

Center for Economic and Business Research

Whatcom County Agribusiness Sector Analysis

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Acknowledgement

Western Washington University’s Center for Economic and Business Research (CEBR) was asked by the Whatcom Business Alliance (WBA) to gather job and wage data and more clearly define the local agribusiness sector to include not only those jobs and wages directly relating to food production, but also those supported by spending by those in farming related jobs.

We thank the WBA for their assistance in organizing meetings with leaders in the farm industry and interest groups, helping with a survey and for other support. Funding for this work comes from various businesses in Whatcom County, through the WBA.

About the Authors

The Center for Economic and Business Research is an outreach center of Western Washington University located within the College of Business and Economics. The Center connects the resources found throughout the University to assist for-profit, non-profit, government agencies, quasi-government entities and tribal communities in gathering and analyzing useful data. We use a number of collaborative approaches to help inform our clients so that they are better able to hold policy discussions and craft decisions.

The Center employs students, staff and faculty from across the University as well as outside resources to meet the individual needs of those we work with. Our work is based on academic approaches and rigor and not only provides a neutral analysis perspective but also provides applied learning opportunities. We focus on developing collaborative relationships with our clients and not simply delivering an end product.

The approaches we utilize are insightful, they are useful, and they are all a part of the debate surrounding the topics we explore; however, none are absolutely fail-safe. Data, by nature, is challenged by how it is collected and how it is leveraged with other data sources; following only one approach without deviation is ill-advised. We provide a variety of insights within our work – not only on the topic at hand but the resources (data) that inform that topic.

We are always seeking opportunities to bring the strengths of Western Washington University to fruition within our region. If you have a need for analysis work or comments on this report, we encourage you to contact us at 360-650-3909. To learn more about CEBR visit us online at <https://cbe.wvu.edu/cebr/center-economic-and-business-research>.

The Center for Economic and Business Research is directed by Hart Hodges, PhD and James McCafferty.

Executive Summary

Agriculture. Of all the standardized business sectors, agriculture is perhaps the one people relate to or think they understand the best. Farms with large red barns in picturesque fields come to mind. Sectors like “business and professional services” can be confusing. It is not immediately obvious if it includes information technology or how it might differ from administrative support services. But agriculture is obvious... except it isn't.

In terms of the official North American Industrial Classification System, agriculture includes farming, forestry, fishing and hunting. Moreover, many activities that someone might consider to be part of farming are actually classified as manufacturing. For example, the processing of milk and berries are most likely manufacturing activities (with the definition depending partly on where the activities occur and who is responsible). In short, counting the number of jobs in agriculture is actually a lot more complicated than you might think, if only because there are so many ways to define agriculture.

In this report we think of agriculture as farming: the activity of growing crops and raising livestock. We do not include aquaculture and other activities in our definition (though it is certainly part of the NAICS agriculture sector).

Focusing on employment, the numbers still vary significantly depending on what jobs you decide to count. For example, we can talk about year round jobs (which can include full-time and part-time jobs); we can decide to include the thousands of jobs that last for the berry harvesting season in summer; and we can calculate an average annual employment base that gives a mix of the two.

Farming Jobs

Year Round Jobs	3,300 jobs	
Farming Employment – Summer Peak	9,000 jobs	
Average Annual Employment	3,749 jobs	\$101 million in annual wages

After deciding on the number of farming jobs, we can also ask how many jobs in other sectors depend critically on those farming jobs. For example, there are jobs in cold storage businesses, trucking, banking, and many other sectors that exist largely because the farming jobs exist.

The employment contribution of agriculture includes the (3,749) jobs in farming plus the jobs supported by farming. In the jargon of impact analyses, the employment contribution includes the direct and indirect jobs. We use the average annual employment figure rather than the summer peak because the berry harvesting jobs do not have long lasting impacts that support other jobs, due to the limited duration of the harvesting jobs. (Of course, they support other jobs to some degree, but that impact is included in the average annual employment figure because the jobs in summer influence the average annual figure.)

Employment Contribution of Farming

Average Annual Employment	3,749 jobs
Jobs Related to or Supported by Farming (also known as Indirect Jobs)	2,161 jobs
Farming and Farm Related Jobs	5,911 jobs
Jobs Supported by Spending by those in farming and the related jobs (also known as Induced Jobs)	2,494 jobs
Overall Employment Contribution	8,405 jobs

Finally, we define the broad agribusiness sector as all of the jobs related to farming and food processing or food manufacturing jobs.

Agribusiness Jobs

Farming and Farming Related Jobs (Direct and Indirect Jobs)	5,911 jobs	\$194 million in annual wages^a
Food Manufacturing	2,032 jobs	\$82 million in annual wages^b
Agribusiness Jobs in Whatcom County	7,943 jobs	\$276 million in annual wages

Note a: Wages = wages for 3,749 farming jobs as reported by Employment Security plus the average county wage for all 2,161 related jobs. This figure should be refined with further research.

b: Washington State Department of Agriculture shows 1,774 jobs in food processing (with \$959 million in gross sales)¹. We show the employment count and annual wage figure as reported by Washington State Department of Employment Security.

Because of this complexity and common misunderstandings of sector definitions we propose within this report using the term agribusiness to more accurately capture and reflect upon the sector activities within Whatcom County.

Other Notes

- Washington State is the top blueberry and raspberry producing state in the US and Whatcom County is the top producer of raspberry producer. In fact, 85% of the state's frozen red raspberries and 65% of the U.S. frozen red raspberries come from Whatcom County.

¹ WSDA figures provided by Whatcom Family Farmers.

- Whatcom County is also one of the top milk producing counties in the state, with over \$193 million in sales of milk in 2012 (just over half of the commodity sales). Much of the milk is converted to milk powder at the Darigold facility, but more and more is going to liquid milk and other value added products.
- Whatcom County has more than 1,700 farms
- With a mix of very small to mid-size farms, the average farm is 68 acres (Whatcom County does not have large farms, defined as large scale industrialized and/or factory farms. Some definitions of large farms suggest 5,000+ acres and/or a minimum amount of revenue.)
 - More than three quarters of the farms are less than 50 acres
 - The top 10 percent of farms in terms of size produce 90 percent of the sales
- The market value of products sold by farmers was \$357 million in 2012. (This figure is considerably smaller than the agribusiness sales estimate shown above because this figure does not include sales by businesses related to farming or businesses in food manufacturing.)
 - More than 75% of the market, or farmgate value, comes from berry and dairy farms
 - Focusing on farmgate value obscures the benefits provided by smaller farms
- Regulations pose a difficult challenge for farmers
 - Problems can arise because regulators do not understand farming and/or how different regulations can be problematic together (if not contradictory); farmers tend to support the intent of virtually all the regulations they face but often struggle with the implementations.
 - Given the many connections between farming and other sectors, it is important for regulators to look at the whole farming web when considering the impacts a given regulation might have.

If we assume 40-45 percent of revenue goes to wages, the \$276 million in wages in agribusiness suggests gross sales of \$613 million to \$690 million. However, the total of farmgate value and Washington State Department of Agriculture estimates of gross sales in food processing exceed \$1.3 billion. Adding in sales at businesses related to farming suggests a conservative estimate of agribusiness sales of more than \$1.4 billion.

A Quick Note

Our objective with this report is to improve the understanding of agriculture in Whatcom County. Some of the numbers in the report depend on our decisions about what to count and what not to count when defining agriculture and agribusiness. Different people might think a narrow or broader definition would be more appropriate. That is fine. We do not hope to convince anyone that our numbers are right. We just want to promote good conversations and help people ask good questions about agriculture.

