscellaneous animals and products	64,891	77,146	80,687	76,719	74,133	-1.0
Crops	2,686,567	3,197,601	3,363,807	3,393,983	3,301,355	4.5
Wheat	299,915	382,975	440,897	372,960	298,077	-20.3
Barley	8,812	11,244	16,845	12,238	7,212	-41.3
Corn	31,718	48,831	69,373	49,814	30,832	-38.3
Hay	252,131	398,020	312,791	340,710	354,907	8.9
Oats	3,947	2,547	5,320	2,541	4,175	16.3
Oil crops	2,678	3,373	3,660	4,205	3,971	14.1
Vegetables and melons	332,862	323,845	377,404	372,196	326,700	-7.1
Fruits and nuts	455,150	533,858	571,780	616,781	646,567	18.8
All other crops	1,266,815	1,390,309	1,398,857	1,402,431	1,364,851	0.0

While prices have fluctuated and increases in many commodities have moderated over the last two years. The trend of increasing sales can be expected to continue:

- “As global population and incomes increase over the next four decades, demand for agricultural commodities is also expected to increase.
- Growth in agricultural productivity will determine how agricultural input, output, and land markets will adjust to increased demand.
- A continuation of recent productivity growth trends should allow the agricultural sector to respond to increased demand with little additional use of land and other agricultural inputs, but a slowdown in productivity growth could result in high agricultural commodity prices and additional environmental stress.”¹⁸

¹⁸Sands, Ron 2014. With Adequate Productivity Growth, Global Agriculture Is Resilient to Future Population and Economic Growth. Amber Waves, USDA Economic Research Service. http://www.ers.usda.gov/amber-waves/2014-december/with-adequate-productivity-growth,-global-agriculture-is-resilient-to-future-population-and-economic-growth.aspx#.VSQ_2vnF_7Q

The projection that little additional use of land and other agricultural inputs will be needed to meet growing demand is significant. Agricultural production will need to be increased or intensified to meet rising global demand and there is a high level of concern about the environmental impacts of agricultural intensification.



Over the last half century, Oregon agriculture has significantly increased the efficiency of how it uses inputs like land, water and chemicals in its production. Between 1960 and 2004, Oregon agriculture lead the nation in growth of efficient use of inputs with an average annual growth rate of total factor

productivity (TFP) of 2.58 percent. From 1960 to 2004 Oregon moved from 46th in the nation in 1960 to 15th in 2004.¹⁹

While we have not found a similar long-term study ranking TFP by state, a 2012 global study of TFP showed Oregon continues to improve its use of inputs by 1-3 percent per year.²⁰ Since “It is widely agreed that increased productivity, arising from innovation and changes in technology, is the main contributor to economic growth in U.S. agriculture ,”²¹ there appears to continue to be high returns to the research and development investment in the agriculture, food and fiber industry for consumers, producers, and ecosystems.

Economic effects of the agriculture, food, and fiber industry

Agriculture, food and fiber sales are estimated by a number of federal and state agencies. Some of the estimates are made annually and one – the Census of Agriculture is completed every five years, most recently 2012. We have primarily used the Census of Agriculture as the source for the information above.

The USDA National Agricultural Statistics Service (NASS), USDA Economic Research Service (ERS), the U.S. Census Bureau – Census of Agriculture, the Oregon Department of Agriculture, Oregon Department of Fish and Wildlife and the Columbia River Inter-Tribal Fish Commission were some the primary sources used for the analysis that follows. In addition to government agencies, many private firms make these types of estimates. One of the most widely used is the IMPLAN input-output model²² produced by the IMPLAN Group LLC. We used the IMPLAN data as the starting point to determine the economic footprint and impact of the agriculture, food and fiber industry.

Few of the estimates from public or private sources are labelled consistently or corroborate each other. This is due to which sectors they include in agriculture, food and fiber, how they defined their sectors and how they gathered the information to make their estimates. We edited the IMPLAN data from its most current release in 2014 of 2013 data with public and private data. The estimated sales are shown in Table 9.

¹⁹USDA Economic Research Service 2010. Agricultural Productivity in the U.S. Table 22—States ranked by level and growth of productivity. <http://www.ers.usda.gov/data-products/agricultural-productivity-in-the-us.aspx#28268>

²⁰Fuglie, Keith and Sun Ling Wang 2012. New Evidence Points to Robust But Uneven Productivity Growth in Global Agriculture. USDA Economic Research Service. <http://www.ers.usda.gov/amber-waves/2012-september/global-agriculture.aspx#.VWy6mM9Viko>

²¹Ball, Eldon, Sun Ling Wang and Keith Fuglie 2013. Agricultural Productivity. USDA Economic Research Service. <http://www.ers.usda.gov/topics/farm-economy/agricultural-productivity.aspx>

²²IMPLAN Group, LLC, IMPLAN System (data and software),16740 Birkdale Commons Parkway, Suite 206, Huntersville, NC 28078 www.IMPLAN.com

Farm, ranch and fishing sales

The estimates that follow in Table 9 are primarily from the USDA National Agricultural Statistics Service and the Oregon Department of Agriculture *Facts & Figures 2015* report that provides 2014 with some 2013 data. We have added data not found in *Facts & Figures 2015* report from other sources as noted below the table.

The last time this economic report was published in 2011 using 2009 data, sales were \$4.32 billion so this estimate of \$5.66 billion is a 30 percent increase over the 2009 estimate. While we are expecting a continued moderation of commodity prices and these estimates are in current dollars that are not adjusted for inflation, almost a one-third increase is significant.

The reader will notice differences between Tables 7 and 9. This is due to our use of a number of sources for the data and the addition of commercial fishing including ocean and Columbia River in Table 9, which was not included in Table 7.

There are also sources of on farm income that contribute to the Oregon economy as noted on page 8 that are not included in Table 9. An example is farmers and ranchers “sell” or contract for services with state and federal agencies to improve ecosystems. An example is conservation services like planting additional trees in riparian areas. However to be consistent with previous analyses, we have only included those types of farm, ranch or fishing income sources that are food or fiber related. There is only one exception, which was also included in previous reports, for game related income like hunting leases that are shown as “Other” in Table 9.

Table 9. Oregon farm, ranch and fishing sales 2014

Commodity	\$000
Grain farming	347,010
Seed crops	449,018
Oilseed farming	9,233
Vegetable and melon farming including potatoes	353,284
Fruit farming	558,217
Tree nut farming	129,600
Greenhouse, nursery, and floriculture production	800,000
Christmas trees	103,777
Sugar beet farming	14,280
All other crop farming - primarily hay	923,160
Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	922,031
Dairy cattle and milk production	656,635
Poultry and egg production	135,000
Animal production, except cattle and poultry and eggs	80,000
Commercial fishing including ocean and Columbia River	163,380
Other	12,604
Total	\$5,657,229

Source: NASS, IMPLAN, U.S. Census Bureau-Census of Agriculture, Economic Research Service, Oregon Department of Agriculture, Oregon Department of Fish and Wildlife and Columbia River Inter-Tribal Fish Commission

Processing Sales

Oregon’s food and fiber processing industry uses farm, ranch and fishing inputs to produce a wide variety of food and fiber products. This report includes the fiber related sectors of mills and tannery production that could directly use Oregon inputs (e.g. cut and sew apparel contractors was not included). While some of the processing sectors are moderate in terms of sales and may or may not use Oregon inputs, the ones we included all could use Oregon inputs and are important to understand the scope of the industry. Table 10 lists the top 20 processing sectors. These sectors account for \$13.9 billion or 87 percent of the total of almost \$16 billion in sales. A total of 50 processing sectors are included in this analysis.

Table 10. Oregon agriculture, food and fiber processing top 20 sectors ranked by sales in 2015 dollars

Rank	Sector	Sales (\$)
1	Frozen fruits, juices and vegetables manufacturing	2,223,746,976
2	Breweries	1,345,613,709
3	Fluid milk manufacturing	1,114,787,254
4	Canned fruits and vegetables manufacturing	944,215,236
5	Wineries	909,658,594
6	Cheese manufacturing	764,544,724
7	Bread and bakery product, except frozen manufacturing	729,213,150
8	All other food manufacturing	660,009,850
9	Flour milling	649,612,177
10	Frozen specialties manufacturing	627,457,170
11	Coffee and tea manufacturing	594,583,497
12	Other snack food manufacturing	549,628,936
13	Meat processed from carcasses	507,839,207
14	Seafood product preparation and packaging	421,644,941
15	Bottle and canned soft drinks & water	330,927,802
16	Animal, except poultry, slaughtering	330,617,889
17	Dehydrated food products manufacturing	327,801,742
18	Other animal food manufacturing	308,272,467
19	Cookie and cracker manufacturing	269,043,889
20	Fats and oils refining and blending	255,787,557