Introduction

This report describes the agriculture sector and the role it plays in the regional economy. The report also highlights the overall employment contributions of farming and agribusiness. It is not an impact analysis. While it may seem like a matter of semantics, it is important for the reader to understand the differences between economic impacts, economic contributions, and other metrics like economic benefits.² Economic impact studies summarize the impacts of specific events, with the impacts typically expressed in terms of changes in employment, income, and perhaps tax revenues. While we refer at times in this report to hypothetical changes, we do so to illustrate how changes in agriculture ripple through a variety of different business areas. We do not try to estimate the impacts of a specific event, such as a new regulation or technology. In addition, we use the term agribusiness because many activities that we think of as agriculture are actually found in other sectors, including manufacturing. In fact, agriculture cannot be described in any meaningful way without considering financing, logistics, and many other businesses.

A contribution analysis estimates the overall economic activity associated with an industry, such as agriculture.³ We focus primarily on the backward linkages associated with farming. That is, we look at farming and show the various businesses in the area that depend on farming because they sell products and services to farmers. We only begin to sketch the forward linkages or what happens to the products and who buys them. Moreover, we use readily available data from the Washington State Department of Employment Security and the US Department of Agriculture to describe the agricultural sector in Whatcom County. We organized focus groups and conducted interviews, but we did not conduct a thorough survey to gather detailed data on spending by farmers or consumers buying farm products. As such, this report is not a complete contribution analysis. Nevertheless, we think it can help improve the overall understanding about agriculture or farming in Whatcom County and farming's role in the regional economy.

Farmers helped us collect data on employment levels at berry, dairy, and potato farms to help us both corroborate the official state data and be able to explain why so many people often think the state figures are too low. The data from the farmers showed the official state data to be accurate, but also highlighted for us how easy it is for someone to question those data. For example, a farmer may know that there are roughly 9,000 people working on farms in Whatcom County in a given July, but the state figures show something much less. We describe below how the state includes the short-term berry picking jobs and how some of the jobs are, in fact, not counted.

Finally, we note a critical limitation of this report. We imagine that farming in Whatcom County contributes to the economy in a variety of ways not discussed in this report. In particular, farming gives the County a look or feel. People benefit from being able to look across farms at Mt. Baker. That benefit is real and could be described in dollar terms. Similarly, people benefit from being able to visit small farms, to know the individuals growing some of their food, and to obtain farm fresh food so easily. Those benefits are also real and could be expressed in dollar terms. These values are part of the value of agriculture, though we leave the calculations to future research.

² See for example "Determining Economic Contributions and Impacts: What is the difference and why do we care?" by Watson, Wilson, Thilmany, and Winter (2007):

<https://www.ntc.blm.gov/krc/uploads/74/Watson,%20et%20al%20Impacts%20vs%20Contribution%2037-2-6.pdf>

³ "The 2011 Economic Contribution Analysis of Washington Dairy Farms and Dairy Processing: an Input – Output Analysis", prepared by Shannon Neibergs and Michael Brady at WSU (May 2013) provides a good example of a detailed contribution analysis. <http://wastatedairy.com/wp-content/uploads/2013/12/2013-Updated-Dairy-Economic-Impact.pdf>

Key Questions

One question we seek to answer in this study is how many jobs exist in agriculture (defined as farming in this case) in Whatcom County? And what is the overall employment contribution of farming in the County?

The Washington State Department of Employment Security shows jobs in Agriculture, which technically includes forestry and fishing. Again, we mean farming when we talk about agriculture in this report, so we focus on the state data for crop production, livestock, and related services.

The state figures show roughly 3,300 jobs in farming in most months, with the number increasing to more than 7,800 in July. Overall, we have 3,700 average annual jobs in farming in Whatcom County. Farmers and Whatcom Family Farmers provided information that supports these figures, but also suggests there are another 1,000 to 2,000 berry picking jobs that do not appear in the state figures. It may be helpful to note that the state figures come from payroll and unemployment insurance records and some jobs do not get reported in a way that the state would count them. We provide more information below on this topic.

The 3,749 average annual jobs in farming support jobs in a variety of sectors, including transportation, warehousing and storage, finance, and manufacturing. If we add the 2,161 “indirect” jobs (from business-to-business purchases), we get 5,911 jobs.

But each of these workers spends a portion of his or her income, and that household spending supports other jobs in an even wider array of other businesses. If we add the 2,494 “induced” jobs (from household spending), we get 8,405 jobs.

We focus on the business-to-business relationships or jobs that ag business activities support, and add food manufacturing jobs when thinking about “agribusiness” (direct farming jobs + closely related jobs + food manufacturing jobs). We estimate there are more than 7,900 jobs in agribusiness, which is roughly 11 percent of the jobs in Whatcom County. One could consider the overall economic contribution of agribusiness, taking into consideration all the jobs related to household spending. We do not show that number because we want to focus more on jobs related to farming and less on jobs related to activity at firms like Nature’s Path or Chocolate Necessities.

Another question is whether we should include jobs related to farmers’ markets, food hubs (defined below), farm-to-table restaurants and other retail or consumer activity related to farming when assessing the employment impact of farming. We do not. We focus on the jobs found on farms and at businesses that support the farms. We view farmers’ markets, the purchase of food in grocery stores and restaurants, and even CSA (community supported agriculture) boxes as consumer driven activities – not farm driven. Put another way, we focus on backward linkages from farms back to the business that provide for and sell to them (farm implements, soil supplements, etc.). We view the forward linkages from farms to consumers, with all the various products and sales methods, as something separate.

We describe below in more detail the different sectors and ways of counting jobs in agriculture. We also include information on important trends and efforts to protect and to develop further the agribusiness sectors. One such effort we highlight here is the opportunity to leverage the varieties of salad greens that grow well in the local climate. Earthbound Farms in California sells more than 50% of the salad greens sold in the U.S. It would seem there are opportunities to increase the amount and type of salad greens grown in Whatcom County and to package those greens in ways to capture

more value than just selling the greens as a commodity.⁴ Berry growers and dairy farmers are already experimenting with ways to capture more of the value in the products they sell.

Background

The official Agriculture Sector (NAICS⁵ sector 11) includes farming, forestry, fishing and hunting. These sectors contain businesses primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

Following the NAICS definition, farming is divided into two primary subsectors – crop production, and animal production. Crop production is further broken down into fruits and nuts, nursery and greenhouse, and vegetables, melons and potatoes, while animal production subsector includes for example, milk from cows, cattle ranching and farming, hog and pig farming, poultry and egg production.

As mentioned, this report focuses on farming activities specifically and refers to the broad set of farming and farming related activities as agribusiness. Specifically, agribusiness includes specific on-farm activities, the closely related service, production, and distribution activities, and closely related processing activities. The closely related service, production, and distribution activities include feed production, fertilizer production, mechanical support services, warehousing, trucking, and more. The closely related processing activities include cold storage, a portion of the food manufacturing sector (i.e., that portion tied directly to farming activities in the area), milk processing, and more.

As of the 2012 census of agriculture, there were 2.1 million farms in the US, covering an area of 914 million acres in land and generating revenue of about \$394 billion.⁶ The US ranks the 1st in production of maize, soybean, strawberry and blueberry, almond, dairy, and poultry.⁷

Characteristics of Farming in Whatcom County

In the 2012 Ag census, Whatcom County ranks the 8th in the State of Washington and 212th in US by total value of agricultural products sold. More importantly, the county's value of livestock sales ranks 3rd in the state and 136th nationwide, while milk from cows ranks 2nd in the state and 29 nationwide

Table 1 presents summary statistics for Whatcom County, with Washington State as a reference.

⁴ Data from Jeff Votlz, Northwest Agriculture Business Center

⁵ North American Industrial Classification System (NAICS) replaced the previous Standard Industry Classification (SIC) system

⁶ Agriculture & Forestry Sector Industry Profile. Dun and Bradstreet First Research. 2017.

<https://www.firstresearch.com/Industry-Research/Agriculture-and-Forestry-Sector.html>

⁷ Food and Agriculture Organization of the United Nations. 2013.