Source: IMPLAN Group, LLC, IMPLAN System (data and software)

Agriculture, food, fiber and directly related forward linkages

Three industry groups provide producers and processors with specialized services, an extensive distribution and marketing network, and multiple modes of transportation to get products to markets. Those sectors are agricultural support services (e.g., well drilling, disease advice, and custom applications, etc.); wholesale trade; and transportation (truck, rail, air, and water) and warehousing. Two large sectors—retail trade (food and beverage) and food services and drinking places—add additional value to products as they sell and serve them to consumers. The industries’ that take agriculture, food and fiber products from the farmgate and/or processors to market or the consumers are not regularly reported as part of economic impact

analyses. Economic analyses typically focus on producer prices and backward linkages to suppliers. However, large portions of the wholesale trade, transportation and warehousing, retail trade, and food services and drinking places sectors complete the critical links to bring agriculture, food and fiber products and services to the consumer. These industries form important forward linkages to the consumers. The links/expenditures are added to producer prices to establish the final retail prices that consumers pay.

We used IMPLAN and USDA Economic Research Service (ERS) estimates of the value added portion of the food dollar by industry²³ to estimate the sales of wholesale trade, transportation and warehousing, and retail trade industries that are tied to Oregon agriculture, food and fiber. The portion of the food services and drinking places industry that are directly linked to Oregon agriculture, food and fiber was estimated by the portion of food inputs that are used by Oregon food and drink establishment and are grown and/or processed in Oregon. IMPLAN's estimate is that 31.5 percent of the food inputs for Oregon eating and drinking places meet those criteria. This percentage was not ground-truthed with interviews of food and drink establishments due to cost constraints. Additional research into the percentage of Oregon products used in different types of food and drinking establishments could improve these results.

Table 11 brings together all seven parts of the agriculture, food and fiber industry: production, processing (food and fiber), support services, wholesale trade, transportation and warehousing, retail trade, and food services and drinking places. It provides the output (sales), employment (full- and part-time jobs), and value-added expenditures or net income or product (employee compensation, proprietor income, special business taxes, and leases and rents that represent the portion of the product's value that is added in Oregon) for each part of the industry. It summarizes of the economic activity of the agriculture, food and fiber industry.

Table 11. Oregon agriculture, food and fiber industry in 2015 dollars

Aggregated Industry	Output-Sales (\$)	Employment Full & part-time jobs (#)	Value-Added or Net Product (\$)
Production	5,672,352,430	61,218	3,267,486,257
Processing food	15,699,054,764	32,842	2,807,421,122
Processing fiber	228,424,262	1,570	60,643,900
Agriculture support services	624,713,856	13,635	479,402,132
Wholesale trade	5,034,728,236	24,338	3,139,380
Transportation & warehousing	1,834,352,599	11,617	1,834,352,599
Retail trade -food and beverage stores	476,047,969	7,582	300,816,905
Food services & drinking places Oregon portion	2,847,740,787	49,577	1,483,193,754
Total agriculture, food and fiber	32,417,414,903	202,379	10,236,456,049
Total all Oregon sectors	379,892,513,864	2,363,234	215,756,616,650
Agriculture, food and fiber percentage of Oregon	8.5	8.6	4.7

Note: Retail trade is just the margin or difference between the selling price from the food store and the cost the store paid for the food.

²³Canning, Patrick 2015. Food Dollar Series – Documentation. USDA Economic Research Service. <http://www.ers.usda.gov/data-products/fooddollar-series/documentation.aspx>

Economic footprint

The direct expenditures and employment profiled in Table 11 are associated with a number of other expenditures and jobs in the Oregon economy. Each of the listed agriculture, food and fiber sectors purchases a wide range of inputs from suppliers. These purchases are the *indirect expenditures*. Another type of expenditure includes those that members of households make when they receive their salaries or other income from businesses directly or indirectly related to the agriculture, food and fiber industry. These are *induced expenditures*, including purchases for food, medical services, retail goods, and many others. We have combined these three types of effects – direct, indirect and induced – for simplicity of presentation and shown them in three measures – sales, jobs and income – in Table 12. Table 12 indicates that \$8.191 billion in total sales in Oregon is associated with the direct sales of \$5.672 billion from agricultural production reported in Table 11.

The output, employment, and income measures of these direct, indirect, and induced expenditures are the “economic footprint” of the agriculture, food and fiber industry in Oregon. While many of these linked industries that are included in the economic footprint noted in the Table 12 may be able to find sources outside Oregon for their agriculture, food and fiber inputs they are likely to be significantly disrupted if the agriculture, food and fiber industry experiences an economic shock, such as a serious drop in prices and/or reduced level of production.

Table 12. Oregon agriculture, food and fiber industry economic linkages in 2015 dollars

Industry	Output - Sales (\$)	Employment Full & part-time jobs (#)	Value-Added or Net Product (\$)
Production	8,191,288,907	77,490	4,745,480,088
Processing food	23,073,136,049	80,155	7,043,139,183
Processing fiber	338,666,309	2,294	128,155,159
Ag. Support Services	1,048,517,549	16,821	727,311,289
Wholesale trade	8,984,154,703	54,336	5,434,770,272
Transportation & warehousing	3,313,911,344	22,488	1,737,441,368
Retail trade - food and beverage stores	888,685,750	10,662	541,339,839
Food services & drinking places Oregon portion	4,391,585,329	62,371	2,512,443,397
Total agriculture, food and fiber	50,229,945,940	326,617	22,870,080,595
Total all Oregon sectors	379,892,513,834	2,363,234	215,756,616,650
Agriculture, food and fiber percentage of Oregon economy	13.2	13.8	10.6



Economic impacts of agriculture, food and fiber exports

Determining what “drives” the Oregon economy, or the extent to which each major industrial sector is critical to that economy, can be estimated in a number of ways. One approach, called export base theory, suggests that economies are primarily dependent on the goods and services they can export to bring in outside money to maintain growth and economic vitality. The IMPLAN model we used for this report is an input/output model that relies on export base theory. We calculate how a change in demand from outside Oregon both in the U.S. and internationally can cause economic changes in Oregon. Table 13 shows IMPLAN’s estimate of exports from the Oregon agriculture, food and fiber industry.

Table 13. Exports both domestic (U.S. outside Oregon) and international for Oregon agriculture, food and fiber production basic sectors in 2015 dollars

Industry	Output - Sales (\$)
Production	3,322,418,438
Processing	11,438,482,582
Fiber manufacturing	224,571,877
Agriculture support services	262,526,873
Total agriculture, food and fiber exports	15,247,999,770
Total all Oregon exports	139,501,045,083
Agriculture, food and fiber exports as a % of Oregon exports	10.9

We estimated the economic impacts of the agriculture, food and fiber exports throughout Oregon and summarized those impacts in Table 14. The amounts in Table 14 are less than those in Table 12 because Table 12 shows all of the expenditures in the Oregon economy that are related to agriculture, food and fiber both inside Oregon (local sales and intermediate goods) and outside Oregon (exports). In Tables 13 and 14, we included just the exports and just the basic components of the agriculture, food and fiber industry and did not include the directly related forward linkages.

As mentioned above, any changes to an economic footprint (Table 12) can disrupt an economy. However, structural changes or long-term impacts are likely if agricultural, food and fiber exports are affected. While exports are critical to an economy it is important to remember that the closer to a finished good that Oregon can bring a product the greater the economic effect. If a commodity can be used by an Oregon food processor to produce food that can be exported or is purchased in lieu of an imported food (import substitution) the economic effect will be much greater than exporting the commodity right from the field or range.