Table 1: Agriculture Summary Statistics

	2012	2007	Washington State	% share
Number of farms	1,702	1,483	37,249	5
Land in Farms (acres)	115,831	102,584	14,748,107	1
Average Size of Farm (acres)	68	69	396	17
Market Value of Products Sold	\$357,312,000	\$326,450,000	\$9,120,749,000	4
Crop Sales	\$119,816,000	\$99,897,000	\$6,492,042,000	2
Livestock Sales	\$237,496,000	\$226,553,000	\$2,628,708,000	9
Average per Farm	\$209,937	\$220,128	\$244,859	86
Government Payments	\$3,425,000	\$1,050,000	\$159,269,000	2
Average per Farm	\$11,456	\$3,594	\$22,014	52

Source: Ag Census 2012

(See, https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Washington/cp99053.pdf)

Table 2 shows the top agricultural commodities in Whatcom County by value of production in 2007 and 2012. Milk is Whatcom County's leading agricultural commodity in terms of value of production. In 2012, milk generated annual income of \$193 million. If we consider livestock sales from cull cows and calves in addition to milk's value of production, the dairy industry accounted for 61% of agricultural production in 2012.

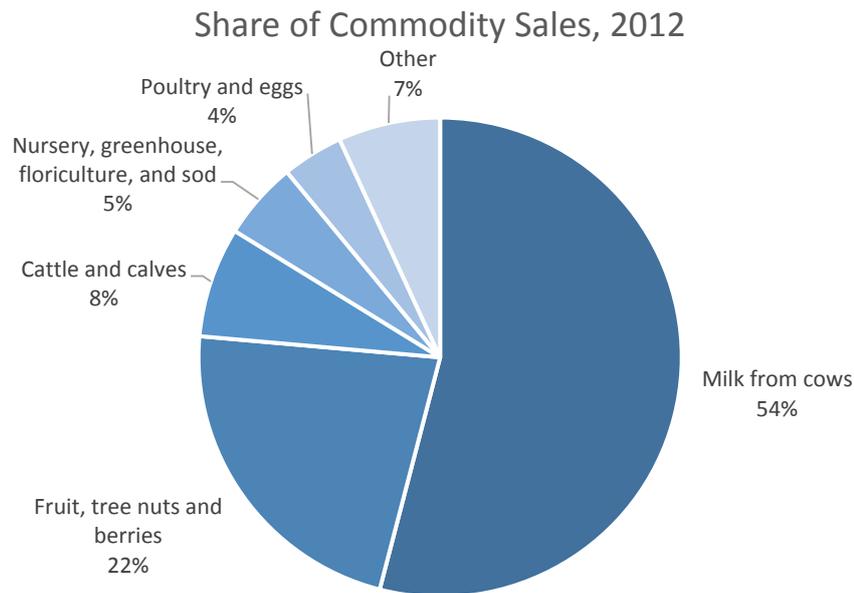
The second leading commodity in the county is fruit, tree nuts and berries, where particularly, berries deserve statewide and nationwide attention as Whatcom County is the top producer of raspberries in the US. Compared to the 2007 ag census, we see a notable increase of 27.7% in poultry and egg sales and an increase of 19.7% in fruit, tree nuts and berries. The value of cattle and calves sales, and milk sales rose by 3.5% and 9.9%, respectively.

Table 2: Value of Sales and Percentage Change

Commodity Group	Value (\$) in 2007	Value (\$) in 2012	State Rank in 2012	% change
Milk from cows	186,491,000	193,042,000	2	+3.5
Fruit, tree nuts and berries	66,788,000	79,978,000	9	+19.7
Cattle and calves	24,135,000	26,535,000	7	+9.9
Nursery, greenhouse, floriculture, and sod	16,736,000	18,697,000	6	+11.7
Poultry and eggs	11,461,000	14,641,000	7	+27.7
Other	20,839,000	24,419,000		-17.2
Total	326,450,000	357,312,000		+9.5

Source: Ag Census 2007 and 2012

Figure 1: Commodity Sales, 2012



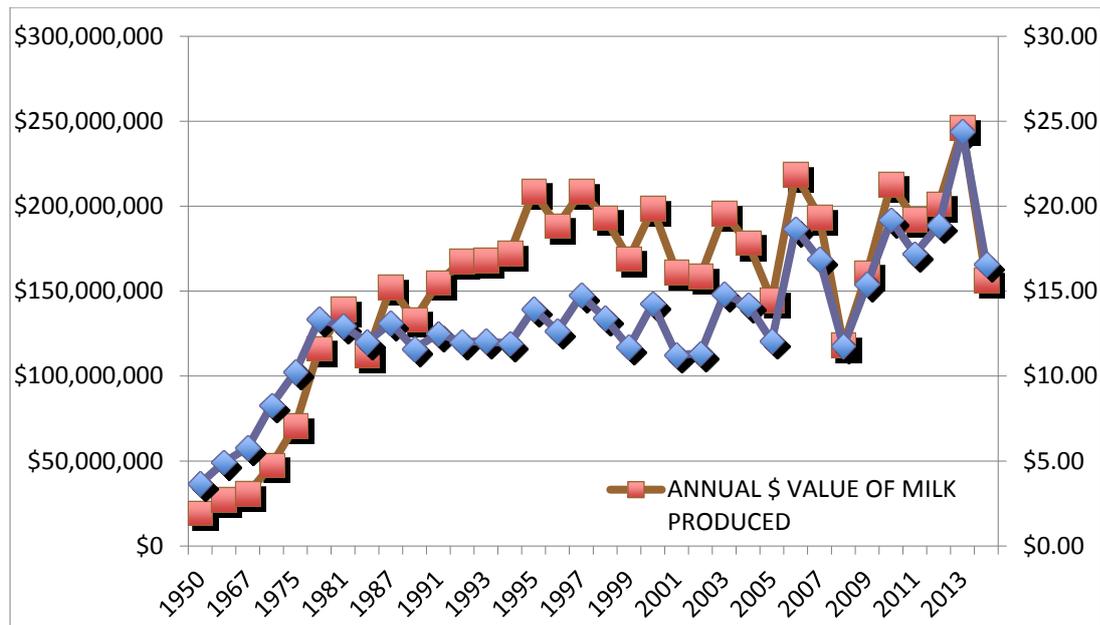
Source: *Ag Census 2012*

Historically, milk has played a vital role in the state-level economy being Washington’s second leading commodity. About 90% of the milk produced in Washington is also processed in Washington. Thus, the dairy sector generates additional economic contributions in terms of income and employment in the region. Figure 2 shows milk production over the course of 90 years. We can observe a gradual increase in milk production since the 1970s mostly attributed to increases in mechanization in dairy industry. Since 2009, milk production has risen by almost 20%.

As of 2013, Washington State had 6,184 jobs in the dairy industry, with 18,066 jobs tied directly or indirectly to dairy. The industry contributed roughly \$5.2 billion to the state economy⁸.

⁸ <http://wastatedairy.com/wp-content/uploads/2013/12/2013-Updated-Dairy-Economic-Impact.pdf>

Figure 2: Milk Prices and Local Production 1950-2015



Source: Whatcom Family Farmers

A study from Oregon State University notes that the production of blueberries in Washington increased from 28 million pounds in 2008 to 82 million pounds in 2013. As of 2013, 9,000 acres of land were dedicated to blueberry production, making Washington the fourth largest national producer in acres harvested after Michigan, Georgia, and Oregon. With more land in berry production and increasing yields, Washington is now the top blueberry producing state.

Production has continued to increase and was expected to exceed 90 million pounds in 2014. Commercial production was initially limited to western Washington, particularly Whatcom and Skagit Counties. Increased demand for fruit has supported the expansion of the industry east of the Cascade Mountains. Additional growth is also occurring in other counties, including Snohomish, Walla Walla, and Grant Counties. Washington also leads in organic blueberry production, with the majority of production occurring east of the Cascade Mountains.⁹

Last, but not least, Washington State farmers lead the nation in the production of red raspberries. In 2015 farmers in Washington produced 52 million pounds; 95% of which came from Whatcom County.¹⁰ In fact, 85% of the state's frozen red raspberries and 65% of the U.S. frozen red raspberries come from Whatcom County. The following two figures show production in weight and dollar value.

⁹ http://oregonstate.edu/dept/NWREC/sites/default/files/pg_programs/berry/documents/001-008-production_regions_in_the_pacific_northwest.pdf

¹⁰ <http://letsgrowtogether.ws/washington-state-wins-with-red-raspberries/>

Figure 3: Berry Production (pounds)

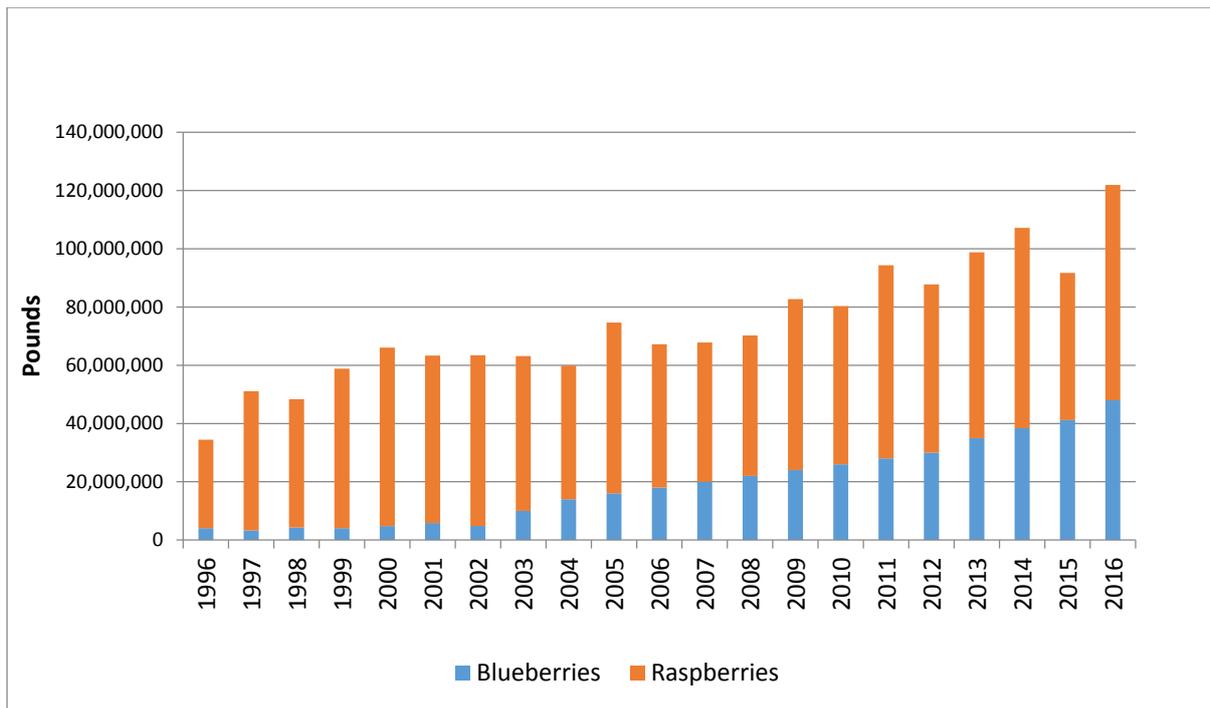
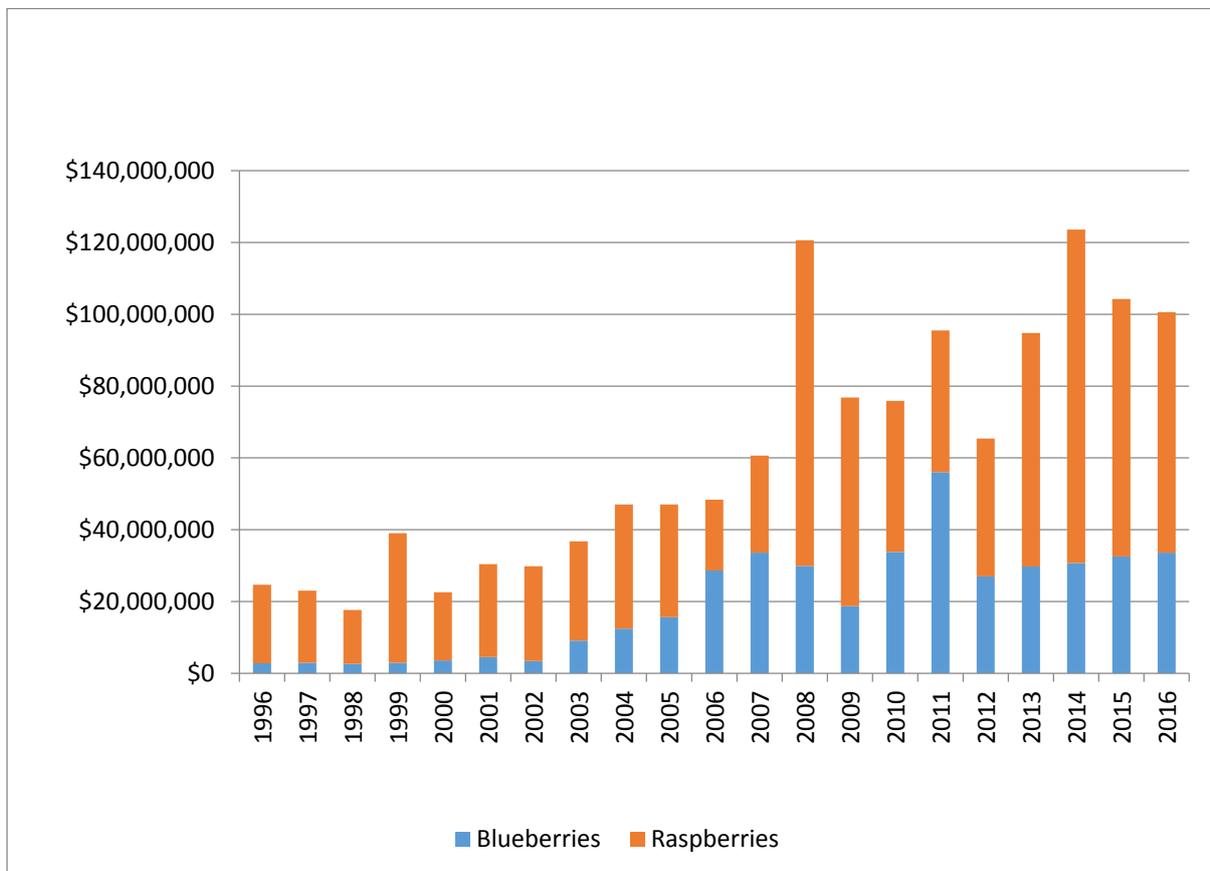


Figure 4: Berry Production (\$ Value)



And the future of agriculture in Whatcom County depends on how well farmers are able to leverage the value of the products like milk, raspberries, and blueberries. Liquid milk can be converted to powdered milk and sold in a variety of markets, but some local farmers are producing other products with their liquid milk to try to capture more of the value. Berry farmers also continue to search for ways to add value and/or capture more of the value in their crops.

Employment in farming

Table 3 and Table 4 provide details about employment and wages in Whatcom County. As of 2016, out of 88,087 jobs, 3,749 were associated with agriculture (not including fishing or forestry). That is, roughly one in 23 jobs appears in the agricultural sector. Three times more jobs are associated with crop production than animal production with average wages being lower in crop production by 17%. The smallest number of jobs is in support services with even lower average wages. However, it is important to note that many jobs most of us would describe as ag jobs are not in fact in the ag sector. For example, there are 9,770 jobs associated with manufacturing with an average wage of \$60,100. Roughly 21% of those jobs are in food manufacturing, which is very closely related to the ag sector. In total, there are 5,781 direct jobs in agriculture or food manufacturing with the total contribution in wages of more than \$180 million.