Table 14. Oregon economic footprint of exports from the agriculture, food and fiber basic sectors in 2015 dollars

Industry	Output-Sales (\$)	Employment - Full & part-time jobs (#)	Value-Added or Net Product (\$)
Production	5,457,763,369	55,252	3,131,782,968
Processing	20,361,334,726	83,057	6,708,148,810
Fiber manufacturing	351,299,117	2,455	130,436,202
Agriculture support services	447,280,683	7,109	304,435,072
Total agriculture	26,617,677,895	147,873	10,274,803,052
Total all Oregon sectors	379,892,513,864	2,363,234	215,756,616,650
Portion agricultural, food and fiber Production, percentage	7.0	6.3	4.8

Considerations

Demand for the goods and services produced by Oregon’s agriculture, food and fiber industry will continue to grow in the U.S. and globally. Producers are prepared to meet the growing demand. Twelve of the sixteen production agriculture and fishing sectors in Table 9 had sales over \$100 Million. Three of those sectors - all other crop farming (primarily hay), beef production, and greenhouse and nursery production had sales approaching \$1 billion. Just the top five food processing sectors from Table 10 had \$4.54 billion in sales.

Oregon’s farmers and ranchers have demonstrated a steady improvement in how they use their factors of production over the last 55 years. They lead the nation in average annual growth rate of total factor productivity between 1960 and 2004 and may still. These accomplishments may provide sufficient evidence that agriculture, food and fiber production can be increased to meet rising demand and still maintain healthy ecosystems.

Oregon’s agricultural, food and fiber industry accounted for 8.5 percent of the state’s total output or sales and 8.6 percent of all jobs (Table 11). These included jobs in production, processing, agricultural support services, wholesale trade, transportation and warehousing, retail trade and food services that are directly connected to Oregon’s food and fiber products. When the indirect

and induced effects or links to the agriculture, food and fiber industry are added, the total economic footprint is 13.2 percent (\$50.2 billion) of Oregon's total sales, 13.8 percent (326,617 jobs) of total jobs in Oregon and 10.6 percent (\$22.9 billion) of net product or the portion of sales that are produced exclusively in Oregon once the imported goods and services have been subtracted.

Given the current capacity of the agriculture, food and fiber industry and the potential for expanding that capacity, two examples of initiatives to increase the economic effects across Oregon of the current and growing demand for food and fiber are – 1) develop water availability and water markets from new and/or existing resources in Eastern Oregon²⁴ and 2) support strategic investments in processing facilities and marketing services to add value to the Oregon commodities that are currently being processed outside Oregon.

While demand for U.S. commodities is expected to continue growing as economies in other countries grow and mature, that increase in demand may not be at the pace of the last few years when China had very high rates of economic expansion.²⁵ Focusing on higher value crops and value added process becomes even more important.



As mentioned earlier, 31.5 percent of the ingredients of food and beverages that are created and served in Oregon are grown and/or processed in Oregon. If Oregon commodity or food production could be increased and that production substituted for imports thereby moving the 31.5 percent to 50 percent, the economic effects would be additional sales of approximately \$350 million dollars in the agriculture, food and fiber industry. Across the whole Oregon economy, it could mean an additional \$600 million in sales, 2,600 jobs and

\$200 million in the net product portion of sales. It must be stressed that import substitution needs to come from increased production, given there are sufficient capacity and inputs, and preferably not come from production that is exported.

Exports are very important and bring new money into Oregon. Yet, the more *finished* the good or service is before it is exported or used to substitute for an import, the greater the value added to the economy. Adding value to commodities from crops to livestock to fish and even sustainable energy produced on agricultural land continues to be the challenge for the agriculture, food and fiber industry. Processing commodities and marketing those products in other states, internationally and as substitutes for imports in Oregon need to be the focus of public and private resources to meet that challenge.

²⁴ Plaven, George of the East Oregonian 2014. Water proposal holds potential for making Eastern Oregon bloom. Union-Bulletin.com April 14, 2014. <http://union-bulletin.com/news/2014/apr/14/water-proposal-holds-potential-making-eastern-oreg/>.

²⁵ Schwartz, Nelson D. and Julie Creswell Oct 2015. *Global Chill in Commodity Demand Hits America's Heartland*. NYTimes.com, Business Day October 23, 2015. http://www.nytimes.com/2015/10/25/business/energy-environment/americas-heartland-feels-a-chill-from-collapsing-commodity-prices.html?_r=0.