Table 3: Employment and Wages

Sector	Jobs	Total Wages	Average Wages
Agriculture (Farming)	3,749	\$101,487,982	\$27,071
Crop production	2,778	\$72,573,946	\$26,125
Animal production	775	\$23,913,387	\$30,856
Support services	198	\$5,000,649	\$25,256
Manufacturing	9,770	\$587,179,658	\$60,100
Food Manufacturing	2,032	\$82,221,260	\$40,463
All sectors incl. agriculture and manufacturing	88,087	\$3,808,796,517	\$43,239

Source: Washington Department of Employment Security, 2016

These figures suggest that ag or farming accounts for 4% of all the jobs in Whatcom County and roughly 2.5% of total wages. Of course, part of the motivation for this report is to show how those figures, while accurate, can be confusing. We have highlighted the food manufacturing subsector because most of us think about food manufacturing as part of agribusiness. Food manufacturing feels like agribusiness especially when it is processing berries or something similar.

We note that there are far more than 3,749 jobs in farming in the summer. In fact, employment in farming can exceed 9,500 workers during the weeks when berries need to be picked and other seasonal activities occur. As noted below, the jobs shown in Table 3 reflect the number of jobs reported by employers to the State for unemployment insurance purposes. Not every job has to be reported. Some seasonal workers are exempt from or not eligible for unemployment insurance and do not need to be reported. (Workers with visa classifications H-2A, H-2B, H-3, or F may not be reported, for example.) One grower alone has perhaps 600 H-2A workers¹¹, which means the number of actual workers can be significantly higher than shown in by the state. In addition, high school students working in the summer may not be reported and some family members may not be reported.

¹¹ See for example, Sarbanand Farms in Sumas

Based on our own survey work with farmers in Whatcom County, we estimate that perhaps 2,000 seasonal workers are not included in the figures shown in Table 3. We do not include them when estimating the economic contribution of farming because these workers only work for 5-6 weeks during the summer. They do not create a notable number of additional jobs and their spending habits are not clear. Having said that, we agree with statistics from Whatcom Family Farmers that farming supports roughly 6,000 seasonal work during the picking season – and that figure should not be forgotten when talking about the impacts of farming.¹²

We also show below the number of jobs in other sectors supported by agriculture. Adding together the jobs found in agriculture, plus the jobs farmers support through their purchases of goods and services gives an overall employment contribution closer to 7,900 jobs and annual income of roughly \$276 million per year. Note, since we do not know exactly which finance jobs, trucking jobs, cold storage jobs, etc. actually depend on farming and what those workers earn – we estimate the income of the farm related jobs by multiplying the number of those indirect jobs times the average wage in the county. This figure could be refined in future studies.

A Picture of Farming – practically speaking

The US Bureau of Labor Statistics and the Washington State Department of Employment Security organize their data according to the North American Industrial Classification System (NAICS) codes. Even though we might consider the Darigold plant in Lynden and the Cargill facility in Ferndale to be part of the larger agriculture industrial sector, technically they are not. They are included in particular sub-sectors of the manufacturing sector. Perhaps we could be forgiven if we assumed, incorrectly, that the cold storage facilities that hold berries and only berries are part of the agriculture sector. They are actually part of the warehousing sector. And so it goes with a large number of businesses related to, but not officially part of the farming sector.

In this report, we try to show exactly what is and is not officially part of the agricultural or farming sector, but our primary goal of showing the economic contribution of farming requires that we talk as much about the businesses that rely on farming as the farming businesses themselves. We also hope to show how farming is a modern and technologically advanced sector interwoven with a great variety of sectors such as manufacturing, storage, transportation and many others.

As noted above, there are 3,749 jobs in the farming sector. To be more precise, there are 3,749 ‘covered’ jobs in the farming sector; which means the jobs are covered by unemployment insurance and the wages are used as a basis for establishing unemployment insurance accounts. We estimate that the sector supports another 2,161 through business-to-business activity. For example, farmers buy feed, fertilizer, tractors, and other products from businesses in various manufacturing, warehousing, retail, and other sectors. (Data on covered employment do not include certain sole proprietors, seasonal workers or those who for whatever reason are not reported through a payroll report.)

Table 4 shows the jobs in farming as reported by Employment Security, as well as the closely related jobs as suggested by IMPLAN, a software package used to estimate economic impacts. We show the Employment Security figures in the column “narrowly defined” and refer to the additional jobs from IMPLAN as “linked closely”.¹³ We refer to the sum of these two job counts as the total jobs in ag, where ag is more broadly defined as general agribusiness. We also show the Employment Security

¹² See <http://www.wcfarmfriends.com/>

¹³ We are relying on the assumptions built into the IMPLAN model for the estimate of closely related or indirect jobs.

jobs as the direct jobs and the IMPLAN estimates as indirect jobs, using the jargon of impact analyses.

Table 4: Employment in Agriculture – With Ag More Broadly Defined

Subsector	Jobs Narrowly Defined (Direct Jobs)	Linked Closely to Ag (Indirect Jobs)	Total Jobs – Ag More Broadly Defined (Direct + Indirect Jobs)
Crop production	2,778	1,830	4,608
Animal production	775	264	1,038
Support services	198	67	265
Total	3,749	2,161	5,911

Note: Numbers do not sum symmetrically due to rounding.

Source: Washington Department of Employment Security, 2016; IMPLAN; and CEBR

The figures shown in Table 4 suggest that ag supports roughly 6% of all jobs in the county, not just the 4% we consider when looking only at the direct jobs. We discuss below additional jobs supported by these farming jobs. In short, these workers spend their earnings in the area and thereby support additional jobs.

These 5,911 jobs do not represent the total employment contribution from farming (which we discuss in a separate section below) nor do they give a picture of the total benefit of farming. But this figure does give a rough estimate of the number of jobs in Whatcom County that many of us think of as ag jobs. For perspective, this number is about the same as the number of jobs found in the ‘finance and insurance’ and ‘professional and technical services’ sectors combined. (These other sectors are also connected to and support jobs in other sectors, but are not as interwoven into other sectors as farming.)

These 5,911 jobs also do not include all seasonal jobs that exist in Whatcom County during the picking season. These seasonal jobs inevitably provide additional economic impact in the County. We do not include all of the unreported jobs or try to estimate their influence in the regional economy due to their short duration and the lack of information about those jobs. For example, we do not know how much of their income they spend in the region when they are here. (If they are high school students, we would assume they spend essentially all of their earnings. If they are migrant workers, their spending is harder to assess due to a lack of data. At an average wage of \$500 per week, the 2,000 workers not included in this discussion earn roughly \$1.5 million during the picking season. Assuming most of that income is spent in the area, our estimates of the contribution of farming described below are low by that amount.)

The Whatcom Business Alliance and Whatcom Family Farmers helped us survey a small group of farmers to confirm the accuracy of the job numbers from Employment Security. In particular, some people felt the average annual job figures seemed low. And indeed they are low if we think about employment levels in summer. However, the picking season that brings thousands of jobs is short enough that it does not increase the annual average employment level as much as might be anticipated.

Using data from berry and potato farmers, we calculated the average number of workers per acre, keeping track of full and part-time year round workers, and seasonal workers. We also calculated the average number of workers per cow on dairy farms. We then used the average worker per acre and worker per cow figures to estimate the total number of workers based on total acres and total

number of dairy cows. These estimates matched the figures from Employment Security in most months, but also highlighted that a significant share of seasonal workers did not show up in the Employment Security data in July and August. As such, we mentioned in this report roughly 2,000 seasonal workers not being counted. (Note: our estimate of seasonal workers comes from Whatcom Farm Friends “Farm Facts” report¹⁴. We do not show the exact figures from our survey because of small sample size. We are comfortable saying the figures support the data provided by Employment Security. We do not want to suggest we have alternative data.)

Linkages

In the following section, we focus on two primary agriculture commodities in Whatcom County – crop production (fruit farming in particular) and dairy. Our goal is to illustrate the connections by highlighting just a few of the actual businesses in different sectors that are so closely connected to farming. And we note that while many of the connections are quite obvious – such as the relationship between the Darigold facility in Lynden (technically in the manufacturing sector) and dairy farms – many of the connections are more subtle. For example, Western Refinery Services reported a significant portion of its revenue comes from farmers. Whether pouring pads for barns or digesters or providing other products and services, companies like Western Refinery Services that might not come to mind when discussing agriculture actually do depend on ag to some degree and are part of agribusiness in the county.

Fruit farming (rather obviously) supports a variety of fruit processing companies located in Whatcom County, including Maberry Packing, Curt Maberry Farms, Enfield Farms, Berry Acres, Northwest Coop and Townline Farms. In addition, fruit farmers use advanced manufacturing, harvest and processing technology. Companies such as Andgar, Innotech and Oxbo build equipment for raspberry and blueberry producers while Whatcom Manufacturing supplies specialty equipment for both berry and dairy industries. In fact, some of the harvesting and other equipment was first designed in Whatcom County and is now sold in other states and foreign countries. So, we can easily say that some of the jobs at these companies are supported by local farmers, but it is hard to know exactly what portion. We cannot simply say that all of the jobs at Oxbo or Andgar and other companies are due to local farmers.

Diagram 1 illustrates some of the more obvious linkages between farmers and workers in other sectors, including manufacturing, warehousing, financial services, and retail (equipment suppliers).

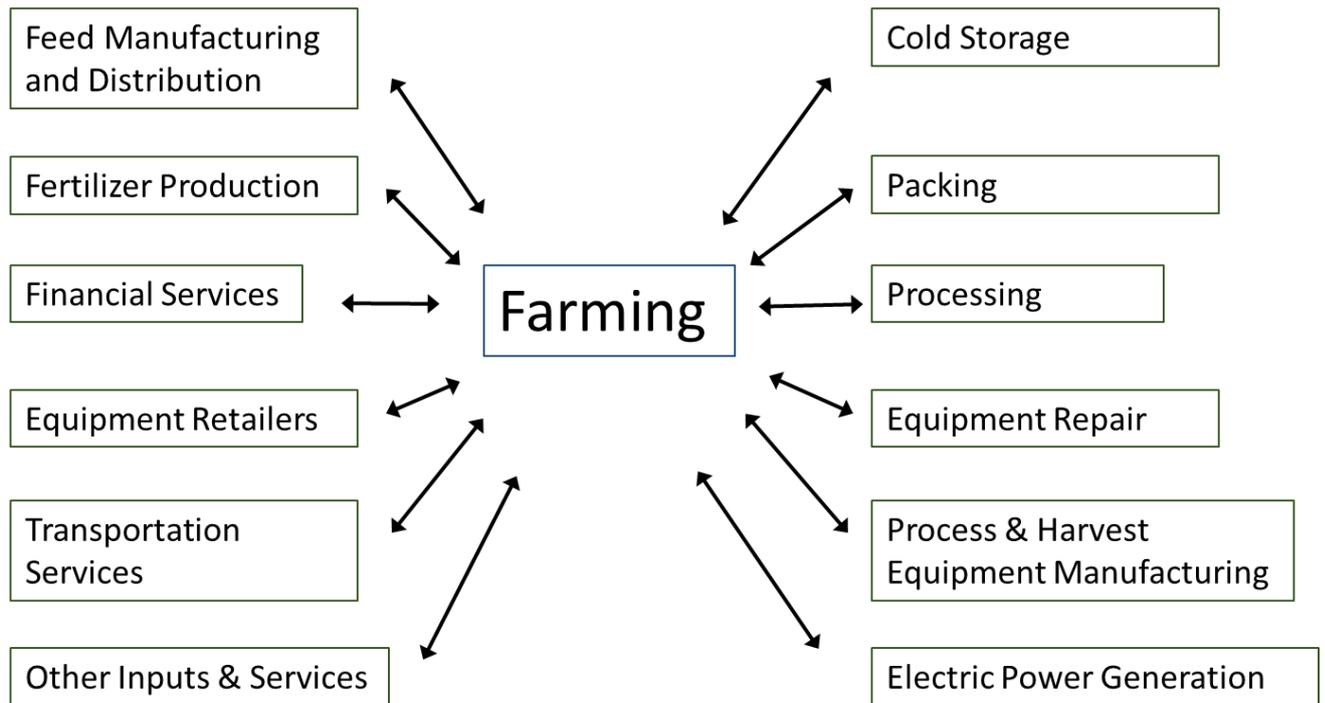
We do not show the linkages with different consumer groups. We focus instead on the activity supported or driven by farmers and agricultural activities. The value of what they sell obviously matters but falls under the heading of consumer impacts. And the jobs that are related to consumer or household spending are referred to as induced jobs. We are trying here to isolate the impacts of the farming jobs. Having said that, it is worth mentioning how farming brings income into the community. Farmers sell products to local consumers, but most of their products are sold to consumers outside the region, thereby adding income to the community.

We also do not show the variety that exists within the crop production sector itself. One obvious type of variation is farmers producing different types of fruits, including different types of berries, apples, etc. Another type of variation is farm size. As noted in Table 1, the average farm in Whatcom County is relatively small compared to the average farm in Washington State. Larger farms can be commercially viable on their own. Many smaller farms provide supplemental income (with farmers or family members earning income in other endeavors), and in many cases a particular lifestyle. One

¹⁴ <http://www.wcfarmfriends.com/farm-facts>

key point is the way the different size farms and different types of farms help each other by supporting the same suppliers. They also may support different customers, allowing the farm sector to contribute to the regional economy in different ways.

Diagram 1: Farming Supports Jobs in a Variety of Industry Sectors

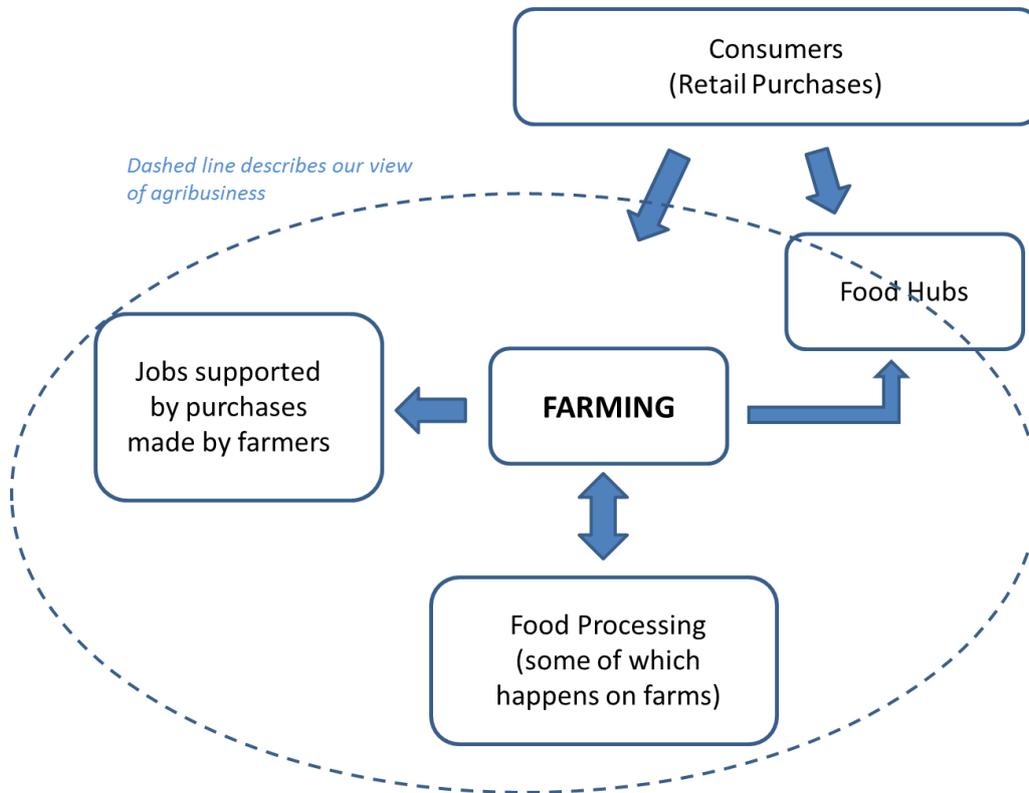


It is important to note that we are focusing on the jobs in agriculture/farming and the jobs farmers support – illustrated in Diagram 1 above. Farmers also support restaurants, provide food directly to households, and are engaged in other retail activities. However, those interactions are more forward looking linkages or consumer related linkages that would be considered separately. For example, farmers do not support restaurants in the same way they support feed manufacturers or equipment retailers. The direction of the purchase matters when thinking about what group supports what other group.

Again, farming – or agribusiness thinking more broadly – can be hard to define and describe. Farmers can find ways to do more than just produce a commodity and sell that commodity to someone else who adds value to that commodity and sells it to the consumer. Edaleen Dairy and Twin Brooks Creamery are convenient examples. They both process their milk into other products and sell to consumers. Farmers are also working together to form or to support food hubs, where they have more scale working together and can better defray the cost of food safety regulations and other costs. So there is no bright line, so to speak between farms and other activities. Our definitions here are somewhat arbitrary and could be modified. But we need to make them clear because we are not including the value of retail activities such as farmers markets, restaurant purchases, and other consumer related activities as part of agribusiness. (Grocery stores and restaurants would not

exist without food from farmers. Still, we consider those retail establishments as just that, retail, not farming or agriculture.)

Diagram 2 – One Definition of Agribusiness



While the categories in Diagram 1 are generic, the companies that exist in those categories are not. We have a number of smaller and mid-sized companies that depend critically on farming. Table 5 gives just a sample of those companies (and Diagram 2 helps explain why we do not include certain other jobs that someone else might want to include).

Table 5. Sample of Firms that Depend on Farming

Feed Manufacturing and Distribution Cargill / Ferndale Grain Elenbaas Feed	Cold Storage Bellingham Cold Storage Americold Preferred Freezer Rader & Enfield Farms
Fertilizer Production & Distribution CHS (Whatcom Farmers Co-op)	Packing Maberry Packing
Financial Services Regional Banks	Processing Curt Maberry Farms, Enfield Farms, Berry Acres, Townline Farms, Twin Brook Creamery, Edaleen Dairy, and more

Larson Gross Northwest Farm Credit Services	Northwest Berry Coop
Equipment Retailers	Equipment Repair
CHS	CHS
Scholten Equipment	Scholten Equipment
Farmers Equipment	Farmers Equipment
Meridian Equipment	Meridian Equipment
Transportation	Process & Harvest Equipment Manufacturing
Milky Way	Oxbo
Lynden Transport	Annotech
	Whatcom Manufacturing
	Power Generation
	Andgar
	Daritech

The Washington State Department of Employment Security provides estimates of wages in the farming and food manufacturing sector. If we assume workers in businesses related to farming earn the average wage in Whatcom County, we see \$276 million in wages in agribusiness.

The US Department of Agriculture’s Economic Research Service suggests that 40 percent of revenue goes to labor in the berry industry.¹⁵ The figure is a bit lower in other areas of farming. However, reports from the University of California at Berkeley show the amount is closer to 40-70 percent of sales.¹⁶ If we assume that labor accounts for 40-45 percent of sales or revenues, we get gross sales in agribusiness of \$613 million to \$690 million. However, we also know that Washington State Department of Agriculture estimates food processing has gross sales over \$900 million and the US Department of Agriculture reports \$357 million in farmgate value or gross sales for farmers. If we also assume reasonable sales for businesses related to farming, it seems the agribusiness “sector” in Whatcom County has sales in excess of \$1.4 billion.

As noted above, we do not try to show in detail the linkages between farming and the consumer. But linkages such as farmers markets, farm-to-table restaurants, community supported agriculture programs, food hubs, and programs such as the Northwest Agricultural Business Center deserve brief mention. They illustrate how farming is integrated into the community in so many ways.

See also “Small Farms: Diversify and Strengthen” – a Whatcom Watch article from February 2016 for more detail on farms and their various connections to each other and other businesses in Whatcom County.¹⁷

Economic Contribution

As mentioned above, CEBR used the IMPLAN software package to estimate the total employment contribution associated with ag. The related impacts that arise due to changes in business activities are known as indirect effects, and those that arise due to changes in household spending are known

¹⁵ <https://www.ers.usda.gov/topics/farm-economy/farm-labor/>

¹⁶ <https://nature.berkeley.edu/ucce50/ag-labor/>

¹⁷ Article by Jennifer Moon: <http://whatcomwatch.org/index.php/article/small-farms-diversify-and-strengthen/>

as induced effects. The relationship between the direct employment and total employment is often described in terms of ‘multiplier effects’. In particular, when analyzing the impact of a given policy change or event, the total change (direct, indirect and induced combined) is typically expressed as a multiple of the direct change.

In this case, we are not analyzing the impact of a policy change or event. Instead, we are using the estimates of the indirect and induced effects to illustrate the contribution of the ag sector.

In 2016, 2,778 workers were employed in crop production. We assume these workers were primarily in the ‘fruit farming’ subsector, which has an employment multiplier of 2.5. That is, each job in fruit farming supports another 1.5 jobs in the county, or another 4,160 jobs, for a total contribution of 6,945 jobs. The employment contribution of dairy farming and services are slightly smaller than in fruit farming. Each job in dairy farming supports an additional 0.5 jobs in the county, which gives a total employment contribution of 1,182 jobs due to dairy and other animal production. The 231 workers in ‘agriculture services’ also support other jobs in the county, ultimately supporting 346 total.

Table 6: Employment Impact, Whatcom County

	Employment	Employment multiplier	Total Employment Contribution
Fruit farming	2,778	2.5	6,945
Dairy and other animal production	775	1.5	1,163
Services	198	1.5	297
Total	3,749		8,405

Source: IMLAN and Employment Security Department, 2016

As noted above, the total employment contribution of ag or farming also includes perhaps another 2,000 jobs during the picking season in summer.

The total employment contribution shown in Table 6 is larger than the total job count for ag broadly defined, shown in Table 4, because the total contribution includes the influence of household spending. In particular, the smaller number includes the jobs found on farms plus the related, indirect jobs supported by farm business-to-business spending. The larger number includes those jobs, plus the ones supported by the related household spending.

The following sections cover topics that farmers and those working in businesses closely related to farming identified as being important and deserving attention in this report.

Critical size of farms

Another issue we should address is the critical size of farms and scale of production. Small, diversified farms offer a variety of benefits. But in some instances they are less efficient than large ones; growing food can be more expensive on small farms compared to larger farms. This statement relies on the concept of economies of scale, which suggests larger farms will enjoy a cost advantage due to lower per-unit fixed costs. Moreover, as farms get larger, it is easier to invest in labor-saving machinery, more advanced technology and specialized management, which further reduces the per-unit production cost.

Without suggesting there is an optimal farm size or that bigger is better (which we do not think is true), we do wonder if there may be a critical size for farming in general or a minimum amount of farming that needs to happen for farming to remain economically viable in the area. If farmers need a minimum amount of support services in order to survive, including equipment supply business,

fertilizer and feed providers, accountants, etc., there is an implied minimum amount of farming needed to pay for those goods and services.

- In general, most businesses are very small. Roughly 50% of the businesses in Whatcom County have fewer than 5 employees. Note – the same is true in almost every county, including King County and other large metro areas. However, most jobs are found in mid- and large-size companies. A small number of firms support a large share of the employment.
- The same is true in farming. Most farms are small. But most of the revenue is generated by a few larger players.
- The message here is that all farms are important, though they play different roles and add different types of value in the community, with larger farms playing a critical role in maintaining the agriculture support industry – which itself is required for farming to endure. (Some of the dairy and berry infrastructure is relevant for larger farms only, but small farms still benefit from different parts of the ag support industry.)

In 2007, there were 1,483 farms in Whatcom County, with 102,584 acres under production. By 2012, the number of farms increased by 15 percent to 1,702 farms, with over 13,000 more acres being farmed, about a 12 percent increase in acreage in only five years. Moreover, the number of farms under 10 acres grew by 47 percent in that period. It is important to note that more than three quarters of farms in Whatcom County are under 50 acres. However, the top 10 percent of Whatcom County's farms produce more than 90 percent of farm sales.¹⁸

We can conclude that without large farmers, there are not enough farm products to process or distribute. The large farmers support an infrastructure of processing and distribution companies that serve not only them, but also small farmers. In other words, the large farms provide the majority of the support to “indirect” jobs cited above. The smaller farmers may not depend as critically on the support businesses, but do benefit from their existence. Thus, we can argue that some smaller farmers are actually dependent on the large farms. Food hubs appear to be a way to leverage the growing number of small farms. We discuss briefly Food Hubs and related items in the section below. We leave more discussions about leveraging small farms and identifying opportunities for businesses to add value and/or create new products using what is grown in the region to groups like the Northwest Agriculture Business Center. We also leave for future study the way that farming in Whatcom County helps and may depend on farming in adjacent areas (including both Skagit County and Lower Mainland, BC).

Food Hubs and Local Purchases

A detailed review of the value of small farms that sell their produce and other items through farmers markets, “CSA” programs, and food hubs is beyond the scope of this report. However, we did want to mention these dimensions of farming because of their significance.

Smaller farms benefit or depend critically upon the infrastructure that exists because the large farms exist. So the small farms depend on the large farms. At the same time, the small farms provide a connection to the larger community and generate a support for farming that the large farms might

¹⁸ <http://whatcomwatch.org/index.php/article/why-larger-farms-in-whatcom-county-are-needed-for-small-farms-to-survive/>

not otherwise enjoy. So while the small farms do not add a significant amount to the employment figures or farmgate revenue numbers, they play critically important roles.

In addition to connecting consumers to the local farming community (e.g., through farmers markets and CSA programs), they also help provide healthy food options at restaurants and even larger institutions like WWU that buy local produce through food hubs (organizations that help a group of small farmers combine their output and cover the cost of shipping, certification, etc.). Moreover, they keep land in agricultural production; land that might otherwise be used for residential or other uses. Having a minimum amount of land in production can be critical to have enough demand for various services and products and to preserve options to grow different crops in the future.

We note in particular how the food hub model has the potential to help small farmers in Whatcom County, particularly those growing vegetable crops, to achieve the economies of scale necessary to supply a larger market of consumers. Since 2009, the thrust of Northwest Agriculture Business Center's (NABC) food hub development efforts is to leverage market trends and create a more equitable and efficient agricultural infrastructure for the marketing, aggregation, distribution, and value-added processing of northwest Washington farm products. The Puget Sound Food Hub was initiated in late 2010 in Mount Vernon and now operates a five-county region of Island, Skagit, Snohomish, San Juan, and Whatcom counties. It has expanded to 40 farms that supply 60 businesses.¹⁹ (We note a curious debate. On the one hand we hear from advocates of small farms and direct to consumer activities about the importance of this segment of the farming industry or agribusiness. Some people believe micro-farms offer healthier options and a form of economic development. Others see a type of community development with the smaller farms, but not as large of an economic impact or path to success for commercially viable farming. For example, "A Method for Evaluating the Economic Contribution of a Local Food System"²⁰ suggests that export based farms have a much larger economic impact than locally oriented farms, which tend to be oriented towards import substitution. We note that both can be important and will try to have students add to this literature in the future.)

The way that Food Hubs and other activities connect farmers in Whatcom and Skagit County could be important. With over \$600 million in farmgate sales in the two counties, it seems that farmers may find it easier to work together as they try to capture more of the ultimate value in what they produce.

Regulations

As we talked to farmers and to businesses that depend on farmers to prepare this report, we frequently heard concerns about the burden of increasing regulations.

Every farmer who expressed concern explicitly acknowledged that regulations exist for a reason and gave their support for the underlying motives for the regulations. As such, the concern was not so much with the idea of regulation, but rather how regulations were designed or imposed/implemented. Farmers want the chance to work with regulatory agencies such as the Dept. of Ecology to ensure regulations are implemented in the best way possible. Farmers also want the opportunity to educate environmental and other advocacy groups – to work with those groups – rather than have to deal with complaints or calls for additional regulations that may be based on misinformation or incomplete information.

¹⁹ <http://www.pugetsoundfoodhub.com/about-us/>

²⁰ Watson, Phillip et. al (2017) "A Method for Evaluating the Economic Contribution of a Local Food System", *Journal of Agricultural and Resource Economics*, 42(2): 180-194.

It struck us that it was not just farmers expressing concerns about the regulations. We heard owners of cold storage businesses, accountants, and others highlight the potential problems of increased regulation on farmers. One concern was that regulators may not understand how the added uncertainty of changing regulations or cost of new regulations can have a profound impact on the financing of existing farming operations. Another concern was that regulators may not understand how what might be perceived as a small regulation on farmers can have ripple effects through so many different businesses.

We see a need for much more dialogue between farmers and regulators about how regulations are designed, what regulations or changes to regulations are under consideration, and what flexibility farmers might have in meeting different regulations. We also see a need for such conversations at a time when farmers can truly participate (thinking, for example, about the seasonal demands on farmers).

Digesters – A Quick Note

Companies like Andgar and Daritech build methane digesters on dairy farms to help farmers convert the methane in manure to electricity and to create bedding or compost. While the digesters are not economically viable without subsidies at present, the economics of the digesters are improving constantly. In addition, there may be opportunities in the future to use the nutrients from dairy farms on nearby berry farms. (While it is easy to say that local berry farms could use the excess nutrients from nearby dairy farms, food safety concerns, transportation costs, and other factors make this idea harder to implement than one might think.)

The study of digesters overlaps with nutrient management strategies in a variety of ways. We are watching these areas with interest as they could generate additional income stream for farmers, help with environmental management, and offer other benefits.

Ongoing Work

We are still collecting data to see how trends in farming in Whatcom County compare to trends in other areas. For example, we're trying to understand how dairy farms and berry farms are changing (in size, in the products they produce, etc.) in other states, and why. We are also still studying price trends and other variables to see if there are particular signs of strength or areas of concern we might highlight. Of course, it is much easier to ask questions like "how much land do we need in farming in Whatcom County to maintain a viable farming community?" than it is to answer such a question. Similarly, it is easy to ask whether we might expect increased consolidation in farms or see more and more small farms. It is difficult to answer those questions. Land use pressures differ by region, water resources and water rights differ by region, etc. But the questions are relevant and the work is very interesting.

Comments on early drafts of this report also note opportunities like the following:

- The U.S (including the Pacific Northwest) imports more than 80% of its cut flowers. BC Hothouse has been a player in vegetables for nearly two decades. Nursery is a large category in Whatcom County. There are some potential opportunities here.
- The pricing trend for fresh berries is going up while prices decline for frozen berries. While the quality of berries grown in Whatcom County helps offset some of the pressure from price declines, the better opportunities may lie with new products with fresh berries.

We hope this report improves the overall understanding of agriculture in the area and helps farmers find new product opportunities and ways to continue to thrive. We also welcome thoughtful feedback to help us improve future updates and revised versions.